CITY OF NEWTON
PURCHASING DEPARTMENT

CONTRACT FOR PUBLIC WORKS

INVITATION FOR BID #21-09

Waban Hill Reservoir Improvements

Bid Opening Date: October 8, 2020 at 10:00 a.m.

Pre-Bid Meeting: September 24, 2020 at 10:00a.m.

September 2020

Ruthanne Fuller, Mayor

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CITY OF NEWTON

PURCHASING DEPARTMENT

INVITATION FOR BID #21-09

The City of Newton invites sealed bids in accordance with M.G.L. c.30, §39M from Contractors for:

WABAN HILL RESERVOIR IMPROVEMENTS

Pre-Bid Meeting: September 24, 2020 at 10:00a.m. at Opposite of 155 Waban Hill Road North

Bids will be received until: **10:00 a.m., Thursday October 8, 2020***
at the Purchasing Department, Room 108, Newton City Hall, 1000 Commonwealth Avenue, Newton, MA 02459. Bids will not be accepted nor may submitted bids be corrected, modified, or withdrawn after the deadline for bids. Immediately following the deadline for bids, all bids received within the time specified will be publicly opened and read aloud.

*** To promote the health and safety of City workers and the public, Newton City Hall is still observing COVID restrictions. The City has adopted the following procedures that may affect your participation in this bid:**

1. **Bidders who wish to attend the Bid Opening can do so by telephone conference call. To attend, call 617.454.5555. When prompted, enter Participant Passcode 1220#. There will be no in person meetings.**

2. **Bids not sent by mail or courier can be dropped off at Room 108 or in a locked drop box at the top of the stairs to left of the main door to City Hall. The drop box will be checked at the scheduled submission deadline.**

3. **Bids results will be scanned and posted as soon as practicable after the opening. Copies of bids will be available on written request.**

The work under this contract generally consists of the rehabilitation of the Waban Hill Reservoir's central core standpipe, replacement and rehabilitation of associated valves and piping, and removal and replacement of the asphalt shingle roofing system. Roofing improvements include removal of the existing roofing system and installation of new ice & water shield, flashing, trim boards, vents, skylights, cupola, and asphalt shingles. Piping improvements include removal of the existing 24" gate valves and cast iron piping and installation of new 20" butterfly valves and stainless steel piping. Existing piping shall be blasted and painted. The work also includes various miscellaneous improvements including inspection and cleaning of the four (4) 2.5 million-gallon chambers of the Waban Hill Reservoir. Reference specification section 01010 for complete summary of work.

Contract Documents will be available online at **www.newtonma.gov/bids** or for pickup in the Purchasing Department after **10:00 a.m., September 17, 2020.**

Time for completion of this project is on or before May 15, 2021. Time is of the essence in the performance of the work of this contract. Bidder's attention is directed to the time for completion stated in the Project Manual and the provisions regarding the assessment of liquidated damages for failure to complete the work within the time specified.

Bids must be submitted with one Original and two Copies.

Award will be made to the bidder with the lowest total cost for the base bid deemed responsible and eligible.

Work shall start upon execution of the contract. Time for completion is on or before May 15, 2021.

A bid deposit in an amount that is not less than five percent (5%) of the value of the bid, including all add alternates, is required. Bid deposits, payable to the City of Newton, shall be either in the form of a bid bond, or cash, or a certified check on, or a treasurer's or cashier's check issued by a responsible bank or trust company. The City of Newton will award the contract to the lowest eligible and responsible bidder. Please Note: this bid, in accordance with the Chapter 303 Acts of 2008, contains Price Adjustments and new Prevailing Wage requirements. All bidders are required to familiarize themselves with these terms and conditions before submitting a bid. Bidders are reminded that the bid deposit covers the City for damages when a bidder withdraws its bid after the bid submisssion date. **Be advised that to the extent permitted by the law the City will retain all bid deposits for withdrawn bids.**

All bids are subject to the provisions of M.G.L. c. 30, § 39M. **Wages are subject** to minimum wage rates determined by the Massachusetts Department of Labor and Industries pursuant to M.G.L. c. 149, § 26 to 27H. The schedule of wage rates applicable to this contract is included in the bidding documents. In addition, the prevailing wage schedule will be updated annually for all public construction projects lasting longer than one (1) year. You will be required to pay the rates set out in any updated prevailing wage schedule. Increases in prevailing wage schedules will not be the basis for change order requests. The successful bidder will be required to provide a Certificate of Insurance demonstrating current coverage of the type and amounts set forth in the Project Manual**.** The successful bidder will be required to furnish a **Labor and Materials Payment Bond** in the amount of **50%** of the contract total. Wages are paid to drivers for all "**on-site"** work.

The costs of any bond and any insurance required in this Invitation For Bid are the responsibility of the bidder; such costs will not be reimbursed by City and should be included in your bid.

Once you've downloaded this bid from the internet website (**www.newtonma.gov/bids**), I strongly suggest you email (purchasing@newtonma.gov) your company's name, address, EMAIL, phone, fax AND the INVITATION FOR BID NUMBER and Project Title, so that we may add you to the Bidders List and you will be notified of any/all addenda.

The City will reject any and all bids in accordance with the above referenced General Laws. In addition, the City reserves the right to waive minor informalities in any or all bids, or to reject any or all bids (in whole or in part) if it be in the public interest to do so.

In the event that any person wishes to attend a bid opening or pre-bid meeting, accessible and reasonable accommodations will be provided to persons requiring assistance. If you need a reasonable accommodation, please contact the city of Newton's ADA Coordinator, Jini Fairley, at least two business days in advance of the meeting: jfairley@newtonma.gov or (617) 796-1253. For Telecommunications Relay Service, please dial 711.

CITY OF NEWTON

Nicholas Read
Chief Procurement Officer
September 17, 2020

CITY OF NEWTON

DEPARTMENT OF PURCHASING

INSTRUCTIONS TO BIDDERS

ARTICLE 1 - BIDDER'S REPRESENTATION

1.1 Each General Bidder (hereinafter called the "Bidder") by making a bid (hereinafter called "bid") represents that:

1. The Bidder has read and understands the Bidding Documents, Contract Forms, General Conditions, Conditions of the Contract, General Requirements and Project Specifications (collectively, referred to as the "Contract Documents") and the bid is made in accordance therewith.

2. The Bidder is familiar with the work site and local conditions under which the work has to be performed.

1.2 Failure to so examine the Contract Documents and and become familiar with the work site and local conditions will not relieve any Bidder from any obligation under the bid as submitted.

ARTICLE 2 - REQUEST FOR INTERPRETATION

2.1 Bidders shall promptly notify the City of any ambiguity, inconsistency, or error which they may discover upon examination of the Contract Documents, the site, and local conditions.

2.2 Bidders requiring clarification or interpretation of the Contract Documents shall make a written request to the *Chief Procurement Officer*, at purchasing@newtonma.gov or via facsimile (617) 796-1227. The City will only answer such requests if received by **Friday, October 2, 2020 at 12:00 noon**. In the event that the bid opening date is changed, the deadline for informational requests may also change as provided in an addendum issued by the City.

2.3 Interpretation, correction, or change in the Contract Documents will be made by addendum which will become part of the Contract Documents. The City will not be held accountable for any oral communication.

2.4 Addenda will be emailed to every individual or firm on record as having taken a set of Contract Documents. Addenda will be emailed to every individual or firm on record as having taken a set of Contract Documents. Receipt of all addenda issued must be acknowledged in the Bid Form. YOUR FAILURE TO ACKNOWLEDGE ALL ADDENDA MAY RESULT IN YOUR BID BEING REJECTED AS NON-RESPONSIVE.

2.5 Copies of addenda will be made available for inspection at the location listed in the Invitation for Bids where Contract Documents are on file, in addition to being available online at **www.newtonma.gov/bids**.

2.6 Bidders or proposers contacting ANY CITY EMPLOYEE regarding an Invitation for Bid (IFB) or a Request for Proposal (RFP), outside of the Purchasing Department, once an IFB or RFP has been released, may be disqualified from the procurement process.

2.7 Bidders downloading information off the internet web site are solely responsible for obtaining any addenda prior to the bid opening. If the bidder makes itself known to the Purchasing Department, at purchasing@newtonma.gov or via facsimile (617) 796-1227, it shall be placed on the bidder's list. Bidders must provide the Purchasing Department with their company's name, street address, city, state, zip, phone, fax, email address and **INVITATION FOR BID #21-09**.

ARTICLE 3 - MBE PARTICIPATION

3.1 Notice is hereby given that the Mayor's Affirmative Action Plan for the City of Newton in effect at the time of this solicitation is applicable to all construction contracts in excess of $10,000.00.

3.2 Notice is hereby given that the City of Newton Minority/Women Business Enterprise Plan and the Supplemental Equal Employment Opportunity Anti-Discrimination and Affirmative Action Program in effect at the time of this solicitation are applicable to all City contracts for goods and services in excess of $50,000.00.

3.3 Copies of the Plans and Program referred to in Sections 3.1 and 3.2 are available at: **www.newtonma.gov/purchasing**.

ARTICLE 4 - PREPARATION AND SUBMISSION OF BIDS

4.1 Bids shall be submitted on the "Bid Form #21-09," attached.

4.2 All entries on the Bid Form shall be made by typewriter or in ink.

4.3 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.

4.4 Bid Deposits shall be submitted in the amount specified in the Invitation for Bids. They shall be made payable to the City 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. Bidders are reminded that the bid deposit covers the City for damages when a bidder withdraws its bid after the bid submisssion date. **Be advised that to the extent permitted by the law the City will retain all bid deposits as permitted by law.**

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

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

* GENERAL BID FOR: **#21-09**

* NAME OF PROJECT: **Waban Hill Reservoir Improvements**

* BIDDER'S NAME, BUSINESS ADDRESS, AND PHONE NUMBER

4.6 Date and time for receipt of bids is set forth in the IFB.

4.7 Timely delivery of a bid at the location designated shall be the full responsibility of the Bidder. In the event that Newton City Hall is closed on the date or at the time that bids are due, the date and time for receipt of bids shall be on the next business day following that the Newton City Hall and the Purchasing Department are open.

4.8 Bids shall be submitted with **one original** and two **copies.**

4.9 Massachusetts law requires all employees who work on Massachusetts public works construction sites must have no Less than 10 hours of OSHA-approved safety and health training. See M.G.L. c.30, §39M(c), M.G.L. c.30, §39S(a)(1), M.G.L. c.149, §44E(2) & M.G.L. c.149, §44F(2).

1. This requirement will apply to any general bid or sub bid submitted.
2. This law directs the Massachusetts Attorney General to restrain the award of construction contracts to any contractor who is in violation to this requirement and to restrain the performance of these contracts by non-complying contractors.
3. The contractor and all subcontractors on this project must certify on the Bid Form compliance with the applicable requirement. Non-compliance with this law will disqualify the bidder.

ARTICLE 5 - ALTERNATES

5.1 Each Bidder shall acknowledge alternates (if any) in Section C on the Bid Form.

5.2 In the event an alternate does not involve a change in the amount of the base bid, the Bidder shall so indicated by writing "No Change", or "N/C" or "0" in the space provided for that alternate.

5.3 Bidders shall enter on the Bid Form a single amount for each alternate which shall consist of the amount for work performed by the Contractor.

5.4 The low Bidder will be determined on the basis of the sum of the base bid and the accepted alternates.

ARTICLE 6 - WITHDRAWAL OF BIDS

6.1 Any bid may be withdrawn prior to the time designated for receipt of bids on written or electronic request. Electronic withdrawal of bids must be confirmed over the Bidder's signature by written notice postmarked on or before the date and time set for receipt of bids.

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

6.3 No bids may be withdrawn within sixty (60) days, Saturdays, Sundays and legal holidays excluded, after the opening of the bids.

ARTICLE 7 - CONTRACT AWARD

7.1 The City is soliciting a total price for all labor and materials described in the General Requirements and Project Specifications set forth at pp. 75-210 below. It is the City's intent to award one (1) contract to the responsive and eligible bidder offering the lowest Proposed Contract Price. A contract will be awarded within sixty (60) days, Saturdays, Sundays, and legal holidays excluded, after the opening of bids.

7.2 The City reserves the right to waive minor informalities in or to reject any or all Bids if it be in the public interest to do so.

7.3 The City reserves the right to reject any bidder who has failed to pay any local taxes, fees, assessments, betterments, or any other municipal charge, unless the bidder has a pending abatement application or has entered into a payment agreement with the collector-treasurer.

7.4 As used herein, 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 has met all the requirements of the invitation for bids; (3) 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; (4) who, where the provisions of section eight B of chapter twenty-nine apply, shall have been determined to be qualified thereunder.

7.5 Subsequent to the award and within five (5) days, Saturday, Sundays and legal holidays excluded, after the prescribed forms are presented for signature, the successful Bidder shall execute and deliver to the City a contract in the form included in the Contract Documents in such number of counterparts as the City may require.

7.6 In the event that the City receives low bids in identical amount from two or more responsive and responsible Bidders, the City shall select the successful Bidder by a blind selection process chosen by the City such as flipping a coin or drawing names from a hat. The low Bidders who are under consideration will be invited to attend and observe the selection process.

ARTICLE 8 - TAXES

8.1 The Bidder shall not include in this bid any tax imposed upon the sale or rental of tangible personal property in this Commonwealth, such as any and all building materials, supplies, services and equipment required to complete the work.

8.2 The City is exempt from payment of the Massachusetts Sales Tax, and the Bidder shall not include any sales tax on its bid. The City's exemption Number is E-046-001-404.

ARTICLE 9 – PROPRIETARY SPECIFICATIONS

9.1 The City has used a proprietary specification to describe the supply listed in the specifications. Such specifications are permitted under M.G.L. c. 30, §39M(b), provided that the City state in writing that use of the proprietary specification is in its best interest and that it will accept an "equal" of the item specified. An item is considered equal if (i) it is at least equal in quality, durability, appearance, strength, and design; (ii) will perform the intended function at least equally; and (iii) conforms substantially, even with deviations, to the detailed requirements contained in the specifications. Bidders wishing to provide an equal item should do so with their bids. The City shall have the sole right to determine whether or not said item is equal.

9.2 The required determination and justification have been duly prepared, and a copy may be requested in accordance with the Massachusetts Public Records Law, M.G.L. c. 66, §10.

ARTICLE 10 – ENVIRONMENTALLY PREFERABLE PRODUCTS

10.1 The City encourages environmentally preferable products, i.e., products or services that have less negative or more positive effects on human health and the environment when compared with competing products or services that serve the same purpose. The city encourages bidders to describe, in the space provided on the Bid Form, the environmental attributes of its goods or services throughout the entire life-cycle, including manufacture, use and disposition. This information may include multiple environmental considerations such as natural resource use, recycled content, energy and water efficiency, greenhouse gas emissions, impact on climate change, packaging, hazardous material use, and health and safety impacts on workers, consumers and the community. If you do not currently assess such attributes, please indicate that. However you respond, the City will not take your information into account in evaluating bid proposals.

10.2 Bidders are encouraged also to provide information related to steps they take internally to (a) identify any positive or negative environmental attributes of products or services they offer, as specified above, and (b) ensure that those attributes are being addressed as part of operations.

END OF SECTION

CITY OF NEWTON

DEPARTMENT OF PURCHASING

BID FORM #21-09

A. The undersigned proposes to supply and deliver the materials specified below in full accordance with the Contract Documents and Project Manual supplied by the City of Newton entitled:

WABAN HILL RESERVOIR IMPROVEMENTS

for the contract price specified below, subject to additions and deduction according to the terms of the specifications.

B. This bid includes addenda number(s) _____, _____, _____, _____,

C. The Proposed Contract Price is:

_____DOLLARS ($ _____).

(The figure inserted above shall be for all labor and materials described in the General Requirements and Project Specifications set forth at pp. 75-210 below.)

COMPANY:_____

D. The undersigned has completed and submits herewith the following documents:

- Bidder's Qualification and Reference Form, 2 pages
- Signed Bid Form, 2 pages
- Debarment Letter, 1 page
- IRS Form W-9, 1 page

- Certificate of Non-Collusion, 1 page
- Certificate of Foreign Corporation, 1 page
- Certificate of Tax Compliance, 1 page
- A five percent (5%) bid deposit/bid guarantee.

E. Prompt Payment Discounts. Bidders are encouraged to offer discounts in exchange for an expedited payment. Payments may be issued earlier than the general goal of within 30 days of receipt of the invoice only when in exchange for discounted prices. Discounts will not be considered in determining the lowest responsible bidder.

Prompt Payment Discount _____%_____Days
Prompt Payment Discount_____%_____ Days
Prompt Payment Discount _____%_____Days

F. The undersigned agrees that, if selected as general contractor, s/he will within five days, Saturdays, Sundays and legal holidays excluded, after presentation thereof by the City of Newton, execute a contract in accordance with the terms of this bid **and furnish a labor and materials payment bond** of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the City of Newton in the **sum not less than 50% of the contract price**, the premiums for which are to be paid by the contractor and are included in the contract price.

The undersigned hereby certifies that s/he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that s/he will comply fully with all laws and regulations applicable to awards made subject to section forty-four A of M.G.L. Chapter 30, s 39M.

The undersigned certifies 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; (2) 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 ("OSHA") 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 (3) 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 OSHA that is at least 10 hours in duration. The undersigned understands that 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.

The undersigned further certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of 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.

The undersigned further certifies under the penalties of perjury that they have familiarized themselves with the changes to the Prevailing Wage Rates, Price Adjustment Clauses, in accordance to Chapter 303 Acts of 2008.

G. Environmentally preferable products information (which is requested but which will not be considered in awarding a contract):

Description of environmental attributes of Bidder's goods or services:

Steps taken to (a) identify any positive or negative environmental attributes of products or services and (b) insure that those attributes are being addressed as part of operations:

Date _____

_____
(Name of General Bidder)

BY: _____

_____
(Printed Name and Title of Signatory)

_____
(Business Address)

_____
(City, State Zip)

_____/_____
(Telephone) (FAX)

_____
(E-mail Address)

NOTE: If the bidder is a corporation, indicate state of incorporation under signature, and affix corporate seal; if a partnership, give full names and residential addresses of all partners; if an individual, give residential address if different from business address; and, if operating as a d/b/a give full legal identity. Attach additional pages as necessary.

END OF SECTION

CITY OF NEWTON

BIDDER'S QUALIFICATIONS AND REFERENCES FORM

All questions must be answered, and the data given must be clear and comprehensive. Please type or print legibly. If necessary, add additional sheet for starred items. This information will be utilized by the City for purposes of determining bidder responsiveness and responsibility with regard to the requirements and specifications of the Contract.

1. FIRM NAME: _____

2. WHEN ORGANIZED: _____

3 INCORPORATED? _____ YES _____ NO DATE AND STATE OF INCORPORATION: _____

4. IS YOUR BUSINESS A **MBE**? _____YES _____NO **WBE**? _____YES _____NO or **MWBE**? _____YES _____NO

* 5. LIST ALL CONTRACTS CURRENTLY ON HAND, SHOWING CONTRACT AMOUNT AND ANTICIPATED DATE OF COMPLETION:

_____

_____

_____

_____

_____

* 6. HAVE YOU EVER FAILED TO COMPLETE A CONTRACT AWARDED TO YOU?
_____ YES _____ NO
IF YES, WHERE AND WHY?

_____

_____

* 7. HAVE YOU EVER DEFAULTED ON A CONTRACT? _____ YES _____ NO
IF YES, PROVIDE DETAILS.

_____

_____

* 8. LIST YOUR VEHICLES/EQUIPMENT AVAILABLE FOR THIS CONTRACT:

_____

_____

_____

_____

_____

_____

_____

* 9. IN THE SPACES FOLLOWING, PROVIDE INFORMATION REGARDING CONTRACTS COMPLETED BY YOUR FIRM SIMILAR IN NATURE TO THE PROJECT BEING BID. A MINIMUM OF FOUR (4) CONTRACTS SHALL BE LISTED. PUBLICLY BID CONTRACTS ARE PREFERRED, BUT NOT MANDATORY.

PROJECT NAME: _____
OWNER: _____
CITY/STATE: _____
DOLLAR AMOUNT: $ _____ DATE COMPLETED: _____
PUBLICLY BID? _____YES _____ NO
TYPE OF WORK?: _____
CONTACT PERSON: _____ TELEPHONE #: ____)_____

CONTACT PERSON'S RELATION TO PROJECT?: _____
(i.e., contract manager, purchasing agent, etc.)

_____

PROJECT NAME: _____
OWNER: _____
CITY/STATE: _____
DOLLAR AMOUNT: $ _____ DATE COMPLETED: _____
PUBLICLY BID? _____YES _____ NO
TYPE OF WORK?: _____
CONTACT PERSON: _____ TELEPHONE #: (____)_____
CONTACT PERSON'S RELATION TO PROJECT?: _____
(i.e., contract manager, purchasing agent, etc.)

_____

PROJECT NAME: _____
OWNER: _____
CITY/STATE: _____
DOLLAR AMOUNT: $ _____ DATE COMPLETED: _____
PUBLICLY BID? _____YES _____ NO
TYPE OF WORK?: _____
CONTACT PERSON:_____ TELEPHONE #: (____)_____
CONTACT PERSON'S RELATION TO PROJECT?:_____
(i.e., contract manager, purchasing agent, etc.)

_____

PROJECT NAME: _____
OWNER: _____
CITY/STATE: _____
DOLLAR AMOUNT: $ _____ DATE COMPLETED: _____
PUBLICLY BID? _____YES _____ NO
TYPE OF WORK?: _____
CONTACT PERSON: _____ TELEPHONE #:(____)_____
CONTACT PERSON'S RELATION TO PROJECT?: _____
(i.e., contract manager, purchasing agent, etc.)

10. The undersigned certifies that the information contained herein is complete and accurate and hereby authorizes and requests any person, firm, or corporation to furnish any information requested by the City in verification of the recitals comprising this statement of Bidder's qualifications and experience.

DATE: _____ BIDDER: _____

SIGNATURE: _____

PRINTED NAME: _____ TITLE: _____

END OF SECTION

CERTIFICATE OF NON-COLLUSION

The undersigned certifies under penalties of perjury that this bid or proposal has been made and submitted in good faith 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 or individuals.

_____
(Signature of individual)

_____
Name of Business

CERTIFICATE OF FOREIGN CORPORATION

The undersigned hereby certifies that it has been duly established, organized, or chartered as a corporation under the laws of:

(Jurisdiction)

The undersigned further certifies that it has complied with the requirements of M.G.L. c. 30, §39L (if applicable) and with the requirements of M.G.L. c. 156D, §15.03 relative to the registration and operation of foreign corporations within the Commonwealth of Massachusetts.

Name of person signing proposal

Signature of person signing proposal

Name of Business (Please Print or Type)

Affix Corporate Seal here

CERTIFICATION OF TAX COMPLIANCE

Pursuant to M.G.L. c.62C, §49A and requirements of the City, the undersigned acting on behalf of the Contractor certifies under the penalties of perjury that the Contractor is in compliance with all laws of the Commonwealth relating to taxes including payment of all local taxes, fees, assessments, betterments and any other local or municipal charges (unless the Contractor has a pending abatement application or has entered into a payment agreement with the entity to which such charges were owed), reporting of employees and contractors, and withholding and remitting child support.*

_____ _____

**Signature of Individual (Mandatory)

*** Contractor's Social Security Number (Voluntary) or Federal Identification Number

Print Name: _____

Date: _____

OR

_____

Company Name
(Corporation, Partnership, LLC, etc.)

By: _____
**Corporate Officer (Mandatory)

Print Name: _____

Date: _____

* The provision in this Certification relating to child support applies only when the Contractor is an individual.

** Approval of a contract or other agreement will not be granted until the City receives a signed copy of this Certification.

*** Your social security number may be furnished to the Massachusetts Department of Revenue to determine whether you have met tax filing or tax payment obligations. Providers who fail to correct their non-filing or delinquency will not have a contract or other agreement issued, renewed, or extended.

City of Newton

Purchasing Department
Nicholas Read *Chief Procurement Officer*
1000 Commonwealth Avenue
Newton Centre, MA 02459-1449
purchasing@newtonma.gov

Telephone
(617) 796-1220
Fax:
(617) 796-1227
TDD/TTY
(617) 796-1089

Mayor
Ruthanne Fuller

Date

Vendor

Re: Debarment Letter for Invitation For Bid #21-09

As a potential vendor on the above contract, the City requires that you provide a debarment/suspension certification indicating that you are in compliance with the below Federal Executive Order. Certification can be done by completing and signing this form.

Debarment:

Federal Executive Order (E.O.) 12549 "Debarment and Suspension" requires that all contractors receiving individual awards, using federal funds, and all sub-recipients certify that the organization and its principals are not debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal department or agency from doing business with the Federal Government.

I hereby certify under pains and penalties of perjury that neither I nor any principal(s) of the Company identified below is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any federal department or agency.

_____ (Name)
_____ (Company)
_____ (Address)
_____ (Address)
PHONE _____ FAX _____
EMAIL _____

_____Signature

_____Date

.

If you have questions, please contact Nicholas Read, Chief Procurement Officer at (617) 796-1220.

Form **W-9**
(Rev. October 2007)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

Give form to the requester. Do not send to the IRS.

Print or type See Specific Instructions on page 2.

Name (as shown on your income tax return)

Business name, if different from above

Check appropriate box: ☐ Individual/Sole proprietor ☐ Corporation ☐ Partnership
☐ Limited liability company. Enter the tax classification (D=disregarded entity, C=corporation, P=partnership) ▶ _____
☐ Other (see instructions) ▶

☐ Exempt payee

Address (number, street, and apt. or suite no.)

Requester's name and address (optional)

City, state, and ZIP code

List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on Line 1 to avoid backup withholding. For individuals, this is your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the chart on page 4 for guidelines on whose number to enter.

Social security number

or

Employer identification number

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, and
3. I am a U.S. citizen or other U.S. person (defined below).

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the Certification, but you must provide your correct TIN. See the instructions on page 4.

Sign Here Signature of U.S. person ▶ Date ▶

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Purpose of Form

A person who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) to report, for example, income paid to you, real estate transactions, mortgage interest you paid, acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA.

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN to the person requesting it (the requester) and, when applicable, to:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income.

Note. If a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien,
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States,
- An estate (other than a foreign estate), or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax on any foreign partners' share of income from such business. Further, in certain cases where a Form W-9 has not been received, a partnership is required to presume that a partner is a foreign person, and pay the withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid withholding on your share of partnership income.

The person who gives Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States is in the following cases:

- The U.S. owner of a disregarded entity and not the entity,

Cat. No. 10231X Form **W-9** (Rev. 10-2007)

CONTRACT FORMS

The awarded bidder will be required to complete and submit documents substantially similar in form to the following.

These forms may need to be modified on account of changed circumstances and are provided for informational purposes only.

CITY - CONTRACTOR AGREEMENT

CONTRACT NO. C -

AGREEMENT made this ____day of _____ in the year Two Thousand and Twenty by and between the CITY OF NEWTON, a municipal corporation organized and existing under the laws of the Commonwealth of Massachusetts, hereinafter referred to as the CITY, acting through its Chief Procurement Officer, but without personal liability to him, and hereinafter referred to as the CONTRACTOR.

The parties hereto for the considerations hereinafter set forth agree as follows:

I. **SCOPE OF WORK.** The Contractor agrees to furnish and to deliver to the City at such times, at such place or places, in such manner, and in such quantities as the City may direct, and at the unit prices quoted in the Contractor's bid the following item or items:

WABAN HILL RESERVOIR IMPROVEMENTS

II. **CONTRACT DOCUMENTS.** The Contract Documents consist of the following documents, which are either attached to this Agreement or are incorporated herein by reference:

a. This CITY-CONTRACTOR Agreement;

b. The City's Invitation For Bid #21-09 issued by the Purchasing Department;

c. The Project Manual for **Waban Hill Reservoir Improvements** including the Instructions to Bidders; General Conditions; Special Conditions; MWBE/AA Requirements, Wage Rate Requirements and Wage Rate Schedule(s) including any updated prevailing wage rate schedules if applicable; The Supplementary Special Conditions; General Requirements and Project Specifications; and Drawings, if included or referenced therein;

d. Addenda Number(s)_____;

e. The Bid Response of the CONTRACTOR submitted for this Project and accompanying documents and certifications;

f. Certificate(s) of Insurance and surety bond(s), if any, submitted by the CONTRACTOR in connection with this Project;

g. Duly authorized and executed Amendments, Change Orders or Work Orders issued by the CITY after execution of this CITY-CONTRACTOR Agreement.

This CITY-CONTRACTOR Agreement, together with the other documents enumerated in this Article, constitute the entire Agreement between the CITY and the CONTRACTOR. The CONTRACTOR represents that is bid was made without condition, qualification or reservation of any kind, except upon the written acknowledgement and consent of the CITY.

III. **PRIORITY OF DOCUMENTS.** In the event of inconsistency between the terms of this CITY -CONTRACTOR Agreement and the Project Manual, the terms of this Agreement shall prevail.

IV. **APPLICABLE STATUTES.** All applicable federal, state and local laws and regulations are incorporated herein by reference and the Contractor agrees to comply with same.

V. **CONTRACT TERM.** The term of this contract shall **extend from day of contract execution through May 15, 2021**.

VI. **QUANTITIES.** The quantities specified in the Project Manual are approximate and are based on previous consumption. It is specifically understood the City does not agree to purchase any specific quantity, and purchases will be made to cover actual requirements only. The City may increase or decrease the quantity of any item specified without change in price per unit of quantity as stated in the Contractor's Bid Response.

VII. MATERIALS. The Contractor agrees, unless otherwise specified, that all equipment, materials and supplies furnished under this contract are to be first quality, new and unused.

VIII. AUTHORIZATION OF AND PAYMENT FOR WORK PERFORMED. The execution of this contract does not constitute a notice to proceed or authorization to perform work or make deliveries. No work shall be commenced or deliveries made unless authorized by a written Work Order issued by the City specifying the equipment, materials, or supplies to be delivered. The Contractor will be paid following completed delivery and acceptance of the equipment, materials, or supplies ordered in accordance with the Contract. The City will use best efforts to pay within thirty (30) days of receipt of an invoice for the delivered equipment, materials, or supplies or acceptance of same whichever date is later.

IX. CLAIMS FOR MATERIALS OR LABOR. In the event any claims have been filed with the City for material or labor delivered or performed pursuant to this contract, the City shall be under no obligation to make any payment until such claims are adjusted to the satisfaction of the City. Any and all liens for supplies may be paid off by the City within twenty (20) days after the filing for record as provided by law of a notice of such liens, except where the claim on which the lien is filed is being litigated by the Contractor, and in such case the City may pay the amount of any final judgment or decree on any such claim. All money paid by the City in settlement of liens and claims as aforesaid, with the costs and expenses incurred by the City in connection therewith shall be charged to the Seller, bearing interest at the rate of six percent (6%) per annum, and be deducted from the next payment falling due the Seller under the terms of this contract.

X. UNIT PRICES. It is agreed that the unit prices listed are maximum prices and that the City shall be entitled to take advantage of any decreasing market conditions, decreases to be governed by the manufacturers' price listing as might be generally adopted in the trade, or by the same percentage that the Seller may reduce prices to others who purchase in similar quantities and under similar conditions.

XI. RESPONSIBILITY FOR THE WORK/INDEMNIFICATION. In the performance of any work, including the delivery of equipment, materials or supplies, pursuant to this Contract, the Contractor shall take all responsibility for the work, and shall take all precautions for preventing injuries to persons and property in or about the work and shall defend, indemnify and hold the City harmless from all loss, cost, damage or expense arising from injuries to persons or property in or about the work. The Contractor shall be responsible for any damage, which may be caused by the failure or insufficiency of any temporary works. He shall effectively protect his work and shall be liable for all damage and loss by delay or otherwise caused by his neglect or failure so to do.

XII. WARRANTY. Except as may be otherwise provided in the Project Manual, the Contractor shall replace, repair or make good, without cost to the City, any defects or faults arising within one (1) year after date of acceptance of equipment, materials or supplies furnished hereunder (acceptance not to be unreasonably delayed) resulting from imperfect or defective work done or materials furnished by the Contractor.

XIII. PATENT INDEMNIFICATION. The Contractor agrees to assume the defense of and shall indemnify and save harmless the City and all persons acting for or on behalf of it from all suits and claims against them, or any of them, arising from or occasioned by the use of any material, equipment or apparatus, or any part thereof which infringes or is alleged to infringe on any patent rights. In case such material, equipment or apparatus, or any part thereof, in any such suit is held to constitute infringement, the Contractor, within a reasonable time, shall at its own expense, and as the City may elect, replace such material, equipment or apparatus with non-infringing material, equipment or apparatus, or remove the material, equipment, or apparatus and refund the sums paid therefor.

XIV. INSURANCE The Contractor shall purchase and maintain commercial general liability and other insurance appropriate for the work and which will provide protection from claims itemized below which may arise out of or result from the Contractor's performance and furnishing of the work and the Contractor's other obligations under the Contract Documents, whether the work and other obligations will be performed or furnished by the Contractor, any subcontractor or supplier. The amounts of the commercial general liability insurance policy shall be as follows:

Worker's Compensation	
	Per M.G.L.C. 149, §§34 & 152
Commercial General Liability	
General aggregate	$5,000,000
Products	$2,000,000
Personal & advertising injury	$2,000,000
Each occurrence	$1,000,000
Fire damage	$100,000
Medical expense	$5,000
Vehicle Liability	
Personal Injury	$500,000 per occurrence
	$1,000,000 aggregate
Property Damage	$300,000 aggregate

The Contractor shall also provide insurance coverage for

a. Claims for bodily injury and property damage resulting from liability arising out of pollution related exposures such as asbestos abatement, lead paint abatement, tank removal, removal of contaminated soil, etc. The City shall be named as an additional insured and the amount of coverage shall be $1,000,000 per occurrence and $2,000,000 aggregate.

b. Claims under worker's compensation, disability benefits, and other applicable similar employee benefits acts; claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees.

c. Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees; claims for damages insured by personal injury liability coverage sustained (a) by any person as a result of an offense directly or indirectly related to the employment of such person by the Contractor, or (b) by any other person for any other reason; claims for damages because of injury to or destruction of tangible property wherever located, including loss of use resulting from any such injury or destruction.

d. Claims arising out of operation of laws for damages because of bodily injury or death of any person or for damage to property.

e. Claims for damages because of bodily injury or death of any person, or property damage arising out of ownership, maintenance, operation, use or loading and unloading of any owned, hired or non-owned motor vehicle used in the Work, including employee non-ownership use. The combined single limit shall be $1,000,000 and shall include a CA9948 Pollution Endorsement and shall name the City as an additional insured.

The Contractor's liability insurance shall include contractual liability coverage sufficient to cover to the Contractor's indemnification obligations under the Contract Documents. The Contractor agrees to pay on behalf of the City, and to provide and pay a defense for all claims covered by the Contractor's obligations under the indemnification provisions.

The Contractor's liability insurance shall be endorsed to include the City as an additional insured, and the architect/engineer, the City's and architect/engineer's consultants, any of their subsidiaries or affiliates, and each of their respective directors, officers, shareholders, agents or employees as additional insureds. The insurance afforded to the City and those other parties shall be primary insurance, and neither the coverage nor the amount of insurance provided under the Contractor's policies shall be reduced or prorated by the existence of any other insurance applicable to any loss the City or those other parties may have sustained.

The Contractor's liability insurance shall remain in effect until the end of any correction period and at all times after that when the Contractor may be correcting, or removing and replacing *defective* work. Products and completed operations insurance shall be maintained for two (2) years after final payment. Evidence of insurance shall be furnished to the City upon request and no less frequently than yearly.

These requirements shall not be construed to limit the liability of the Contractor or its insurers. The City does not represent that the specified coverages or limits of insurance are sufficient to protect the Contractor's interests or liabilities.

If the City or the Contractor suffers injury or damage to person or property because of error, omission or act of the other, any of the other's employees or agents or others for whose acts the other party is legally liable, claim will be made in writing to the other party within a reasonable time of the first observation of that injury or damage. This provision is not and shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or statute of repose.

XV. INSPECTION. For the purposes of inspection of the equipment, materials and supplies covered by this contract, the Contractor shall give the City free access to his works and furnish every facility for properly inspecting such equipment, materials and supplies, and shall furnish full information, whenever requested, relating thereto. Approval by any inspector of the City shall not relieve the Contractor from his obligation to comply in all respects with the contract.

XVI. ASSIGNMENT/SUB-CONTRACTING. The Contractor agrees that he will not sell, assign, or transfer this Contract or any part thereof or interest therein without the prior written consent of the City.

XVII. INSTALLATION. If any of the equipment, materials, and supplies covered by this contract is to be installed by either the Contractor or the City, the Contractor shall, upon request of the City, furnish a competent employee to supervise the installation without expense to the City, unless otherwise provided herein. Such supervisor, or other employees furnished by the Contractor, shall be the agents of the Contractor and not of the City, and the Contractor hereby agrees to indemnify the City and hold it harmless from and against any and all loss, costs, damage, and expense sustained as the result of negligence or other conduct on the part of such supervisor or employee.

XVIII. TERMINATION. The City of Newton may, by written notice of default to the Contractor, terminate the whole or any part of this Contract or any Work Order issued pursuant thereto in any one of the following circumstances:

a. If the Contractor fails to make delivery of the equipment, goods or supplies or to perform the services within the time specified herein or any extension thereof;

b. If the Contractor fails to perform any of the other provisions of this contract or, if in the opinion of the City, Contractor so fails to make progress as to endanger performance of this contract in accordance with its terms, and in either of these two circumstances does not correct such failure within thirty (30) days (or such longer period as the City may authorize in writing) after receipt of notice from the City specifying such failure.

XIX. GOVERNING LAW. This Contract shall be governed by and construed in accordance with the laws of the Commonwealth of Massachusetts.

XX. SEVERABILITY. The provisions of this Contract are severable. If any section, paragraph, clause or provision of this Contract shall be finally adjudicated by a court of competent jurisdiction to be invalid, the remainder of this Contract shall be unaffected by such adjudication and all of the remaining provisions of this Contract shall remain in full force and effect as though such section, paragraph, clause or provision, or any part thereof so adjudicated to be invalid, had not been included herein, unless such remaining provisions, standing alone, are incomplete and incapable of being executed in accordance with the intent of the parties to this Contract.

XXI. AMENDMENTS TO THIS CONTRACT. This Contract may not be amended except in writing executed in the same manner as this CITY-CONTRACTOR Agreement.

THIS SPACE INTENTIONALLY LEFT BLANK

IN WITNESS WHEREOF, the parties have caused this instrument to be executed under seal the day and year first above written.

CONTRACTOR

By_____

Print Name _____

Title _____

Date _____

Affix Corporate Seal Here

CITY OF NEWTON

By_____
Chief Procurement Officer

Date_____

By_____
Commissioner of Public Works

Date_____

Certified that funds are available in the following accounts:

_____

_____

I further certify that the Mayor, or her designee, is authorized to execute contracts and approve change orders.

By_____
Comptroller of Accounts

Date_____

Approved as to Legal Form and Character

By _____
Associate City Solicitor

Date _____

CONTRACT AND BONDS APPROVED

By _____
Mayor or her designee

Date_____

CERTIFICATE OF AUTHORITY - CORPORATE

1. I hereby certify that I am the Clerk/Secretary of _____
(insert full name of Corporation)

2. corporation, and that _____
(insert the name of officer who signed the **contract and bonds**.)

3. is the duly elected _____
(insert the title of the officer in line 2)

4. of said corporation, and that on _____
(insert a date that is ***ON OR BEFORE*** the date the officer signed the **contract and bonds**.)

at a duly authorized meeting of the Board of Directors of said corporation, at which all the directors were present or waived, notice, it was voted that

5. _____ the _____
(insert **name** from line 2) (insert **title** from line 3)

of this corporation be and hereby is authorized to execute contracts and bonds in the name and on behalf of said corporation, and affix its Corporate Seal thereto, and such execution of any contract of obligation in this corporation's name and on its behalf, with or without the Corporate Seal, shall be valid and binding upon this corporation; and that the above vote has not been amended or rescinded and remains in full force and effect as of the date set forth below.

6. ATTEST: _____ *AFFIX CORPORATE SEAL HERE*
(Signature of **Clerk or Secretary**)*

7. Name: _____
(Please print or type name in line 6)*

8. Date: _____
(insert a date that is ***ON OR AFTER*** the date the officer signed the **contract and bonds**.)

* The name and signature inserted in lines 6 & 7 **must** be that of the **Clerk or Secretary** of the corporation.

CITY OF NEWTON, MASSACHUSETTS

PAYMENT BOND

Know All Men By These Presents:

That we, _____, as PRINCIPAL, and _____, as SURETY, are held and firmly bound unto the City of Newton as Obligee, in the sum of

dollars **($_____)** to be paid to the Obligee, for which payments well and truly to be made, we bind ourselves, our respective heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Whereas, the said PRINCIPAL has made a contract with the Obligee, bearing the date of _____ _, 2020, for the construction of _____ in Newton, Massachusetts.

(Project Title)

Now, the conditions of this obligation are such that if the PRINCIPAL and all Sub-contractors under said contract shall pay for all labor performed or furnished and for all materials used or employed in said contract and in any and all duly authorized modifications, alterations, extensions of time, changes or additions to said contract that may hereafter be made, notice to the SURETY of such modifications, alterations, extensions of time, changes or additions being hereby waived, the foregoing to include any other purposes or items set out in, and to be subject to, provisions of M.G.L. c.30, §39A, and M.G.L. c.149, §29, as amended, then this obligation shall become null and void; otherwise it shall remain in full force, virtue and effect.

In Witness Whereof, the PRINCIPAL and SURETY have hereto set their hands and seals this ___day of_____2020.

PRINCIPAL	SURETY
_____	_____
BY_____	BY _____
(SEAL)	(ATTORNEY-IN-FACT) (SEAL)
_____ (Title)	
ATTEST: _____	ATTEST: _____

CITY OF NEWTON

GENERAL CONDITIONS OF THE CONTRACT

FOR PUBLIC WORKS CONSTRUCTION

ARTICLE 1

CONTRACT DRAWINGS

1. The location, general characteristics, and principal details of the work are indicated on a set Contract Drawings titled:

WABAN HILL RESERVOIR IMPROVEMENTS

DATED: September 2020

ARTICLE 2
Definitions

The word "Commissioner" shall mean the official duly authorized to act for the City of Newton in the execution of the work of this contract, acting directly or through properly authorized agents.

The word "Engineer," or "City Engineer," shall mean the City Engineer of the City of Newton, acting directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.

The word "Contractor" shall mean the party or parties contracting to perform the work covered by this contract or his, or their, legal representatives, successors or assigns.

The word "Plan" shall mean plans referred to and included in the Project Manual for this contract. The word "City" shall mean the City of Newton.

ARTICLE 3
Plans, Drawings, Profiles

1. The work shall be done in accordance with plans referred to in Article 1 and such further working and detail plans, drawings and profiles as may be furnished from time to time by the Engineer. All said plans, general and detail, are to be deemed a part of this contract, and the said plans, specifications and contract are to be considered together, so that any work mentioned in the contract, though not shown on the plans, and any work shown on the plans though not mentioned in the contract, is to be executed by the Contractor as a part of this contract. Figured dimensions are to prevail over scale. All things which in the opinion of the Engineer may fairly be inferred from the contract, plans and specifications, are to be executed by the Contractor as a part of the contract; and the Engineer shall be sole judge as to whether detail plans, drawings and profiles conform to the general plans and the contract.

Discrepancy in Plans

2. The Contractor shall carefully examine all said plans, profiles, drawings, specifications and orders; all figures, dimensions, lines, marks and scales thereof, and all directions of the Commissioner and the Engineer relating to the work, and conform to those in relation to which there is no doubt or discrepancy, but at once submit all cases of doubt or discrepancy to the Engineer for adjustment. Anything done on any part of the work for which special information or drawing should be procured, unless done in accordance with such information or drawing, or anything done in relation to which there is doubt or discrepancy, except in accordance with the adjustment thereof, or done in violation of law or public authority, is to be redone if the Commissioner shall so direct.

ARTICLE 4
Inspection

1. The Contractor in carrying on the contract shall conform to all determinations and directions of the Engineer relating to the proper interpretation of the plans, specifications, profiles or drawings, the fitness of persons employed on the work or the number thereof, or the suitableness, amount, quality, and value of anything done or any materials used, and the Contractor shall permit the Commissioner and the Engineer and persons designated by them to enter upon the work and inspect the same at all times and in all places, and shall provide safe and convenient facilities for making such entry and inspection.

ARTICLE 5
Change in Plans and Work

1. The City, acting through the Commissioner and upon his written order only, from time to time given to the Contractor or his foreman, may change, increase or take away any part of the work, or change the specifications, plans, drawings, form or materials thereof. Any deduction or addition thereto is to be allowed, or paid for at a price to be determined, within not more than 15 days of the completion of the change, by the City Engineer acting in the same capacity as an architect in a building contract as between City and Contractor. Any demand for addition or deduction must be made in writing to the Commissioner of Public Works within seven (7) days of the time change was ordered.

ARTICLE 6
Time and Manner of Doing the work - Beginning and Completion

1. The Contractor shall begin work upon receipt of written Notice to Proceed. Once begun the work shall be carried out in a continuous and uninterrupted fashion with sufficient workforce and resources to assure completion by the date for completion established by the Contract Documents.

2. The Contractor shall carry on the work in accordance with the requirements of law and of all other public authorities, and to the satisfaction of the Commissioner; he shall give all notices, take out all permits, pay all charges and fees, give personal supervision to the work and keep thereon a competent foreman and sufficient employees, skilled in the several parts which are given them to do.

Maintenance of Travel

3. The Contractor shall conduct his work so as to interfere as little as possible with public travel and shall give property owners proper means of access to their property where existing access has been cut off by the work. The Contractor shall keep the streets open for through travel except where, in the opinion of the Commissioner, it is necessary to close the street. The continuous length of the street occupied for the work shall be kept as short as possible, and no part of the work shall be unnecessarily delayed. Wherever the Commissioner shall direct, trenches shall be bridged by the Contractor in a proper and secure manner so as not to interrupt travel. Free access shall be maintained at all times to all water gates, gas gates, and fire hydrants.

Abandonment of Work by Contractor

4. In the event the Commissioner of Public Works certifies that the work is not being so carried forward or if the Contractor at any time is not carrying on the work to the satisfaction of the Commissioner, or is not observing any of the provisions of the contract, or has abandoned the work, or become insolvent or assigned his property, the City, acting by the Commissioner and at his discretion, may, with or without notice to the Contractor, or advertising for doing the work, and by contract, day labor or otherwise, do any part of the work which the Contractor has failed to do or replace any part not done to the satisfaction of the Commissioner, or take possession of the work and complete the same, and in doing so may use any implements, machinery or materials on or about the work which are the property of the Contractor, charging the Contractor any excess cost for completing the work, which excess cost the Contractor agrees to pay.

ARTICLE 6A
Liquidated Damages

1. In case the work embraced in the contract shall not have been completed by the date stipulated therein, the Contractor shall pay to the City of Newton as liquidated damages a designated sum per calendar day for the entire period of overrun in accordance with the following Schedule of Deductions, and in addition, the Contractor shall pay without reimbursement the entire cost of all traffic officers, railroad flagmen, inspectors, or other personnel the City Engineer and/or the Chief Engineer of the railroad determines to be necessary during the period of overrun of time.

SCHEDULE OF DEDUCTIONS

Daily Charge
Per Calendar Day

$1,300.00

2. Whatever sum of money may become due and payable to the City of Newton by the Contractor under this Article may be retained out of money belonging to the Contractor in the hands and possession of the City of Newton. It is agreed that this Article shall be construed and treated by the parties to the contract not as imposing a penalty upon said Contractor for failing fully to complete said work as agreed on or before the time specified in the proposal, but as liquidated damages to compensate said City of Newton for all additional costs incurred by it because of the failure of the Contractor fully to complete said work on or before the date of completion specified in the proposal.

ARTICLE 6B

Delays and Extensions of Time

1. If the Contractor is delayed at any time in the progress of the work by an act or neglect of the City, or by changes in the work ordered by the City, or by unseasonably inclement weather, or by other causes deemed by the City Engineer to be beyond the Contractor's control, and which the City Engineer determines may justify delay, then the time for completion may be extended for such reasonable time as the City Engineer may determine.

2. No such extension of time will be allowed unless the Contractor submits a written request for an extension to the City Engineer no later than 10 calendar days of the start of the occurrence or event giving rise thereto. Each such request must describe the occurrence or event and specify the manner and extent that such occurrence or event is causing or has caused a delay in the work. The City Engineer shall promptly investigate each request and make his written determination to the Commissioner and the Contractor within 10 days after receipt of the request. In his determination the City Engineer may either grant, deny, or modify the length of the requested extension.

3. If the City Engineer's determination so warrants, the Commissioner shall authorize a written Change Order to the Contract extending the time for completion. No extension of time shall be deemed as granted until said Change Order has been duly executed by the parties.

4. Change Orders which may be executed by the City and the Contractor in connection with additions, extra labor and/or extra materials shall not be considered as allowing extensions of the time for completion unless the change order expressly specifies that additional time is allowed in connection with the work under the change order. Once a Change Order has been executed by the parties, any request by the Contractor for an extension of time based solely on the fact that additions, extra labor and/or extra materials are required by the Change Order will be denied by the City Engineer.

5. Permitting the Contractor to continue and finish the work or any part of it after the times fixed for its completion, or after the date to which the time for completion may have been extended, shall in no way operate as a waiver on the part of the City of Newton of any of its rights under the contract. The Contractor remains liable for damages caused other than by delay.

ARTICLE 7
Lines and Grades

1. The Contractor shall retain a Registered Land Surveyor who shall furnish such boards and stakes and cause to be placed thereon, such lines, marks and directions relating to the work as the Commissioner or City Engineer shall from time to time direct.

ARTICLE 8
Public Service Pipes and Conduits

1. The Contractor shall maintain such pipes or conduits of public service corporations or of the City as are across or within the lines of the work until such time as said public service corporations or the City assume the maintenance or removal of said pipes or conduits. The Commissioner will notify such public service corporations to that effect on the existence of such obstructions to the work being brought to his notice by the Contractor. The City will relocate either temporarily or permanently all water mains and water service pipes, or hydrants, and drains or sewers which may interfere with the work contemplated in this contract. (This clause is not to be construed as applying to such pipes as may be readily supported and protected during the progress of the work.) The cost of shutting off and turning on water in water mains during blasting shall be assumed by the City.

Protection of Existing Structures

2. All existing gas pipes, water pipes, sewers, drains, conduits, or other structures which are uncovered by the excavation shall be carefully supported and protected from injury by the Contractor, and, in case of injury, they shall be restored by him, without compensation therefor, to as good condition as that in which they were found, and shall be kept in repair until 6 months after the completion of the work. The Contractor shall provide suitable temporary channels for water at all water courses. Wherever the work passes under or adjacent to street railway tracks, the Contractor shall make all necessary arrangements with the railway company for doing any work which may affect the property of the company or interfere with the operating of the railway, and he shall be liable for any damage that may be caused by any act, omission or neglect on his part, and shall pay all expenses of every kind incidental to this work.

Changing the Location of Existing Structures

3. Whenever it becomes necessary to change the location of any water or gas pipes, sewers, drains, conduits or other structures not otherwise provided for in these specifications, the Contractor shall do the whole or such portions of the work of making such changes as the Commissioner may require, and shall receive in payment therefor the reasonable cost of the work done as determined by the Commissioner plus 15 per cent of such cost. In estimating such cost, no allowance shall be made to the Contractor for the use of tools not especially provided for this work, for general superintendence, or for any overhead expenses except liability insurance.

ARTICLE 9
Co-operation with Other Contractors

1. The Contractor shall conduct the work in such manner as not to interfere with other work being done by the City, by contract or otherwise, and if deemed necessary by the Commissioner, the work under this contract shall conform to the progress of said other work; shall co-operate with other contractors or employees who may be doing work for the City, and with public service corporations affected by the work, in arranging for storage places, connections, bracings, temporary support for structures, repairs, etc.

ARTICLE 10
Subcontracts

1. The Contractor, in any contract with a Subcontractor, shall provide that the Subcontractor shall be subject to all specifications, terms, provisions, conditions, requirements and liabilities set forth in this contract so far as such specifications, terms, provisions, conditions, requirements and liabilities are applicable to the work to be done under such Subcontract, and shall also provide that such Subcontract shall be terminated by the Contractor whenever the Commissioner shall certify to him in writing that in his opinion the work of the Subcontractor is unnecessarily or unreasonably delayed or that the Subcontractor has violated any of the provisions of this contract. The Contractor shall at once terminate such subcontract if the Commissioner, after certifying as aforesaid, shall in writing direct the Contractor to make such termination.

2. Subcontracts shall be made in writing and the Contractor shall furnish the Commissioner with a copy of his subcontracts on demand.

3. Pursuant to the provisions of M.G.L. Ch. 30, Sec. 39F (1), the following provisions are included in the General Conditions:

(a) Forthwith after the general contractor receives payment on account of a periodic estimate, the general contractor shall pay to each subcontractor the amount paid for the labor performed and the materials furnished by that subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.

(b) Not later than the sixty-fifth day after each subcontractor substantially completes his work in accordance with the plans and specifications, the entire balance due under the subcontract less amounts retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, shall be due the subcontractor; and the awarding authority shall pay that amount to the general contractor. The general contractor shall forthwith pay to the subcontractor the full amount received from the awarding authority less any amount specified in any court proceedings barring the payment and also less any amount claimed due from the subcontractor by the general contractor.

(c) Each payment made by the awarding authority to the general contractor pursuant to subparagraphs (a) and (b) of this paragraph for the labor performed and the materials furnished by a subcontractor shall be made to the general contractor for the account of the subcontractor; and the awarding authority shall take reasonable steps to compel the general contractor to make each such payment to each such subcontractor. If the awarding authority has received a demand for direct payment from a subcontractor for any amount which has already been included in a payment to the general contractor or which is to be included in a payment to the general contractor for payment to the subcontractor as provided in subparagraphs (a) and (b), the awarding authority shall act upon the demand as provided in this section.

(d) If, within seventy days after the subcontractor has substantially completed the subcontract work, the subcontractor has not received from the general contractor the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount retained by the awarding authority, the demand shall be by a sworn statement delivered to or sent by certified mail to the awarding authority, and a copy shall be delivered to or sent by certified mail to the general contractor at the same time. The demand shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of the completion of the subcontract work shall be valid even if delivered or mailed prior to the seventieth day after which the subcontractor has substantially completed the subcontract work. Within ten days after the subcontractor has delivered or so mailed the demand to the awarding authority and delivered or so mailed a copy to the general contractor, the general contractor may reply to the demand. The reply shall be by a sworn statement delivered to or sent by certified mail to the awarding authority and a copy shall be delivered to or sent by certified mail to the subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor and of the amount due for each claim made by the general contractor against the subcontractor.

(e) Within fifteen days after receipt of the demand by the awarding authority, but in no event prior to the seventieth day after substantial completion of the subcontract work, the awarding authority shall make direct payment to the subcontractor of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount (i) retained by the awarding authority as the estimated cost of completing the incomplete or unsatisfactory items of work (ii) specified in any court proceedings barring such payment, or, (iii) if the reply shall not deduct from a direct payment any amount as provided in part (iii) if the reply is not sworn to, or for which the sworn reply does not contain the detailed breakdown required by subparagraph (d). The awarding authority shall make further direct payments to the subcontractor forthwith after the removal of the basis for deductions from direct payments made as provided in parts (i) and (ii) of this subparagraph.

(f) The awarding authority shall forthwith deposit the amount deducted from a direct payment as provided in part (iii) of subparagraph (e) in an interest-bearing joint account in the names of the general contractor and the subcontractor in a bank in Massachusetts selected by the awarding authority or agreed upon by the general contractor and the subcontractor and shall notify the general contractor and the subcontractor of the date of the deposit and the bank receiving the deposit. The bank shall pay the amount in the account, including accrued interest, as provided in an agreement between the general contractor and the subcontractor or as determined by decree of a court of competent jurisdiction.

(g) All direct payments and all deductions from demands for direct payments deposited in an interest-bearing account or accounts in a bank pursuant to subparagraph (f) shall be made out of amounts payable to the general contractor at the time of receipt of a demand for direct payment from a subcontractor and out of amounts which later become payable to the general contractor and in the order of receipt of such demands from subcontractors. All direct payments shall discharge the obligation of the awarding authority to the general contractor to the extent of such payment.

(h) The awarding authority shall deduct from payments to a general contractor amounts which, together with deposits in interest-bearing accounts pursuant to subparagraph (f), are sufficient to satisfy all unpaid balances of demands for direct payment received from subcontractors. All such amounts shall be earmarked for such direct payments, and the subcontractors shall have a right in such deductions prior to any claims against such amounts by creditors of the general contractor.

ARTICLE 11
Compensation for Work

1. Subject to any provisions in Paragraph 7, the price named in the proposal and accepted by the City shall be paid by the City and received by the Contractor as full compensation for furnishing materials and for use of tools, forms, machinery and other implements, and for labor in moving materials and executing all the work contemplated in this contract, also for loss or damage arising from delay however occasioned, or out of the nature of the work aforesaid or from the action of the elements, from floods, or from any unforeseen obstructions or difficulties which may be encountered in the prosecution of the same and for all risks of every description connected with the work and for well and faithfully completing the work in the proper manner and according to the plans and specifications and requirements of the Commissioner under them.

2. During the first week of each calendar month, the City Engineer shall cause all work done by the Contractor during the previous month to be measured and shall estimate the value thereof and, on or before the 10th of each month issue a certificate to the Commissioner of the measurements and the amount due the Contractor according to the terms of his contract.

3. The City shall pay the Contractor on approval of the Commissioner monthly on or before the 18th of each month for all work done during the preceding month according to the aforementioned certificate of the City Engineer, less 5 per cent of the amount of such work and less any amounts due the City by the Contractor.

4. Within ten days after the completion of the work as determined by the Commissioner, the City Engineer shall issue to the Commissioner a final certificate of the total amount of work done and the money due the Contractor therefor, crediting thereon the amounts of the previous payments. In making the final certificate, the City Engineer shall not be bound by any preceding certificate or estimate of the amount of work done or materials furnished.

Final Payment--Claims Against Contractor

5. At the expiration of 65 days after the completion of the work as determined by the Commissioner, the City shall, unless claims are made or notice of liability against the City is given, pay the Contractor, on the approval of the Commissioner, the percentages retained and the balance due the Contractor according to the aforementioned final certificate of the City Engineer less any indebtedness of the Contractor to the City. If a claim or claims are made, or notice of liability given, such amounts due the Contractor may be paid upon satisfaction of such claims or upon furnishing of indemnity to said City against all loss, cost, damage or expense by reason of such claims. In the event of no known claims or liens the City may, at its option, pay within 35 days.

6. The City, on making any payment after the completion of the work, shall be released from all claim or liability to the Contractor for anything done or used, or for any loss or injury sustained in carrying on the contract, or for any act, omission, neglect or mistake of the City or any person relating to or affecting the contract, except for the balance of any sum retained as aforesaid.

Extra Work

7. The Contractor shall be paid for any additions, or deductions as provided in Article 5, paragraph 1, and for extra labor done by, and for extra materials furnished by him in compliance with the written order only of the Commissioner, calling for work not similar in character to that covered by the items given in the proposal, and for which no price is set in the said written order, the direct (not including consequential) cost to the Contractor, as determined to be reasonable by the Commissioner, plus fifteen per cent of said costs as so determined in regard to labor only. For teams or trucks so furnished, no payment shall be made to the Contractor beyond the current local rate as determined by the Commissioner in each case. The direct cost of labor may include the cost of mechanics and laborers furnished and a reasonable proportion of the time of the foreman and timekeeper, but it shall in no case include any charge for the use of tools, for establishment charges or for time spent by the Contractor. The actual cost of insurance on extra pay rolls and of materials furnished for extra work, shall be paid without any addition. The labor and materials so ordered shall constitute a part of the work to be done under the contract; and all and singular the provisions of the contract shall apply to said labor and materials as if the same were specified therein. The Contractor shall have no claim for the above mentioned extra labor and materials unless he furnishes the details and bills therefor within one week after doing any such labor or furnishing any such materials.

8. No claim of the Contractor against the City under this contract shall be deemed valid unless such claim is presented to the Commissioner within ten days from the time when the Contractor first knows of, or has opportunity to know of, the facts and circumstances on which such claim is based.

9. A payment or payments to the Contractor, in cases where these provisions or any of them, are not complied with, shall not be construed as a waiver of said provisions or any part thereof.

Contract Made Subject to Appropriations

10. This contract is made subject to appropriation heretofore made and shall not be altered unless the Contractor, the sureties on the bond, if any, the officer making the contract and the Mayor shall in writing agree thereto.

ARTICLE 12
Responsibility for Work--Contractor's Responsibility

1. The Contractor has made his proposal from his own examinations and estimates, and shall not hold the City, its agents, or employees, responsible for or bound by, any schedule, estimate, sounding, boring, or any plan of any part of the work; shall, if any error in any plan, drawing, specification or direction relating to anything to be done under the contract come to his knowledge, report it at once to the Commissioner; shall not, except as the Commissioner shall authorize in writing, assign or sublet any part of the contract except for the supply of materials and plant, or of anything to be done thereunder; shall, subject to the provisions of the contract take all responsibility of, and bear all losses resulting to him in carrying on the contract, and shall assume the defense of, and hold the City, its agents and employees harmless from all suits and claims against them, or any of them, arising from the use of any invention, patent or patent right, material, labor or implement, by or from any act or omission or neglect of the Contractor, his Subcontractor, his agents or employees, in carrying on the contract, or for any liability of any nature arising under the contract. The Contractor shall be solely responsible and liable for, and shall fully protect and indemnify the City against all claims for damages to persons or property occasioned by or resulting from blasting or other methods or processes in the work of construction, whether such damages be attributable to negligence of the Contractor, his employees or his Subcontractor or otherwise.

ARTICLE 13
LIGHTS--GUARDS

1. The Contractor shall assume all responsibilities of the work and take all proper precautions to protect persons and property from injury and unnecessary interference; leave a reasonably unobstructed way along public and private places for pedestrians, teams, and vehicles, and for access to hydrants; provide proper walks over or around any obstruction made in a public or private place in carrying on the contract, and maintain from the beginning of twilight through the whole of every night, on or near the obstruction sufficient lights and guards to protect travelers from injury thereby, and if, after one notification from the Commissioner that said lights and guards are not sufficient, the Contractor has not placed additional lights and guards to the satisfaction of the Commissioner, the Commissioner shall have the right to take charge of that part of the work at the expense of the Contractor. While the work is suspended he shall keep all roadways and sidewalks in proper condition, and when the work is completed put the place and vicinity in proper condition and so leave them.

The Contractor shall provide proper means of access to property where the existing access is cut off by the Contractor and replace or put in good condition every conduit, catch-basin, tree, wall, fence, or other thing injured by the Contractor in carrying on the contract, unless the same has been permanently done away with, on approval of the Commissioner, as being necessary to the proper carrying on of the contract.

ARTICLE 14
Guaranty

1. Any settlement or other defect, or the failure of any part of the structure or the work due to defective materials or workmanship, that occurs within one year after the work is completed, is to be immediately repaired by the Contractor. In the event of any such settlement, defect, or failure causing liability to the City for damage to persons or property, the Contractor does by this clause agree to hold the City harmless and to assume the defense of any claims therefor.

2. Responsibility under this guaranty for the adequacy of the work does not relieve the Contractor of his obligation to comply with the terms of the contract and to conform to all the requirements of the plans and specifications, nor does it give him the right to deviate in any way from the details of design of the structure or the work.

ARTICLE 15
Defective Work and Materials

1. The inspection of the work shall not relieve the Contractor of any of his obligations to fulfill his contract as herein described, and defective work shall be made good and unsuitable materials may be rejected, notwithstanding that such work and materials have been previously overlooked by the Engineer and accepted or estimated for payment.
   If the work or materials, or any part thereof shall be found defective at any time before the final acceptance of the whole work, the Contractor shall forthwith make good such defect in a manner satisfactory to the Engineer, and if any material brought upon the ground for use in the work or selected for the same, shall be condemned by the Engineer as unsuitable

or not in conformity with the specifications, the Contractor shall forthwith remove such materials from the vicinity of the work.

Nothing in this contract shall be construed as vesting in the Contractor any right of property in the materials used after they have been attached or affixed to the work or the soil, but all materials shall, upon being so attached or affixed, become the property of the City of Newton.

ARTICLE 16
Employment of Labor

1. The Contractor shall give preference in employment, first to citizens of Massachusetts, second, to other citizens of the United States; and shall allow all employees on said work to lodge, board and trade where they choose, and shall not obstruct any other person in doing work for the City; and shall conform to all labor laws of the Commonwealth; and no laborer or teamster, workman or mechanic working within this Commonwealth in the employ of the Contractor or Subcontractor or other person doing or contracting to do the whole or a part of the work contemplated by the Contractor shall be requested to, or required to, or work more than eight hours in any one calendar day. This contract is subject to all the laws of the Commonwealth, and ordinances of the City and if any clause thereof does not conform to such laws and ordinances, such clause shall be void and such laws and ordinances operated in lieu thereof.

ARTICLE 17
Laws and Regulations--Contractor to Comply with Law

1. The Contractor shall keep fully informed of all existing or future acts of the legislature, and of all municipal ordinances, prohibitions, rules and regulations in any manner affecting the conduct of the work, and of all orders or decrees of anybody or tribunal having any jurisdiction or authority over the materials, times, places and actions of those employed in the work embraced in the contract. The Contractor shall at all times observe and comply with all existing and future acts, ordinances, prohibitions, rules, regulations, orders and decrees; and shall protect and indemnify the city and its employees against any and all claims arising from or based on any violation of such acts, ordinances, prohibitions, rules, regulations, orders or decrees, and against all violations of law by the Contractor or his agents or employees.

END OF SECTION

CITY OF NEWTON

WAGE RATE REQUIREMENTS

1. GENERAL

A. This section summarizes the requirements for the payment of wages to laborers and mechanics employed under the Contract.

B. Other duties and requirements of law which may not be specified in this section apply and are inherently a part of the Contract.

2. WAGE RATES

A. The rate per hour to be paid to mechanics, apprentices, teamsters, chauffeurs, and laborers employed on the Work shall not be less than the rate of wages in the attached "Minimum Wage Rates" as determined by the Commissioner of Labor and Industries. This schedule shall continue to be the minimum rate of wages for said employees during the life of this Contract.

B. Keep posted on the site a legible copy of said schedule. Keep on file the wage rates and classifications of labor employed on this Work in order that they may be available for inspection by the Owner, Administrator, or the Architect.

C. Apprentices employed pursuant to this determination of wage rates must be registered and approved by the State Apprenticeship Council wherever rates for journeymen or apprentices are not listed.

D. Pay reserve police officers employed on the Work the prevailing rate of wages paid to regular police officers as required by M.G.L. c149, Sec. 34B, as amended. Such police officers shall be covered by Workmen's Compensation Insurance and Employers Liability Insurance by the Contractor.

E. **The Contractor and all subcontractors shall, on a weekly basis throughout the term of the contract, provide to the City of Newton certified payroll affidavits verifying compliance with M.G.L. c.149, Sec. 27, 27A and 27B.** The Contractor is obiligated to provide such records to the City directly on a weekly basis. The City may assess a penalty of $100 for each day beyond the required submission date that such records are received, which amount shall be deducted from any amounts to the Contractor from the City. In the event of chronic late submissions, the City shall report the same to the Office of the Attorney General.

F. The Contractor and all subcontractors shall provide a Statement of Compliance within 15 days of the completion of its portion of the work. This statement shall be submitted to the Owner on the form found elsewhere in this section.

G. The Contractor shall maintain accurate and complete records, including payroll records, during the Contract term and for three years thereafter.

END OF SECTION

CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

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

ROSALIN ACOSTA
Secretary
MICHAEL FLANAGAN
Director

Awarding Authority:	City of Newton
Contract Number:	IFB 21-09 **City/Town:** NEWTON
Description of Work:	Waban Hill Reservoir Improvements: Rehabilitation of the reservoirs central core standpipe including blasting and painting the interior and exterior of the standpipe and other related work
Job Location:	Chestnut St

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	08/01/2020	$36.25	$12.91	$13.72	$0.00	$62.88
TEAMSTERS JOINT COUNCIL NO. 10 ZONE A	12/01/2020	$36.25	$12.91	$14.82	$0.00	$63.98
	06/01/2021	$37.05	$12.91	$14.82	$0.00	$64.78
	08/01/2021	$37.05	$13.41	$14.82	$0.00	$65.28
	12/01/2021	$37.05	$13.41	$16.01	$0.00	$66.47
(3 AXLE) DRIVER - EQUIPMENT	08/01/2020	$36.32	$12.91	$13.72	$0.00	$62.95
TEAMSTERS JOINT COUNCIL NO. 10 ZONE A	12/01/2020	$36.32	$12.91	$14.82	$0.00	$64.05
	06/01/2021	$37.12	$12.91	$14.82	$0.00	$64.85
	08/01/2021	$37.12	$13.41	$14.82	$0.00	$65.35
	12/01/2021	$37.12	$13.41	$16.01	$0.00	$66.54
(4 & 5 AXLE) DRIVER - EQUIPMENT	08/01/2020	$36.44	$12.91	$13.72	$0.00	$63.07
TEAMSTERS JOINT COUNCIL NO. 10 ZONE A	12/01/2020	$36.44	$12.91	$14.82	$0.00	$64.17
	06/01/2021	$37.24	$12.91	$14.82	$0.00	$64.97
	08/01/2021	$37.24	$13.41	$14.82	$0.00	$65.47
	12/01/2021	$37.24	$13.41	$16.01	$0.00	$66.66
ADS/SUBMERSIBLE PILOT	08/01/2019	$102.78	$9.90	$21.15	$0.00	$133.83
PILE DRIVER LOCAL 56 (ZONE 1)						
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR	06/01/2020	$39.90	$8.60	$17.09	$0.00	$65.59
LABORERS - ZONE 1	12/01/2020	$40.88	$8.60	$17.09	$0.00	$66.57
	06/01/2021	$41.90	$8.60	$17.09	$0.00	$67.59
	12/01/2021	$42.91	$8.60	$17.09	$0.00	$68.60
For apprentice rates see "Apprentice- LABORER"						
ASBESTOS REMOVER - PIPE / MECH. EQUIPT.	06/01/2020	$38.00	$12.50	$8.85	$0.00	$59.35
HEAT & FROST INSULATORS LOCAL 6 (BOSTON)	12/01/2020	$39.00	$12.50	$8.85	$0.00	$60.35
ASPHALT RAKER	06/01/2020	$39.40	$8.60	$17.09	$0.00	$65.09
LABORERS - ZONE 1	12/01/2020	$40.38	$8.60	$17.09	$0.00	$66.07
	06/01/2021	$41.40	$8.60	$17.09	$0.00	$67.09
	12/01/2021	$42.41	$8.60	$17.09	$0.00	$68.10
For apprentice rates see "Apprentice- LABORER"						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE	06/01/2020	$49.33	$13.00	$15.70	$0.00	$78.03
OPERATING ENGINEERS LOCAL 4	12/01/2020	$50.48	$13.00	$15.70	$0.00	$79.18
	06/01/2021	$51.58	$13.00	$15.70	$0.00	$80.28
	12/01/2021	$52.73	$13.00	$15.70	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER	06/01/2020	$49.33	$13.00	$15.70	$0.00	$78.03
OPERATING ENGINEERS LOCAL 4	12/01/2020	$50.48	$13.00	$15.70	$0.00	$79.18
	06/01/2021	$51.58	$13.00	$15.70	$0.00	$80.28
	12/01/2021	$52.73	$13.00	$15.70	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER	06/01/2020	$39.40	$8.60	$17.09	$0.00	$65.09
LABORERS - ZONE 1	12/01/2020	$40.38	$8.60	$17.09	$0.00	$66.07
	06/01/2021	$41.40	$8.60	$17.09	$0.00	$67.09
	12/01/2021	$42.41	$8.60	$17.09	$0.00	$68.10
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 1*	06/01/2020	$39.90	$8.60	$17.09	$0.00	$65.59
	12/01/2020	$40.88	$8.60	$17.09	$0.00	$66.57
	06/01/2021	$41.90	$8.60	$17.09	$0.00	$67.59
	12/01/2021	$42.91	$8.60	$17.09	$0.00	$68.60
For apprentice rates see "Apprentice- LABORER"						
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2020	$46.10	$7.07	$17.98	$0.00	$71.15

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) *BRICKLAYERS LOCAL 3 (NEWTON)*	08/01/2020	$55.75	$10.75	$22.09	$0.00	$88.59
	02/01/2021	$56.39	$10.75	$22.09	$0.00	$89.23
	08/01/2021	$57.79	$10.75	$22.25	$0.00	$90.79
	02/01/2022	$58.38	$10.75	$22.25	$0.00	$91.38

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 Newton*

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.88	$10.75	$22.09	$0.00	$60.72
2	60	$33.45	$10.75	$22.09	$0.00	$66.29
3	70	$39.03	$10.75	$22.09	$0.00	$71.87
4	80	$44.60	$10.75	$22.09	$0.00	$77.44
5	90	$50.18	$10.75	$22.09	$0.00	$83.02

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.20	$10.75	$22.09	$0.00	$61.04
2	60	$33.83	$10.75	$22.09	$0.00	$66.67
3	70	$39.47	$10.75	$22.09	$0.00	$72.31
4	80	$45.11	$10.75	$22.09	$0.00	$77.95
5	90	$50.75	$10.75	$22.09	$0.00	$83.59

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$48.81	$13.00	$15.70	$0.00	$77.51
	12/01/2020	$49.95	$13.00	$15.70	$0.00	$78.65
	06/01/2021	$51.04	$13.00	$15.70	$0.00	$79.74
	12/01/2021	$52.18	$13.00	$15.70	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE*	06/01/2020	$40.30	$8.60	$17.24	$0.00	$66.14
	12/01/2020	$41.28	$8.60	$17.24	$0.00	$67.12
	06/01/2021	$42.30	$8.60	$17.24	$0.00	$68.14
	12/01/2021	$43.31	$8.60	$17.24	$0.00	$69.15
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	06/01/2020	$39.15	$8.60	$17.24	$0.00	$64.99
	12/01/2020	$40.13	$8.60	$17.24	$0.00	$65.97
	06/01/2021	$41.15	$8.60	$17.24	$0.00	$66.99
	12/01/2021	$42.16	$8.60	$17.24	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	06/01/2020	$39.15	$8.60	$17.24	$0.00	$64.99
	12/01/2020	$40.13	$8.60	$17.24	$0.00	$65.97
	06/01/2021	$41.15	$8.60	$17.24	$0.00	$66.99
	12/01/2021	$42.16	$8.60	$17.24	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 1*	06/01/2020	$39.40	$8.60	$17.09	$0.00	$65.09
	12/01/2020	$40.38	$8.60	$17.09	$0.00	$66.07
	06/01/2021	$41.40	$8.60	$17.09	$0.00	$67.09
	12/01/2021	$42.41	$8.60	$17.09	$0.00	$68.10
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CARPENTER *CARPENTERS -ZONE 2 (Eastern Massachusetts)*	09/01/2020	$43.15	$9.40	$18.95	$0.00	$71.50
	03/01/2021	$43.75	$9.40	$18.95	$0.00	$72.10
	09/01/2021	$44.40	$9.40	$18.95	$0.00	$72.75
	03/01/2022	$45.00	$9.40	$18.95	$0.00	$73.35
	09/01/2022	$45.65	$9.40	$18.95	$0.00	$74.00
	03/01/2023	$46.25	$9.40	$18.95	$0.00	$74.60

Apprentice - *CARPENTER - Zone 2 Eastern MA*

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.58	$9.40	$1.73	$0.00	$32.71
2	60	$25.89	$9.40	$1.73	$0.00	$37.02
3	70	$30.21	$9.40	$13.76	$0.00	$53.37
4	75	$32.36	$9.40	$13.76	$0.00	$55.52
5	80	$34.52	$9.40	$15.49	$0.00	$59.41
6	80	$34.52	$9.40	$15.49	$0.00	$59.41
7	90	$38.84	$9.40	$17.22	$0.00	$65.46
8	90	$38.84	$9.40	$17.22	$0.00	$65.46

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.88	$9.40	$1.73	$0.00	$33.01
2	60	$26.25	$9.40	$1.73	$0.00	$37.38
3	70	$30.63	$9.40	$13.76	$0.00	$53.79
4	75	$32.81	$9.40	$13.76	$0.00	$55.97
5	80	$35.00	$9.40	$15.49	$0.00	$59.89
6	80	$35.00	$9.40	$15.49	$0.00	$59.89
7	90	$39.38	$9.40	$17.22	$0.00	$66.00
8	90	$39.38	$9.40	$17.22	$0.00	$66.00

Notes:
% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $30.55/ 3&4 $36.53/ 5&6 $55.10/ 7&8 $61.14

Apprentice to Journeyworker Ratio:1:5

CARPENTER WOOD FRAME *CARPENTERS -ZONE 2 (Wood Frame)*	04/01/2020	$27.12	$7.21	$5.80	$0.00	$40.13
	04/01/2021	$27.87	$7.21	$5.80	$0.00	$40.88
	04/01/2022	$28.62	$7.21	$5.80	$0.00	$41.63
	04/01/2023	$28.97	$7.21	$5.80	$0.00	$41.98

All Aspects of New Wood Frame Work

Issue Date: 09/01/2020 **Wage Request Number:** 20200901-017 **Page 5 of 35**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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

Effective Date - 04/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$16.27	$7.21	$0.00	$0.00	$23.48
2	60	$16.27	$7.21	$0.00	$0.00	$23.48
3	65	$17.63	$7.21	$2.00	$0.00	$26.84
4	70	$18.98	$7.21	$2.00	$0.00	$28.19
5	75	$20.34	$7.21	$5.80	$0.00	$33.35
6	80	$21.70	$7.21	$5.80	$0.00	$34.71
7	85	$23.05	$7.21	$5.80	$0.00	$36.06
8	90	$24.41	$7.21	$5.80	$0.00	$37.42

Effective Date - 04/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$16.72	$7.21	$0.00	$0.00	$23.93
2	60	$16.72	$7.21	$0.00	$0.00	$23.93
3	65	$18.12	$7.21	$2.00	$0.00	$27.33
4	70	$19.51	$7.21	$2.00	$0.00	$28.72
5	75	$20.90	$7.21	$5.80	$0.00	$33.91
6	80	$22.30	$7.21	$5.80	$0.00	$35.31
7	85	$23.69	$7.21	$5.80	$0.00	$36.70
8	90	$25.08	$7.21	$5.80	$0.00	$38.09

Notes:
% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $19.41/ 3&4 $24.13/ 5&6 $31.99/ 7&8 $34.71

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (NEWTON)*	01/01/2020	$49.07	$12.75	$22.41	$0.62	$84.85

Apprentice - *CEMENT MASONRY/PLASTERING - Eastern Mass (Newton)*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.54	$12.75	$15.41	$0.00	$52.70
2	60	$29.44	$12.75	$17.41	$0.62	$60.22
3	65	$31.90	$12.75	$18.41	$0.62	$63.68
4	70	$34.35	$12.75	$19.41	$0.62	$67.13
5	75	$36.80	$12.75	$20.41	$0.62	$70.58
6	80	$39.26	$12.75	$21.41	$0.62	$74.04
7	90	$44.16	$12.75	$22.41	$0.62	$79.94

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 1*	06/01/2020	$39.40	$8.60	$17.09	$0.00	$65.09
	12/01/2020	$40.38	$8.60	$17.09	$0.00	$66.07
	06/01/2021	$41.40	$8.60	$17.09	$0.00	$67.09
	12/01/2021	$42.41	$8.60	$17.09	$0.00	$68.10
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$50.33	$13.00	$15.70	$0.00	$79.03
	12/01/2020	$51.48	$13.00	$15.70	$0.00	$80.18
	06/01/2021	$52.58	$13.00	$15.70	$0.00	$81.28
	12/01/2021	$53.73	$13.00	$15.70	$0.00	$82.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$32.72	$13.00	$15.70	$0.00	$61.42
	12/01/2020	$33.50	$13.00	$15.70	$0.00	$62.20
	06/01/2021	$34.25	$13.00	$15.70	$0.00	$62.95
	12/01/2021	$35.04	$13.00	$15.70	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2020	$51.51	$8.25	$22.40	$0.00	$82.16
	01/01/2021	$52.06	$8.25	$22.75	$0.00	$83.06

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 07/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.76	$8.25	$0.00	$0.00	$34.01
2	55	$28.33	$8.25	$6.05	$0.00	$42.63
3	60	$30.91	$8.25	$6.60	$0.00	$45.76
4	65	$33.48	$8.25	$7.15	$0.00	$48.88
5	70	$36.06	$8.25	$19.10	$0.00	$63.41
6	75	$38.63	$8.25	$19.65	$0.00	$66.53
7	80	$41.21	$8.25	$20.20	$0.00	$69.66
8	90	$46.36	$8.25	$21.30	$0.00	$75.91

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.03	$8.25	$0.00	$0.00	$34.28
2	55	$28.63	$8.25	$6.16	$0.00	$43.04
3	60	$31.24	$8.25	$6.72	$0.00	$46.21
4	65	$33.84	$8.25	$7.28	$0.00	$49.37
5	70	$36.44	$8.25	$19.39	$0.00	$64.08
6	75	$39.05	$8.25	$19.95	$0.00	$67.25
7	80	$41.65	$8.25	$20.51	$0.00	$70.41
8	90	$46.85	$8.25	$21.63	$0.00	$76.73

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: ADZEMAN *LABORERS - ZONE 1* For apprentice rates see "Apprentice- LABORER"	12/01/2019	$39.30	$8.10	$16.60	$0.00	$64.00
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 1* For apprentice rates see "Apprentice- LABORER"	12/01/2019	$40.30	$8.10	$16.60	$0.00	$65.00
DEMO: BURNERS *LABORERS - ZONE 1* For apprentice rates see "Apprentice- LABORER"	12/01/2019	$40.05	$8.10	$16.60	$0.00	$64.75
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 1* For apprentice rates see "Apprentice- LABORER"	12/01/2019	$40.30	$8.10	$16.60	$0.00	$65.00
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 1* For apprentice rates see "Apprentice- LABORER"	12/01/2019	$40.05	$8.10	$16.60	$0.00	$64.75
DEMO: WRECKING LABORER *LABORERS - ZONE 1* For apprentice rates see "Apprentice- LABORER"	12/01/2019	$39.30	$8.10	$16.60	$0.00	$64.00
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$48.81	$13.00	$15.70	$0.00	$77.51
	12/01/2020	$49.95	$13.00	$15.70	$0.00	$78.65
	06/01/2021	$51.04	$13.00	$15.70	$0.00	$79.74
	12/01/2021	$52.18	$13.00	$15.70	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2019	$68.52	$9.90	$21.15	$0.00	$99.57
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2019	$48.94	$9.90	$21.15	$0.00	$79.99
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2019	$73.41	$9.90	$21.15	$0.00	$104.46
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2019	$102.78	$9.90	$21.15	$0.00	$133.83
DRAWBRIDGE OPERATOR (Construction) *DRAWBRIDGE - SEIU LOCAL 888*	07/01/2020	$26.77	$6.67	$3.93	$0.16	$37.53
ELECTRICIAN *ELECTRICIANS LOCAL 103*	09/01/2020	$54.45	$13.00	$19.73	$0.00	$87.18
	03/01/2021	$55.41	$13.00	$20.01	$0.00	$88.42
	09/01/2021	$56.84	$13.00	$20.06	$0.00	$89.90
	03/01/2022	$58.04	$13.00	$20.09	$0.00	$91.13
	09/01/2022	$59.48	$13.00	$20.13	$0.00	$92.61
	03/01/2023	$60.67	$13.00	$20.17	$0.00	$93.84

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELECTRICIAN - Local 103*

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$21.78	$13.00	$0.65	$0.00	$35.43
2	40	$21.78	$13.00	$0.65	$0.00	$35.43
3	45	$24.50	$13.00	$14.87	$0.00	$52.37
4	45	$24.50	$13.00	$14.87	$0.00	$52.37
5	50	$27.23	$13.00	$15.31	$0.00	$55.54
6	55	$29.95	$13.00	$15.75	$0.00	$58.70
7	60	$32.67	$13.00	$16.19	$0.00	$61.86
8	65	$35.39	$13.00	$16.63	$0.00	$65.02
9	70	$38.12	$13.00	$17.07	$0.00	$68.19
10	75	$40.84	$13.00	$17.53	$0.00	$71.37

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$22.16	$13.00	$0.66	$0.00	$35.82
2	40	$22.16	$13.00	$0.66	$0.00	$35.82
3	45	$24.93	$13.00	$15.13	$0.00	$53.06
4	45	$24.93	$13.00	$15.13	$0.00	$53.06
5	50	$27.71	$13.00	$15.57	$0.00	$56.28
6	55	$30.48	$13.00	$16.01	$0.00	$59.49
7	60	$33.25	$13.00	$16.46	$0.00	$62.71
8	65	$36.02	$13.00	$16.90	$0.00	$65.92
9	70	$38.79	$13.00	$17.34	$0.00	$69.13
10	75	$41.56	$13.00	$17.80	$0.00	$72.36

Notes: :
App Prior 1/1/03; 30/35/40/45/50/55/65/70/75/80

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2020	$61.42	$15.73	$18.41	$0.00	$95.56
	01/01/2021	$63.47	$15.88	$19.31	$0.00	$98.66
	01/01/2022	$65.62	$16.03	$20.21	$0.00	$101.86

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELEVATOR CONSTRUCTOR - Local 4*

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$30.71	$15.73	$0.00	$0.00	$46.44
2	55	$33.78	$15.73	$18.41	$0.00	$67.92
3	65	$39.92	$15.73	$18.41	$0.00	$74.06
4	70	$42.99	$15.73	$18.41	$0.00	$77.13
5	80	$49.14	$15.73	$18.41	$0.00	$83.28

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$31.74	$15.88	$0.00	$0.00	$47.62
2	55	$34.91	$15.88	$19.31	$0.00	$70.10
3	65	$41.26	$15.88	$19.31	$0.00	$76.45
4	70	$44.43	$15.88	$19.31	$0.00	$79.62
5	80	$50.78	$15.88	$19.31	$0.00	$85.97

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

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2020	$42.99	$15.73	$18.41	$0.00	$77.13
	01/01/2021	$44.43	$15.88	$19.31	$0.00	$79.62
	01/01/2022	$45.93	$16.03	$20.21	$0.00	$82.17
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"						
FENCE & GUARD RAIL ERECTOR *LABORERS - ZONE 1*	06/01/2020	$39.40	$8.60	$17.09	$0.00	$65.09
	12/01/2020	$40.38	$8.60	$17.09	$0.00	$66.07
	06/01/2021	$41.40	$8.60	$17.09	$0.00	$67.09
	12/01/2021	$42.41	$8.60	$17.09	$0.00	$68.10
For apprentice rates see "Apprentice- LABORER"						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2020	$44.73	$12.50	$15.70	$0.00	$72.93
	11/01/2020	$45.73	$12.50	$15.70	$0.00	$73.93
	05/01/2021	$46.88	$12.50	$15.70	$0.00	$75.08
	11/01/2021	$47.88	$12.50	$15.70	$0.00	$76.08
	05/01/2022	$49.03	$12.50	$15.70	$0.00	$77.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2020	$46.23	$12.50	$15.70	$0.00	$74.43
	11/01/2020	$47.24	$12.50	$15.70	$0.00	$75.44
	05/01/2021	$48.40	$12.50	$15.70	$0.00	$76.60
	11/01/2021	$49.41	$12.50	$15.70	$0.00	$77.61
	05/01/2022	$50.57	$12.50	$15.70	$0.00	$78.77
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	05/01/2020	$22.64	$12.50	$15.70	$0.00	$50.84
	11/01/2020	$23.23	$12.50	$15.70	$0.00	$51.43
	05/01/2021	$23.91	$12.50	$15.70	$0.00	$52.11
	11/01/2021	$24.51	$12.50	$15.70	$0.00	$52.71
	05/01/2022	$25.18	$12.50	$15.70	$0.00	$53.38
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 103*	09/01/2020	$54.45	$13.00	$19.73	$0.00	$87.18
	03/01/2021	$55.41	$13.00	$20.01	$0.00	$88.42
	09/01/2021	$56.84	$13.00	$20.06	$0.00	$89.90
	03/01/2022	$58.04	$13.00	$20.09	$0.00	$91.13
	09/01/2022	$59.48	$13.00	$20.13	$0.00	$92.61
	03/01/2023	$60.67	$13.00	$20.17	$0.00	$93.84
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING *ELECTRICIANS* *LOCAL 103*	09/01/2020	$40.84	$13.00	$17.53	$0.00	$71.37
	03/01/2021	$42.11	$13.00	$17.88	$0.00	$72.99
	09/01/2021	$43.77	$13.00	$18.00	$0.00	$74.77
	03/01/2022	$45.27	$13.00	$18.12	$0.00	$76.39
	09/01/2022	$46.99	$13.00	$18.24	$0.00	$78.23
	03/01/2023	$48.54	$13.00	$18.37	$0.00	$79.91
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$40.30	$13.00	$15.70	$0.00	$69.00
	12/01/2020	$41.25	$13.00	$15.70	$0.00	$69.95
	06/01/2021	$42.16	$13.00	$15.70	$0.00	$70.86
	12/01/2021	$43.11	$13.00	$15.70	$0.00	$71.81
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER *LABORERS - ZONE 1*	06/01/2020	$23.50	$8.60	$17.09	$0.00	$49.19
	12/01/2020	$24.50	$8.60	$17.09	$0.00	$50.19
	06/01/2021	$24.50	$8.60	$17.09	$0.00	$50.19
	12/01/2021	$24.50	$8.60	$17.09	$0.00	$50.19
For apprentice rates see "Apprentice- LABORER"						
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE 1*	09/01/2020	$47.85	$9.40	$19.25	$0.00	$76.50
	03/01/2021	$48.65	$9.40	$19.25	$0.00	$77.30
	09/01/2021	$49.45	$9.40	$19.25	$0.00	$78.10
	03/01/2022	$50.25	$9.40	$19.25	$0.00	$78.90

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *FLOORCOVERER - Local 2168 Zone I*

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.93	$9.40	$1.79	$0.00	$35.12
2	55	$26.32	$9.40	$1.79	$0.00	$37.51
3	60	$28.71	$9.40	$13.88	$0.00	$51.99
4	65	$31.10	$9.40	$13.88	$0.00	$54.38
5	70	$33.50	$9.40	$15.67	$0.00	$58.57
6	75	$35.89	$9.40	$15.67	$0.00	$60.96
7	80	$38.28	$9.40	$17.46	$0.00	$65.14
8	85	$40.67	$9.40	$17.46	$0.00	$67.53

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.33	$9.40	$1.79	$0.00	$35.52
2	55	$26.76	$9.40	$1.79	$0.00	$37.95
3	60	$29.19	$9.40	$13.88	$0.00	$52.47
4	65	$31.62	$9.40	$13.88	$0.00	$54.90
5	70	$34.06	$9.40	$15.67	$0.00	$59.13
6	75	$36.49	$9.40	$15.67	$0.00	$61.56
7	80	$38.92	$9.40	$17.46	$0.00	$65.78
8	85	$41.35	$9.40	$17.46	$0.00	$68.21

Notes: Steps are 750 hrs.
% After 09/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 $32.36/ 3&4 $38.80/ 5&6 $58.01/ 7&8 $64.50

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$49.33	$13.00	$15.70	$0.00	$78.03
	12/01/2020	$50.48	$13.00	$15.70	$0.00	$79.18
	06/01/2021	$51.58	$13.00	$15.70	$0.00	$80.28
	12/01/2021	$52.73	$13.00	$15.70	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$32.72	$13.00	$15.70	$0.00	$61.42
	12/01/2020	$33.50	$13.00	$15.70	$0.00	$62.20
	06/01/2021	$34.25	$13.00	$15.70	$0.00	$62.95
	12/01/2021	$35.04	$13.00	$15.70	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 35 (ZONE 2)*	07/01/2020	$41.01	$8.25	$22.40	$0.00	$71.66
	01/01/2021	$41.56	$8.25	$22.75	$0.00	$72.56

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *GLAZIER - Local 35 Zone 2*

Effective Date - 07/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.51	$8.25	$0.00	$0.00	$28.76
2	55	$22.56	$8.25	$6.05	$0.00	$36.86
3	60	$24.61	$8.25	$6.60	$0.00	$39.46
4	65	$26.66	$8.25	$7.15	$0.00	$42.06
5	70	$28.71	$8.25	$19.10	$0.00	$56.06
6	75	$30.76	$8.25	$19.65	$0.00	$58.66
7	80	$32.81	$8.25	$20.20	$0.00	$61.26
8	90	$36.91	$8.25	$21.30	$0.00	$66.46

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.78	$8.25	$0.00	$0.00	$29.03
2	55	$22.86	$8.25	$6.16	$0.00	$37.27
3	60	$24.94	$8.25	$6.72	$0.00	$39.91
4	65	$27.01	$8.25	$7.28	$0.00	$42.54
5	70	$29.09	$8.25	$19.39	$0.00	$56.73
6	75	$31.17	$8.25	$19.95	$0.00	$59.37
7	80	$33.25	$8.25	$20.51	$0.00	$62.01
8	90	$37.40	$8.25	$21.63	$0.00	$67.28

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$49.33	$13.00	$15.70	$0.00	$78.03
	12/01/2020	$50.48	$13.00	$15.70	$0.00	$79.18
	06/01/2021	$51.58	$13.00	$15.70	$0.00	$80.28
	12/01/2021	$52.73	$13.00	$15.70	$0.00	$81.43

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *OPERATING ENGINEERS - Local 4*

Effective Date - 06/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$27.13	$13.00	$0.00	$0.00	$40.13
2	60	$29.60	$13.00	$15.70	$0.00	$58.30
3	65	$32.06	$13.00	$15.70	$0.00	$60.76
4	70	$34.53	$13.00	$15.70	$0.00	$63.23
5	75	$37.00	$13.00	$15.70	$0.00	$65.70
6	80	$39.46	$13.00	$15.70	$0.00	$68.16
7	85	$41.93	$13.00	$15.70	$0.00	$70.63
8	90	$44.40	$13.00	$15.70	$0.00	$73.10

Effective Date - 12/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$27.76	$13.00	$0.00	$0.00	$40.76
2	60	$30.29	$13.00	$15.70	$0.00	$58.99
3	65	$32.81	$13.00	$15.70	$0.00	$61.51
4	70	$35.34	$13.00	$15.70	$0.00	$64.04
5	75	$37.86	$13.00	$15.70	$0.00	$66.56
6	80	$40.38	$13.00	$15.70	$0.00	$69.08
7	85	$42.91	$13.00	$15.70	$0.00	$71.61
8	90	$45.43	$13.00	$15.70	$0.00	$74.13

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 17 - A*	08/01/2020	$50.67	$13.50	$24.12	$2.65	$90.94
	02/01/2021	$52.32	$13.50	$24.12	$2.70	$92.64
	08/01/2021	$54.07	$13.50	$24.12	$2.75	$94.44
	02/01/2022	$55.82	$13.50	$24.12	$2.80	$96.24
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 103*	09/01/2020	$54.45	$13.00	$19.73	$0.00	$87.18
	03/01/2021	$55.41	$13.00	$20.01	$0.00	$88.42
	09/01/2021	$56.84	$13.00	$20.06	$0.00	$89.90
	03/01/2022	$58.04	$13.00	$20.09	$0.00	$91.13
	09/01/2022	$59.48	$13.00	$20.13	$0.00	$92.61
	03/01/2023	$60.67	$13.00	$20.17	$0.00	$93.84
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 17 - A*	08/01/2020	$50.67	$13.50	$24.12	$2.65	$90.94
	02/01/2021	$52.32	$13.50	$24.12	$2.70	$92.64
	08/01/2021	$54.07	$13.50	$24.12	$2.75	$94.44
	02/01/2022	$55.82	$13.50	$24.12	$2.80	$96.24
For apprentice rates see "Apprentice- SHEET METAL WORKER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (TESTING AND BALANCING -WATER) *PIPEFITTERS LOCAL 537*	09/01/2020	$57.69	$10.95	$19.74	$0.00	$88.38
	03/01/2021	$59.19	$10.95	$19.74	$0.00	$89.88
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC *PIPEFITTERS LOCAL 537*	09/01/2020	$57.69	$10.95	$19.74	$0.00	$88.38
	03/01/2021	$59.19	$10.95	$19.74	$0.00	$89.88
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS *LABORERS - ZONE 1*	06/01/2020	$39.90	$8.60	$17.09	$0.00	$65.59
	12/01/2020	$40.88	$8.60	$17.09	$0.00	$66.57
	06/01/2021	$41.90	$8.60	$17.09	$0.00	$67.59
	12/01/2021	$42.91	$8.60	$17.09	$0.00	$68.60
For apprentice rates see "Apprentice- LABORER"						
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	09/01/2019	$48.44	$12.80	$16.40	$0.00	$77.64

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

Effective Date - 09/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.22	$12.80	$11.90	$0.00	$48.92
2	60	$29.06	$12.80	$12.80	$0.00	$54.66
3	70	$33.91	$12.80	$13.70	$0.00	$60.41
4	80	$38.75	$12.80	$14.60	$0.00	$66.15

Notes:
Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER *IRONWORKERS LOCAL 7 (BOSTON AREA)*	03/16/2019	$46.66	$8.00	$23.50	$0.00	$78.16

Apprentice - *IRONWORKER - Local 7 Boston*

Effective Date - 03/16/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$28.00	$8.00	$23.50	$0.00	$59.50
2	70	$32.66	$8.00	$23.50	$0.00	$64.16
3	75	$35.00	$8.00	$23.50	$0.00	$66.50
4	80	$37.33	$8.00	$23.50	$0.00	$68.83
5	85	$39.66	$8.00	$23.50	$0.00	$71.16
6	90	$41.99	$8.00	$23.50	$0.00	$73.49

Notes:
** Structural 1:6; Ornamental 1:4

Apprentice to Journeyworker Ratio:**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 1*	06/01/2020	$39.40	$8.60	$17.09	$0.00	$65.09
	12/01/2020	$40.38	$8.60	$17.09	$0.00	$66.07
	06/01/2021	$41.40	$8.60	$17.09	$0.00	$67.09
	12/01/2021	$42.41	$8.60	$17.09	$0.00	$68.10
For apprentice rates see "Apprentice- LABORER"						
LABORER *LABORERS - ZONE 1*	06/01/2020	$39.15	$8.60	$17.09	$0.00	$64.84
	12/01/2020	$40.13	$8.60	$17.09	$0.00	$65.82
	06/01/2021	$41.15	$8.60	$17.09	$0.00	$66.84
	12/01/2021	$42.16	$8.60	$17.09	$0.00	$67.85

Apprentice - *LABORER - Zone 1*

Effective Date - 06/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$23.49	$8.60	$17.09	$0.00	$49.18
2	70	$27.41	$8.60	$17.09	$0.00	$53.10
3	80	$31.32	$8.60	$17.09	$0.00	$57.01
4	90	$35.24	$8.60	$17.09	$0.00	$60.93

Effective Date - 12/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$24.08	$8.60	$17.09	$0.00	$49.77
2	70	$28.09	$8.60	$17.09	$0.00	$53.78
3	80	$32.10	$8.60	$17.09	$0.00	$57.79
4	90	$36.12	$8.60	$17.09	$0.00	$61.81

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER: CARPENTER TENDER *LABORERS - ZONE 1*	06/01/2020	$39.15	$8.60	$17.09	$0.00	$64.84
	12/01/2020	$40.13	$8.60	$17.09	$0.00	$65.82
	06/01/2021	$41.15	$8.60	$17.09	$0.00	$66.84
	12/01/2021	$42.16	$8.60	$17.09	$0.00	$67.85
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 1*	06/01/2020	$39.15	$8.60	$17.09	$0.00	$64.84
	12/01/2020	$40.13	$8.60	$17.09	$0.00	$65.82
	06/01/2021	$41.15	$8.60	$17.09	$0.00	$66.84
	12/01/2021	$42.16	$8.60	$17.09	$0.00	$67.85
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 1*	06/01/2020	$39.30	$8.60	$17.09	$0.00	$64.99
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 1*	06/01/2020	$39.40	$8.60	$17.09	$0.00	$65.09
	12/01/2020	$40.38	$8.60	$17.09	$0.00	$66.07
	06/01/2021	$41.40	$8.60	$17.09	$0.00	$67.09
	12/01/2021	$42.41	$8.60	$17.09	$0.00	$68.10
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 1*	06/01/2020	$39.15	$8.60	$17.09	$0.00	$64.84
	12/01/2020	$40.13	$8.60	$17.09	$0.00	$65.82
	06/01/2021	$41.15	$8.60	$17.09	$0.00	$66.84
	12/01/2021	$42.16	$8.60	$17.09	$0.00	$67.85
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER *LABORERS - ZONE 1*	06/01/2020	$39.15	$8.60	$17.09	$0.00	$64.84
	12/01/2020	$40.13	$8.60	$17.09	$0.00	$65.82
	06/01/2021	$41.15	$8.60	$17.09	$0.00	$66.84
	12/01/2021	$42.16	$8.60	$17.09	$0.00	$67.85
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 1*	06/01/2020	$39.40	$8.60	$17.09	$0.00	$65.09
	12/01/2020	$40.38	$8.60	$17.09	$0.00	$66.07
	06/01/2021	$41.40	$8.60	$17.09	$0.00	$67.09
	12/01/2021	$42.41	$8.60	$17.09	$0.00	$68.10
For apprentice rates see "Apprentice- LABORER"						
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	08/01/2020	$42.57	$10.75	$20.27	$0.00	$73.59
	02/01/2021	$43.08	$10.75	$20.27	$0.00	$74.10
	08/01/2021	$44.20	$10.75	$20.43	$0.00	$75.38
	02/01/2022	$44.67	$10.75	$20.43	$0.00	$75.85

Apprentice - *MARBLE & TILE FINISHER - Local 3 Marble & Tile*

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.29	$10.75	$20.27	$0.00	$52.31
2	60	$25.54	$10.75	$20.27	$0.00	$56.56
3	70	$29.80	$10.75	$20.27	$0.00	$60.82
4	80	$34.06	$10.75	$20.27	$0.00	$65.08
5	90	$38.31	$10.75	$20.27	$0.00	$69.33

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.54	$10.75	$20.27	$0.00	$52.56
2	60	$25.85	$10.75	$20.27	$0.00	$56.87
3	70	$30.16	$10.75	$20.27	$0.00	$61.18
4	80	$34.46	$10.75	$20.27	$0.00	$65.48
5	90	$38.77	$10.75	$20.27	$0.00	$69.79

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS,TILELAYERS & TERRAZZO MECH *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	08/01/2020	$55.77	$10.75	$22.08	$0.00	$88.60
	02/01/2021	$56.41	$10.75	$22.08	$0.00	$89.24
	08/01/2021	$57.81	$10.75	$22.24	$0.00	$90.80
	02/01/2022	$58.38	$10.75	$22.24	$0.00	$91.37

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile*

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.89	$10.75	$22.08	$0.00	$60.72
2	60	$33.46	$10.75	$22.08	$0.00	$66.29
3	70	$39.04	$10.75	$22.08	$0.00	$71.87
4	80	$44.62	$10.75	$22.08	$0.00	$77.45
5	90	$50.19	$10.75	$22.08	$0.00	$83.02

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.21	$10.75	$22.08	$0.00	$61.04
2	60	$33.85	$10.75	$22.08	$0.00	$66.68
3	70	$39.49	$10.75	$22.08	$0.00	$72.32
4	80	$45.13	$10.75	$22.08	$0.00	$77.96
5	90	$50.77	$10.75	$22.08	$0.00	$83.60

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$48.81	$13.00	$15.70	$0.00	$77.51
	12/01/2020	$49.95	$13.00	$15.70	$0.00	$78.65
	06/01/2021	$51.04	$13.00	$15.70	$0.00	$79.74
	12/01/2021	$52.18	$13.00	$15.70	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$48.81	$13.00	$15.70	$0.00	$77.51
	12/01/2020	$49.95	$13.00	$15.70	$0.00	$78.65
	06/01/2021	$51.04	$13.00	$15.70	$0.00	$79.74
	12/01/2021	$52.18	$13.00	$15.70	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 1) *MILLWRIGHTS LOCAL 1121 - Zone 1*	04/01/2019	$42.22	$9.90	$18.50	$0.00	$70.62

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MILLWRIGHT - Local 1121 Zone 1*

Effective Date - 04/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$23.22	$9.90	$5.31	$0.00	$38.43
2	65	$27.44	$9.90	$15.13	$0.00	$52.47
3	75	$31.67	$9.90	$16.10	$0.00	$57.67
4	85	$35.89	$9.90	$17.06	$0.00	$62.85

Notes:

Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:5

MORTAR MIXER *LABORERS - ZONE 1*	06/01/2020	$39.40	$8.60	$17.09	$0.00	$65.09
	12/01/2020	$40.38	$8.60	$17.09	$0.00	$66.07
	06/01/2021	$41.40	$8.60	$17.09	$0.00	$67.09
	12/01/2021	$42.41	$8.60	$17.09	$0.00	$68.10
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$23.13	$13.00	$15.70	$0.00	$51.83
	12/01/2020	$23.70	$13.00	$15.70	$0.00	$52.40
	06/01/2021	$24.25	$13.00	$15.70	$0.00	$52.95
	12/01/2021	$24.83	$13.00	$15.70	$0.00	$53.53
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$27.79	$13.00	$15.70	$0.00	$56.49
	12/01/2020	$28.47	$13.00	$15.70	$0.00	$57.17
	06/01/2021	$29.11	$13.00	$15.70	$0.00	$57.81
	12/01/2021	$29.79	$13.00	$15.70	$0.00	$58.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$48.81	$13.00	$15.70	$0.00	$77.51
	12/01/2020	$49.95	$13.00	$15.70	$0.00	$78.65
	06/01/2021	$51.04	$13.00	$15.70	$0.00	$79.74
	12/01/2021	$52.18	$13.00	$15.70	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2020	$51.51	$8.25	$22.40	$0.00	$82.16
	01/01/2021	$52.06	$8.25	$22.75	$0.00	$83.06

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 07/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.76	$8.25	$0.00	$0.00	$34.01
2	55	$28.33	$8.25	$6.05	$0.00	$42.63
3	60	$30.91	$8.25	$6.60	$0.00	$45.76
4	65	$33.48	$8.25	$7.15	$0.00	$48.88
5	70	$36.06	$8.25	$19.10	$0.00	$63.41
6	75	$38.63	$8.25	$19.65	$0.00	$66.53
7	80	$41.21	$8.25	$20.20	$0.00	$69.66
8	90	$46.36	$8.25	$21.30	$0.00	$75.91

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.03	$8.25	$0.00	$0.00	$34.28
2	55	$28.63	$8.25	$6.16	$0.00	$43.04
3	60	$31.24	$8.25	$6.72	$0.00	$46.21
4	65	$33.84	$8.25	$7.28	$0.00	$49.37
5	70	$36.44	$8.25	$19.39	$0.00	$64.08
6	75	$39.05	$8.25	$19.95	$0.00	$67.25
7	80	$41.65	$8.25	$20.51	$0.00	$70.41
8	90	$46.85	$8.25	$21.63	$0.00	$76.73

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	07/01/2020	$41.21	$8.25	$22.40	$0.00	$71.86
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. *PAINTERS LOCAL 35 - ZONE 2*	01/01/2021	$42.96	$8.25	$22.75	$0.00	$73.96

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - New*

Effective Date - 07/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.61	$8.25	$0.00	$0.00	$28.86
2	55	$22.67	$8.25	$6.05	$0.00	$36.97
3	60	$24.73	$8.25	$6.60	$0.00	$39.58
4	65	$26.79	$8.25	$7.15	$0.00	$42.19
5	70	$28.85	$8.25	$19.10	$0.00	$56.20
6	75	$30.91	$8.25	$19.65	$0.00	$58.81
7	80	$32.97	$8.25	$20.20	$0.00	$61.42
8	90	$37.09	$8.25	$21.30	$0.00	$66.64

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.48	$8.25	$0.00	$0.00	$29.73
2	55	$23.63	$8.25	$6.16	$0.00	$38.04
3	60	$25.78	$8.25	$6.72	$0.00	$40.75
4	65	$27.92	$8.25	$7.28	$0.00	$43.45
5	70	$30.07	$8.25	$19.39	$0.00	$57.71
6	75	$32.22	$8.25	$19.95	$0.00	$60.42
7	80	$34.37	$8.25	$20.51	$0.00	$63.13
8	90	$38.66	$8.25	$21.63	$0.00	$68.54

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2020	$40.47	$8.25	$22.40	$0.00	$71.12
	01/01/2021	$41.02	$8.25	$22.75	$0.00	$72.02

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint*

Effective Date - 07/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.24	$8.25	$0.00	$0.00	$28.49
2	55	$22.26	$8.25	$6.05	$0.00	$36.56
3	60	$24.28	$8.25	$6.60	$0.00	$39.13
4	65	$26.31	$8.25	$7.15	$0.00	$41.71
5	70	$28.33	$8.25	$19.10	$0.00	$55.68
6	75	$30.35	$8.25	$19.65	$0.00	$58.25
7	80	$32.38	$8.25	$20.20	$0.00	$60.83
8	90	$36.42	$8.25	$21.30	$0.00	$65.97

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.51	$8.25	$0.00	$0.00	$28.76
2	55	$22.56	$8.25	$6.16	$0.00	$36.97
3	60	$24.61	$8.25	$6.72	$0.00	$39.58
4	65	$26.66	$8.25	$7.28	$0.00	$42.19
5	70	$28.71	$8.25	$19.39	$0.00	$56.35
6	75	$30.77	$8.25	$19.95	$0.00	$58.97
7	80	$32.82	$8.25	$20.51	$0.00	$61.58
8	90	$36.92	$8.25	$21.63	$0.00	$66.80

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (TRAFFIC MARKINGS) *LABORERS - ZONE 1*	06/01/2020	$39.15	$8.60	$17.09	$0.00	$64.84
	12/01/2020	$40.13	$8.60	$17.09	$0.00	$65.82
	06/01/2021	$41.15	$8.60	$17.09	$0.00	$66.84
	12/01/2021	$42.16	$8.60	$17.09	$0.00	$67.85
For Apprentice rates see "Apprentice- LABORER"						
PAINTER / TAPER (BRUSH, NEW) *	07/01/2020	$41.01	$8.25	$22.40	$0.00	$71.66
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2021	$41.56	$8.25	$22.75	$0.00	$72.56

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER - Local 35 Zone 2 - BRUSH NEW*

Effective Date - 07/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.51	$8.25	$0.00	$0.00	$28.76
2	55	$22.56	$8.25	$6.05	$0.00	$36.86
3	60	$24.61	$8.25	$6.60	$0.00	$39.46
4	65	$26.66	$8.25	$7.15	$0.00	$42.06
5	70	$28.71	$8.25	$19.10	$0.00	$56.06
6	75	$30.76	$8.25	$19.65	$0.00	$58.66
7	80	$32.81	$8.25	$20.20	$0.00	$61.26
8	90	$36.91	$8.25	$21.30	$0.00	$66.46

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.78	$8.25	$0.00	$0.00	$29.03
2	55	$22.86	$8.25	$6.16	$0.00	$37.27
3	60	$24.94	$8.25	$6.72	$0.00	$39.91
4	65	$27.01	$8.25	$7.28	$0.00	$42.54
5	70	$29.09	$8.25	$19.39	$0.00	$56.73
6	75	$31.17	$8.25	$19.95	$0.00	$59.37
7	80	$33.25	$8.25	$20.51	$0.00	$62.01
8	90	$37.40	$8.25	$21.63	$0.00	$67.28

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2020	$39.07	$8.25	$22.40	$0.00	$69.72
	01/01/2021	$39.62	$8.25	$22.75	$0.00	$70.62

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - BRUSH REPAINT*

Effective Date - 07/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.54	$8.25	$0.00	$0.00	$27.79
2	55	$21.49	$8.25	$6.05	$0.00	$35.79
3	60	$23.44	$8.25	$6.60	$0.00	$38.29
4	65	$25.40	$8.25	$7.15	$0.00	$40.80
5	70	$27.35	$8.25	$19.10	$0.00	$54.70
6	75	$29.30	$8.25	$19.65	$0.00	$57.20
7	80	$31.26	$8.25	$20.20	$0.00	$59.71
8	90	$35.16	$8.25	$21.30	$0.00	$64.71

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.81	$8.25	$0.00	$0.00	$28.06
2	55	$21.79	$8.25	$6.16	$0.00	$36.20
3	60	$23.77	$8.25	$6.72	$0.00	$38.74
4	65	$25.75	$8.25	$7.28	$0.00	$41.28
5	70	$27.73	$8.25	$19.39	$0.00	$55.37
6	75	$29.72	$8.25	$19.95	$0.00	$57.92
7	80	$31.70	$8.25	$20.51	$0.00	$60.46
8	90	$35.66	$8.25	$21.63	$0.00	$65.54

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2020	$36.08	$12.91	$13.72	$0.00	$62.71
	12/01/2020	$36.08	$12.91	$14.82	$0.00	$63.81
	06/01/2021	$36.88	$12.91	$14.82	$0.00	$64.61
	08/01/2021	$36.88	$13.41	$14.82	$0.00	$65.11
	12/01/2021	$36.88	$13.41	$16.01	$0.00	$66.30
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2019	$48.94	$9.90	$21.15	$0.00	$79.99
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2019	$48.94	$9.90	$21.15	$0.00	$79.99

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PILE DRIVER - Local 56 Zone 1*

Effective Date - 08/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.47	$9.90	$21.15	$0.00	$55.52
2	60	$29.36	$9.90	$21.15	$0.00	$60.41
3	70	$34.26	$9.90	$21.15	$0.00	$65.31
4	75	$36.71	$9.90	$21.15	$0.00	$67.76
5	80	$39.15	$9.90	$21.15	$0.00	$70.20
6	80	$39.15	$9.90	$21.15	$0.00	$70.20
7	90	$44.05	$9.90	$21.15	$0.00	$75.10
8	90	$44.05	$9.90	$21.15	$0.00	$75.10

Notes:

Apprentice to Journeyworker Ratio:1:5

PIPEFITTER & STEAMFITTER *PIPEFITTERS LOCAL 537*	09/01/2020	$57.69	$10.95	$19.74	$0.00	$88.38
	03/01/2021	$59.19	$10.95	$19.74	$0.00	$89.88

Apprentice - *PIPEFITTER - Local 537*

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$23.08	$10.95	$8.00	$0.00	$42.03
2	45	$25.96	$10.95	$19.74	$0.00	$56.65
3	60	$34.61	$10.95	$19.74	$0.00	$65.30
4	70	$40.38	$10.95	$19.74	$0.00	$71.07
5	80	$46.15	$10.95	$19.74	$0.00	$76.84

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$23.68	$10.95	$8.00	$0.00	$42.63
2	45	$26.64	$10.95	$19.74	$0.00	$57.33
3	60	$35.51	$10.95	$19.74	$0.00	$66.20
4	70	$41.43	$10.95	$19.74	$0.00	$72.12
5	80	$47.35	$10.95	$19.74	$0.00	$78.04

Notes:

** 1:3; 3:15; 1:10 thereafter / Steps are 1 yr.

Refrig/AC Mechanic **1:1;1:2;2:4;3:6;4:8;5:10;6:12;7:14;8:17;9:20;10:23(Max)

Apprentice to Journeyworker Ratio:**

PIPELAYER *LABORERS - ZONE 1*	06/01/2020	$39.40	$8.60	$17.09	$0.00	$65.09
	12/01/2020	$40.38	$8.60	$17.09	$0.00	$66.07
	06/01/2021	$41.40	$8.60	$17.09	$0.00	$67.09
	12/01/2021	$42.41	$8.60	$17.09	$0.00	$68.10

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PLUMBERS & GASFITTERS *PLUMBERS & GASFITTERS LOCAL 12*	09/01/2020	$58.69	$13.57	$17.26	$0.00	$89.52
	03/01/2021	$60.19	$13.57	$17.26	$0.00	$91.02

Apprentice - *PLUMBER/GASFITTER - Local 12*

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$20.54	$13.57	$6.24	$0.00	$40.35
2	40	$23.48	$13.57	$7.08	$0.00	$44.13
3	55	$32.28	$13.57	$9.63	$0.00	$55.48
4	65	$38.15	$13.57	$11.33	$0.00	$63.05
5	75	$44.02	$13.57	$13.03	$0.00	$70.62

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$21.07	$13.57	$6.24	$0.00	$40.88
2	40	$24.08	$13.57	$7.08	$0.00	$44.73
3	55	$33.10	$13.57	$9.63	$0.00	$56.30
4	65	$39.12	$13.57	$11.33	$0.00	$64.02
5	75	$45.14	$13.57	$13.03	$0.00	$71.74

Notes:
** 1:2; 2:6; 3:10; 4:14; 5:19/Steps are 1 yr
Step4 with lic$66.82, Step5 with lic$74.39

Apprentice to Journeyworker Ratio:**

PNEUMATIC CONTROLS (TEMP.) *PIPEFITTERS LOCAL 537*	09/01/2020	$57.69	$10.95	$19.74	$0.00	$88.38
	03/01/2021	$59.17	$10.95	$19.74	$0.00	$89.86
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 1*	06/01/2020	$39.40	$8.60	$17.09	$0.00	$65.09
	12/01/2020	$40.38	$8.60	$17.09	$0.00	$66.07
	06/01/2021	$41.40	$8.60	$17.09	$0.00	$67.09
	12/01/2021	$42.41	$8.60	$17.09	$0.00	$68.10
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER *LABORERS - ZONE 1*	06/01/2020	$40.15	$8.60	$17.09	$0.00	$65.84
	12/01/2020	$41.13	$8.60	$17.09	$0.00	$66.82
	06/01/2021	$42.15	$8.60	$17.09	$0.00	$67.84
	12/01/2021	$43.16	$8.60	$17.09	$0.00	$68.85
For apprentice rates see "Apprentice- LABORER"						
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$49.33	$13.00	$15.70	$0.00	$78.03
	12/01/2020	$50.48	$13.00	$15.70	$0.00	$79.18
	06/01/2021	$51.58	$13.00	$15.70	$0.00	$80.28
	12/01/2021	$52.73	$13.00	$15.70	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$49.33	$13.00	$15.70	$0.00	$78.03
	12/01/2020	$50.48	$13.00	$15.70	$0.00	$79.18
	06/01/2021	$51.58	$13.00	$15.70	$0.00	$80.28
	12/01/2021	$52.73	$13.00	$15.70	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$32.72	$13.00	$15.70	$0.00	$61.42
	12/01/2020	$33.50	$13.00	$15.70	$0.00	$62.20
	06/01/2021	$34.25	$13.00	$15.70	$0.00	$62.95
	12/01/2021	$35.04	$13.00	$15.70	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER *TEAMSTERS 170 - Rosenfeld (Walpole)*	01/01/2020	$23.50	$11.01	$8.00	$0.00	$42.51
	01/01/2021	$23.50	$11.51	$8.00	$0.00	$43.01
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$48.81	$13.00	$15.70	$0.00	$77.51
	12/01/2020	$49.95	$13.00	$15.70	$0.00	$78.65
	06/01/2021	$51.04	$13.00	$15.70	$0.00	$79.74
	12/01/2021	$52.18	$13.00	$15.70	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 1*	06/01/2020	$39.40	$8.60	$17.09	$0.00	$65.09
	12/01/2020	$40.38	$8.60	$17.09	$0.00	$66.07
	06/01/2021	$41.40	$8.60	$17.09	$0.00	$67.09
	12/01/2021	$42.41	$8.60	$17.09	$0.00	$68.10
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$48.81	$13.00	$15.70	$0.00	$77.51
	12/01/2020	$49.95	$13.00	$15.70	$0.00	$78.65
	06/01/2021	$51.04	$13.00	$15.70	$0.00	$79.74
	12/01/2021	$52.18	$13.00	$15.70	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofing &Roofer Damproofg) *ROOFERS LOCAL 33*	08/01/2020	$46.60	$11.75	$16.15	$0.00	$74.50
	02/01/2021	$48.03	$11.75	$16.15	$0.00	$75.93
	08/01/2021	$49.46	$11.75	$16.15	$0.00	$77.36
	02/01/2022	$50.89	$11.75	$16.15	$0.00	$78.79

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ROOFER - Local 33*

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.30	$11.75	$3.81	$0.00	$38.86
2	60	$27.96	$11.75	$16.15	$0.00	$55.86
3	65	$30.29	$11.75	$16.15	$0.00	$58.19
4	75	$34.95	$11.75	$16.15	$0.00	$62.85
5	85	$39.61	$11.75	$16.15	$0.00	$67.51

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.02	$11.75	$3.81	$0.00	$39.58
2	60	$28.82	$11.75	$16.15	$0.00	$56.72
3	65	$31.22	$11.75	$16.15	$0.00	$59.12
4	75	$36.02	$11.75	$16.15	$0.00	$63.92
5	85	$40.83	$11.75	$16.15	$0.00	$68.73

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
(Hot Pitch Mechanics' receive $1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	08/01/2020	$46.85	$11.75	$16.15	$0.00	$74.75
	02/01/2021	$48.28	$11.75	$16.15	$0.00	$76.18
	08/01/2021	$49.71	$11.75	$16.15	$0.00	$77.61
	02/01/2022	$51.14	$11.75	$16.15	$0.00	$79.04
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 17 - A*	08/01/2020	$50.67	$13.50	$24.12	$2.65	$90.94
	02/01/2021	$52.32	$13.50	$24.12	$2.70	$92.64
	08/01/2021	$54.07	$13.50	$24.12	$2.75	$94.44
	02/01/2022	$55.82	$13.50	$24.12	$2.80	$96.24

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SHEET METAL WORKER - Local 17-A*

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	$21.28	$13.50	$5.89	$0.00	$40.67
2	42	$21.28	$13.50	$5.89	$0.00	$40.67
3	47	$23.81	$13.50	$11.13	$1.45	$49.89
4	47	$23.81	$13.50	$11.13	$1.45	$49.89
5	52	$26.35	$13.50	$12.08	$1.56	$53.49
6	52	$26.35	$13.50	$12.33	$1.57	$53.75
7	60	$30.40	$13.50	$13.70	$1.73	$59.33
8	65	$32.94	$13.50	$15.15	$1.83	$63.42
9	75	$38.00	$13.50	$16.56	$2.04	$70.10
10	85	$43.07	$13.50	$17.96	$2.24	$76.77

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	$21.97	$13.50	$5.89	$0.00	$41.36
2	42	$21.97	$13.50	$5.89	$0.00	$41.36
3	47	$24.59	$13.50	$11.13	$1.48	$50.70
4	47	$24.59	$13.50	$11.13	$1.48	$50.70
5	52	$27.21	$13.50	$12.08	$1.58	$54.37
6	52	$27.21	$13.50	$12.33	$1.59	$54.63
7	60	$31.39	$13.50	$13.70	$1.76	$60.35
8	65	$34.01	$13.50	$15.15	$1.88	$64.54
9	75	$39.24	$13.50	$16.56	$2.08	$71.38
10	85	$44.47	$13.50	$17.96	$2.28	$78.21

Notes:
Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2020	$36.54	$12.91	$13.72	$0.00	$63.17
	12/01/2020	$36.54	$12.91	$14.82	$0.00	$64.27
	06/01/2021	$37.34	$12.91	$14.82	$0.00	$65.07
	08/01/2021	$37.34	$13.41	$14.82	$0.00	$65.57
	12/01/2021	$37.34	$13.41	$16.01	$0.00	$66.76
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2020	$36.83	$12.91	$13.72	$0.00	$63.46
	12/01/2020	$36.83	$12.91	$14.82	$0.00	$64.56
	06/01/2021	$37.63	$12.91	$14.82	$0.00	$65.36
	08/01/2021	$37.63	$13.41	$14.82	$0.00	$65.86
	12/01/2021	$37.63	$13.41	$16.01	$0.00	$67.05
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1*	03/01/2020	$60.82	$9.68	$20.55	$0.00	$91.05
	10/01/2020	$62.32	$9.68	$20.55	$0.00	$92.55
	03/01/2021	$63.82	$9.68	$20.55	$0.00	$94.05

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SPRINKLER FITTER - Local 550 (Section A) Zone 1*

Effective Date - 03/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$21.29	$9.68	$11.61	$0.00	$42.58
2	40	$24.33	$9.68	$12.30	$0.00	$46.31
3	45	$27.37	$9.68	$12.99	$0.00	$50.04
4	50	$30.41	$9.68	$13.73	$0.00	$53.82
5	55	$33.45	$9.68	$14.36	$0.00	$57.49
6	60	$36.49	$9.68	$15.05	$0.00	$61.22
7	65	$39.53	$9.68	$15.74	$0.00	$64.95
8	70	$42.57	$9.68	$16.43	$0.00	$68.68
9	75	$45.62	$9.68	$17.11	$0.00	$72.41
10	80	$48.66	$9.68	$17.80	$0.00	$76.14

Effective Date - 10/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$21.81	$9.68	$11.61	$0.00	$43.10
2	40	$24.93	$9.68	$12.30	$0.00	$46.91
3	45	$28.04	$9.68	$12.99	$0.00	$50.71
4	50	$31.16	$9.68	$13.73	$0.00	$54.57
5	55	$34.28	$9.68	$14.36	$0.00	$58.32
6	60	$37.39	$9.68	$15.05	$0.00	$62.12
7	65	$40.51	$9.68	$15.74	$0.00	$65.93
8	70	$43.62	$9.68	$16.43	$0.00	$69.73
9	75	$46.74	$9.68	$17.11	$0.00	$73.53
10	80	$49.86	$9.68	$17.80	$0.00	$77.34

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio: 1:3

STEAM BOILER OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$48.81	$13.00	$15.70	$0.00	$77.51
	12/01/2020	$49.95	$13.00	$15.70	$0.00	$78.65
	06/01/2021	$51.04	$13.00	$15.70	$0.00	$79.74
	12/01/2021	$52.18	$13.00	$15.70	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$48.81	$13.00	$15.70	$0.00	$77.51
	12/01/2020	$49.95	$13.00	$15.70	$0.00	$78.65
	06/01/2021	$51.04	$13.00	$15.70	$0.00	$79.74
	12/01/2021	$52.18	$13.00	$15.70	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TELECOMMUNICATION TECHNICIAN *ELECTRICIANS LOCAL 103*	09/01/2020	$40.84	$13.00	$17.53	$0.00	$71.37
	03/01/2021	$42.11	$13.00	$17.88	$0.00	$72.99
	09/01/2021	$43.77	$13.00	$18.00	$0.00	$74.77
	03/01/2022	$45.27	$13.00	$18.12	$0.00	$76.39
	09/01/2022	$46.99	$13.00	$18.24	$0.00	$78.23
	03/01/2023	$48.54	$13.00	$18.37	$0.00	$79.91

Apprentice - *TELECOMMUNICATION TECHNICIAN - Local 103*

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$18.38	$13.00	$0.55	$0.00	$31.93
2	45	$18.38	$13.00	$0.55	$0.00	$31.93
3	50	$20.42	$13.00	$14.20	$0.00	$47.62
4	50	$20.42	$13.00	$14.20	$0.00	$47.62
5	55	$22.46	$13.00	$14.53	$0.00	$49.99
6	60	$24.50	$13.00	$14.87	$0.00	$52.37
7	65	$26.55	$13.00	$15.20	$0.00	$54.75
8	70	$28.59	$13.00	$15.53	$0.00	$57.12
9	75	$30.63	$13.00	$15.87	$0.00	$59.50
10	80	$32.67	$13.00	$16.20	$0.00	$61.87

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$18.95	$13.00	$0.57	$0.00	$32.52
2	45	$18.95	$13.00	$0.57	$0.00	$32.52
3	50	$21.06	$13.00	$14.47	$0.00	$48.53
4	50	$21.06	$13.00	$14.47	$0.00	$48.53
5	55	$23.16	$13.00	$14.80	$0.00	$50.96
6	60	$25.27	$13.00	$15.14	$0.00	$53.41
7	65	$27.37	$13.00	$15.47	$0.00	$55.84
8	70	$29.48	$13.00	$15.80	$0.00	$58.28
9	75	$31.58	$13.00	$16.15	$0.00	$60.73
10	80	$33.69	$13.00	$16.48	$0.00	$63.17

Notes:

Apprentice to Journeyworker Ratio:1:1

TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	08/01/2020	$54.69	$10.75	$22.09	$0.00	$87.53
	02/01/2021	$55.33	$10.75	$22.09	$0.00	$88.17
	08/01/2021	$56.73	$10.75	$22.25	$0.00	$89.73
	02/01/2022	$57.32	$10.75	$22.25	$0.00	$90.32

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *TERRAZZO FINISHER - Local 3 Marble & Tile*

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.35	$10.75	$22.09	$0.00	$60.19
2	60	$32.81	$10.75	$22.09	$0.00	$65.65
3	70	$38.28	$10.75	$22.09	$0.00	$71.12
4	80	$43.75	$10.75	$22.09	$0.00	$76.59
5	90	$49.22	$10.75	$22.09	$0.00	$82.06

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.67	$10.75	$22.09	$0.00	$60.51
2	60	$33.20	$10.75	$22.09	$0.00	$66.04
3	70	$38.73	$10.75	$22.09	$0.00	$71.57
4	80	$44.26	$10.75	$22.09	$0.00	$77.10
5	90	$49.80	$10.75	$22.09	$0.00	$82.64

Notes:

Apprentice to Journeyworker Ratio: 1:3

TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE*	06/01/2020	$40.55	$8.60	$17.24	$0.00	$66.39
	12/01/2020	$41.53	$8.60	$17.24	$0.00	$67.37
	06/01/2021	$42.55	$8.60	$17.24	$0.00	$68.39
	12/01/2021	$43.56	$8.60	$17.24	$0.00	$69.40
For apprentice rates see "Apprentice- LABORER"						
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE*	06/01/2020	$39.27	$8.60	$17.24	$0.00	$65.11
	12/01/2020	$40.25	$8.60	$17.24	$0.00	$66.09
	06/01/2021	$41.27	$8.60	$17.24	$0.00	$67.11
	12/01/2021	$42.28	$8.60	$17.24	$0.00	$68.12
For apprentice rates see "Apprentice- LABORER"						
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE*	06/01/2020	$39.15	$8.60	$17.24	$0.00	$64.99
	12/01/2020	$40.13	$8.60	$17.24	$0.00	$65.97
	06/01/2021	$41.15	$8.60	$17.24	$0.00	$66.99
	12/01/2021	$42.16	$8.60	$17.24	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$48.81	$13.00	$15.70	$0.00	$77.51
	12/01/2020	$49.95	$13.00	$15.70	$0.00	$78.65
	06/01/2021	$51.04	$13.00	$15.70	$0.00	$79.74
	12/01/2021	$52.18	$13.00	$15.70	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2020	$37.12	$12.91	$13.72	$0.00	$63.75
	12/01/2020	$37.12	$12.91	$14.82	$0.00	$64.85
	06/01/2021	$37.92	$12.91	$14.82	$0.00	$65.65
	08/01/2021	$37.92	$13.41	$14.82	$0.00	$66.15
	12/01/2021	$37.92	$13.41	$16.01	$0.00	$67.34
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)*	06/01/2020	$51.38	$8.60	$17.69	$0.00	$77.67
	12/01/2020	$52.36	$8.60	$17.69	$0.00	$78.65
	06/01/2021	$53.38	$8.60	$17.69	$0.00	$79.67
	12/01/2021	$54.39	$8.60	$17.69	$0.00	$80.68
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)*	06/01/2020	$53.38	$8.60	$17.69	$0.00	$79.67
	12/01/2020	$54.36	$8.60	$17.69	$0.00	$80.65
	06/01/2021	$55.38	$8.60	$17.69	$0.00	$81.67
	12/01/2021	$56.39	$8.60	$17.69	$0.00	$82.68
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)*	06/01/2020	$43.45	$8.60	$17.69	$0.00	$69.74
	12/01/2020	$44.43	$8.60	$17.69	$0.00	$70.72
	06/01/2021	$45.45	$8.60	$17.69	$0.00	$71.74
	12/01/2021	$46.46	$8.60	$17.69	$0.00	$72.75
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)*	06/01/2020	$45.45	$8.60	$17.69	$0.00	$71.74
	12/01/2020	$46.43	$8.60	$17.69	$0.00	$72.72
	06/01/2021	$47.45	$8.60	$17.69	$0.00	$73.74
	12/01/2021	$48.46	$8.60	$17.69	$0.00	$74.75
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE A*	08/01/2020	$36.54	$12.91	$13.72	$0.00	$63.17
	12/01/2020	$36.54	$12.91	$14.82	$0.00	$64.27
	06/01/2021	$37.34	$12.91	$14.82	$0.00	$65.07
	08/01/2021	$37.34	$13.41	$14.82	$0.00	$65.57
	12/01/2021	$37.34	$13.41	$16.01	$0.00	$66.76
WAGON DRILL OPERATOR *LABORERS - ZONE 1*	06/01/2020	$39.40	$8.60	$17.09	$0.00	$65.09
	12/01/2020	$40.38	$8.60	$17.09	$0.00	$66.07
	06/01/2021	$41.40	$8.60	$17.09	$0.00	$67.09
	12/01/2021	$42.41	$8.60	$17.09	$0.00	$68.10
For apprentice rates see "Apprentice- LABORER"						
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2020	$49.33	$13.00	$15.70	$0.00	$78.03
	12/01/2020	$50.48	$13.00	$15.70	$0.00	$79.18
	06/01/2021	$51.58	$13.00	$15.70	$0.00	$80.28
	12/01/2021	$52.73	$13.00	$15.70	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER *PLUMBERS & GASFITTERS LOCAL 12*	09/01/2020	$58.69	$13.57	$17.26	$0.00	$89.52
	03/01/2021	$60.19	$13.57	$17.26	$0.00	$91.02
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$29.67	$9.25	$1.89	$0.00	$40.81
For apprentice rates see "Apprentice- LINEMAN"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CABLEMAN (Underground Ducts & Cables) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$42.03	$9.25	$10.27	$0.00	$61.55
DRIVER / GROUNDMAN CDL *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$34.62	$9.25	$10.07	$0.00	$53.94
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
EQUIPMENT OPERATOR (Class A CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$42.03	$9.25	$14.35	$0.00	$65.63
EQUIPMENT OPERATOR (Class B CDL) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$37.09	$9.25	$10.87	$0.00	$57.21
GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$22.25	$9.25	$1.67	$0.00	$33.17
GROUNDMAN -Inexperienced (<2000 Hrs.) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104* For apprentice rates see "Apprentice- LINEMAN"	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
JOURNEYMAN LINEMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	08/30/2020	$49.45	$9.25	$17.48	$0.00	$76.18

Apprentice - *LINEMAN (Outside Electrical) - East Local 104*

Effective Date - 08/30/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$29.67	$9.25	$3.39	$0.00	$42.31
2	65	$32.14	$9.25	$3.46	$0.00	$44.85
3	70	$34.62	$9.25	$3.54	$0.00	$47.41
4	75	$37.09	$9.25	$5.11	$0.00	$51.45
5	80	$39.56	$9.25	$5.19	$0.00	$54.00
6	85	$42.03	$9.25	$5.26	$0.00	$56.54
7	90	$44.51	$9.25	$7.34	$0.00	$61.10

Notes:

Apprentice to Journeyworker Ratio: 1:2

TELEDATA CABLE SPLICER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$30.73	$4.70	$3.17	$0.00	$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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.

Massachusetts Prevailing Wage Law
M.G.L. ch. 149, §§ 26 – 27

NOTICE TO AWARDING AUTHORITIES

- 'The enclosed wage schedule applies only to the specific project listed at the top and will be updated for any public construction project lasting longer than one (1) year.
- 'You should request an updated wage schedule from the Division of Occupational Safety if you have not opened bids or selected a contractor within 90 days of the date of issuance of the enclosed wage schedule.
- 'The wage schedule shall be incorporated in any advertisement or call for bids for the project for which it has been issued.
- 'Once a contractor has been selected by the awarding authority, the wage schedule shall be made a part of the contract for that project.

NOTICE TO CONTRACTORS

- The enclosed wage schedule, and any updated schedule, must be posted in a conspicuous place at the work site during the life of the project.
- The wages listed on the enclosed wage schedule must be paid to employees on public works projects regardless of whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- The enclosed wage schedule applies to all phases of the project including the final clean-up. Contractors whose only role is to perform final clean-up must pay their employees according to this wage schedule.
- All apprentices must be registered with the Massachusetts Division of Apprentice Training in order to be paid at the reduced apprentice rates. If a worker is not registered with the Division of Apprentice Training, they must be paid the “total rate” listed on the wage schedule regardless of experience or skill level. For further information, please call (617) 727-3486 or write to the Division of Apprentice Training, 399 Washington Street, 4th Floor, Boston, MA 02108

WEEKLY PAYROLL RECORDS REPORT
& STATEMENT OF COMPLIANCE

In accordance with Massachusetts General Law c149, §27B, a true and accurate record must be kept of all persons employed on the public works project for which the enclosed rates have been provided. A Payroll Form has been printed on the reverse of this page and includes all the information required to be kept by law. Every contractor or subcontractor is required to keep these records and preserve them for a period of three years from the date of completion of the contract.

In addition, every contractor and subcontractor is required to submit a copy of their weekly payroll records to the awarding authority. This is required to be done on a weekly basis. Once collected, the awarding authority is also required to preserve those records for three years.

In addition, each such contractor, subcontractor or public body shall furnish to the Department of Labor & Workforce Development/Division of Occupational Safety within fifteen days after completion of its portion of the work a statement, executed by the contractor, subcontractor or public body who supervises the payment of wages, in the following form:

STATEMENT OF COMPLIANCE

_____, 2020

I,_____,_____
(Name of signatory party) (Title)
do hereby state:
That I pay or supervise the payment of the persons employed by
_____ on the _____
(Contractor, subcontractor or public body) (Building or project)
and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty nine of the General Laws.

Signature _____

Title _____

DIVISION OF OCCUPATIONAL SAFETY, 399 WASHINGTON STREET, 5TH FL., BOSTON, MA. 02108

WEEKLY PAYROLL REPORT FORM

Company Name:

Project Name:

Awarding Auth.:

Work Week Ending:

Prime Contractor

Subcontractor
List Prime Contractor:

Employer Signature:

Print Name & Title:

Employee Name & Address	Work Classification	Hours Worked							(A) Tot. Hrs.	(B) Hourly Base Wage	Employer Contributions			(F) [B+C+D+E] Hourly Total Wage (prev. wage)	(G) [A*F] Weekly Total Amount
											(C) Health & Welfare	(D) Pension	(E) Supp. Unemp.		
		S	M	T	W	T	F	S							

NOTE: Every contractor and subcontractor is required to submit a copy of their weekly payroll records to the awarding authority.

INDEX

DIVISION 1 GENERAL REQUIREMENTS

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of this Contract generally consists of the rehabilitation of the Waban Hill Reservoir's central core standpipe, replacement and rehabilitation of associated valves and piping, and removal and replacement of the asphalt shingle roofing system including but not limited to:

1. Roofing improvements including:
   i. Remove existing asphalt shingles. Furnish and install new asphalt shingles.
   ii. Furnish and install ice & water shield within 6-feet of roof edge. Furnish and install new underlayment along remaining roof area.
   iii. Furnish and install new flashing and trim boards including PVC facia trim boards and vented vinyl soffit with insect screens.
   iv. Remove and replace cupola. New cupola shall include insect and security screening.
   v. Remove existing skylights. Furnish and install new skylights (4 total).
2. Remove four (4) 24" discharge gate valves along bottom of central core.
3. Remove all flanges.
4. Install new stainless-steel piping as shown on the Contract Drawings. Use existing piping as host pipe. Sleeve new piping inside existing piping into each cell with link seals.
5. Install four (4) new 20" butterfly valves.
6. Install conduit for wiring from discharge piping to PLC at doorway for Cl2 monitors (Monitors to be furnished and installed by MWRA.). Includes allowance for City's SCADA integrator, Woodard & Curran, to wire and program at PLC.
7. Concrete surface repair (Approximately 100 square feet).
8. Sand blast exterior of all process piping.
9. Sand blasting, pit filler, pit welding, and plate welding interior and exterior of central core standpipe.
10. Repoint all brick work at base of central core standpipe.
11. Paint exterior of all process piping.
12. Paint interior and exterior of central core standpipe.
13. Install fiberglass-reinforced plastic (FRP) or high-density cross-linked polyethylene (HDXLPE) covers on central core standpipe and overflow. Provide manway with bolted hatch on cover for central core standpipe for inspection. Provide screened vent on both covers.
14. Clean/Vacuum four (4) 2.5 million-gallon chambers of Waban Hill Reservoir and include inspection report. All work shall be completed to AWWA standards through the use of divers or remotely operated vehicles.
15. Inspect, tighten, or replace all light fixture brackets/supports.
16. Provide new LED lamps at all existing lighting locations.
17. Remove and replace entry door frame and door. New hardware including hinges, knobs, and deadbolts. All locks shall be keyed to City's existing locks. Incorporate existing door alarm.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION

SECTION 01013

FACILITY INTERFERENCE WITH PROPOSED WORK

PART 1 GENERAL

1.01 LOCATION OF FACILITIES

A. Facilities locations shown on the Drawings are from the best sources available to the Owner at the time of this Contract preparation and are furnished only for information and convenience of the Contractor and are not guaranteed.

1. It is agreed and understood that the Owner does not warrant or guarantee that the locations of existing pipes, structures or other phenomena encountered during construction shall be the same as those shown on the Drawings.
2. It is further agreed and understood that the Contractor shall not use or be entitled to use any of the information made available to him on the plans or obtained in any examination made by him as a basis of any claim or demand against the Owner or the Engineer, because of any variance between the information made available and the locations of natural phenomena, existing pipes or other structures as encountered during the construction work, except as may otherwise be provided for this Section.
3. The Contractor shall take all necessary steps, including field inspections and consultations with the Utility Owner, to ensure that the most up to date information and accurate information available is used to mark the field location of the facilities, prior to construction.

1.02 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.03 PIPE LOCATIONS

A. Pipelines and structures installed under this Contract will be located substantially as indicated on the Drawings. The Engineer reserves the right to make such modifications in location and grade as may be found desirable to avoid interference with existing structures and/or facilities or to avoid unsatisfactory locations, all as he may see fit as in the best interests of the Owner.

1.04 CONDITION OF EXISTING FACILITIES

A. In general, poor physical condition of existing facilities shall not be an acceptable basis for claiming additional compensation.

1. Further, protection or repair of existing facilities shall not be considered as a valid basis for additional compensation.
2. The Contractor shall take all prudent steps to make himself aware of the physical condition of the existing facilities expected to be encountered, and to adjust his operations accordingly.

PART 2 PRODUCTS (not applicable)

PART 3 EXECUTION (not applicable)

END OF SECTION

SECTION 01019

DRAWINGS

PART 1 GENERAL

1.01 DESCRIPTION

A. Bid Documents:
1. Drawings must be obtained through the City of Newton Purchasing Department. The drawings can be obtained at the City's Website (**www.newtonma.gov/gov/purchasing/current**).

B. The Contract Drawings may be modified by addenda and shall be issued for construction purposes.
1. These Drawings may be supplemented or superseded by such additional general and detail drawings as may be necessary and desirable as the work progresses.
2. The Drawings issued for construction at that time or after the signing of the Contract Documents shall become the Contract Drawings.

C. Dimensions:
1. Except where noted, the Drawings are made to scale, but all working dimensions shall be taken from the figured dimensions or by actual measurements at the work, and in no case by scaling the prints.
2. The Contractor shall study and compare all Drawings and verify all figures before laying out or constructing the work and shall be responsible for any and all errors in the Contract work which might have been avoided thereby.
3. The Contractor shall take all measurements of existing established conditions notwithstanding the figured dimensions on the Drawings.
4. When figured dimensions are not in agreement with the Contractor's measurements, the Engineer shall be immediately notified and the Engineer will promptly adjust the same.
5. Whether or not an error is believed to exist, deviations from the Drawings and the dimensions given thereon shall be made only after approval in writing is obtained from the Engineer.

D. Diagrammatic Drawings:
1. Plans or Drawings where the work is shown diagrammatically indicate approved working systems. Every piece of material, fittings, fixtures or small equipment is not shown, nor every difficulty or interference that may be encountered to carry out the true intent and purpose of the Contract Documents.
2. All necessary parts to make complete, approved working systems or installation shall be included as if detailed on these Drawings.
3. The location of pipelines and appurtenances shown on the Drawings, unless exactly dimensioned, shall be considered as approximate only.
4. The Contractor shall adjust the position of the pipelines and appurtenances in accordance with good working practices to meet interferences, provide proper clearance and provide proper access space for operation and maintenance.

E. Typical Details:
1. Where shown on the Drawings, typical details shall apply to each and every item of the Contract work where such items are incorporated and the detail is applicable.
2. Unless noted otherwise, such typical details shall be applicable in full.

F. Copies of Drawings Furnished:
1. The Engineer shall furnish the Contractor, without charge, up to six copies of the Drawings and Specifications for execution of the Contract work.
2. Additional copies will be furnished at the Contractor's expense when requested, except that any copies of available plans and specifications returned from the bidders in good condition will be furnished to the Contractor without charge.
3. All Drawings and Specifications are the property of the Owner.
4. The Contractor shall return all copies if so requested.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.01 EXISTING AND ADJACENT CONDITIONS

A. Wherever existing conditions or construction not required as part of the work of the Contract are shown, they are so shown as a source of information only. The Engineer, while believing such information is substantially correct, assumes no responsibility thereof.

1. Before starting any work that might be affected by such existing construction or conditions, the Contractor shall have made himself familiar with all conditions affecting the nature and manner of performing the work, and shall not be entitled to any extra compensation for any work or expense arising from or caused by his neglect to have verified all existing conditions and requirements.

3.02 DISCREPANCIES

A. If the Contractor, during the progress of the work, discovers any discrepancies between the Drawings and the Specifications, any errors or omissions on the Drawings, or any discrepancies between the physical condition of the Work and the Drawings, then the Contractor shall immediately notify the Engineer, who will promptly adjust the same. Any work performed after such discovery without the approval of the Engineer, shall be at the risk and expense of the Contractor.

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 DESCRIPTION

A. The following sub-sections describe the measurement of and payment for the Work to be done under the items listed in the Form for General Bid.

B. Each lump sum price stated in the Form for General Bid constitutes full compensation as herein specified for each item of work completed in accordance with the Contract Documents, including cleaning up.

C. The Contractor shall carefully acquaint himself with all work associated with each payment item and shall have no claim for his unfamiliarity with the requirements of various items.

D. There will be no separate payment for compliance with the Commonwealth of Massachusetts COVID-19 Guidelines and Procedures for All Construction Site and Workers at All Public Work document. The costs associated with compliance shall be included in the various unit price or lump sum bid prices in the contract.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 00300 Form for General Bid

1.03 PAYMENT ITEMS

A. Item No. 1 – The work of the general bid.

PART 2 MEASUREMENT AND PAYMENT

2.01 GENERAL

A. For accounting purposes, for the Engineer's convenience and as an aid in determining progress payments and price additions or deductions for Contract modifications, the Contractor shall furnish to the Engineer a schedule of values per Specification Section 01026 which shall be approved prior to the first application for payment.

B. The price breakdown schedule shall apportion the total amount of the Contract Price for each separate item among the main features or costs that form the completed Work. The price breakdown shall be in sufficient detail to permit an analysis of all material, labor, equipment, subcontract and overhead costs, as well as profit, and shall cover all work involved for the properly completed item and feature listed.

C. Any amount claimed for subcontracts shall be supported by a similar schedule of values with the total amount shown by this price under the Contract Price stated in the Form for General Bid.

2.02 ITEM NO. 1 – WORK OF THE GENERAL CONTRACTOR

A. The lump sum price for Item No. 1 shall constitute full compensation for furnishing all labor, materials, tools and equipment necessary to construct the Waban Hill Reservoir Improvements, complete, as required by the Contract Documents. Item No. 1 shall include any other work which is not specified or shown but is necessary to complete the Work. Payment of the lump sum will be based on physical progress for each activity in accordance with the approved Schedule of Values.

PART 3 EXECUTION (Not Applicable)

END OF SECTION

SECTION 01026

SCHEDULE OF VALUES

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Provide a detailed breakdown of the agreed Contract Sum showing values allocated to each of the various parts of the Work, as specified herein and in other provisions of the Contract Documents.

1.02 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.03 GENERAL

A. For accounting purposes for the Engineer's convenience and as an aid in determining progress payments and price additions or deductions for Contract modifications, the Contractor shall furnish to the Engineer a schedule of values which shall be approved.
   1. The schedule of values shall apportion the total amount of the Contract price(s) for each separate item among the main features or costs that form the completed Work.
   2. The price breakdown shall be in sufficient detail to permit an analysis of all material, labor, equipment, subcontract and overhead costs, as well as profit, and shall cover all work involved for the properly completed item and feature listed.
   3. Any amount claimed for subcontracts shall be supported by a similar schedule of values with the total amount shown by this price under the Contract price stated in the bid form.

1.04 SUBMITTALS

A. Prior to first application for payment, submit a proposed Schedule of Values to the Engineer.
   1. Meet with the Engineer and determine additional data, if any, required to be submitted.
   2. Secure the Engineer’s approval of the Schedule of Values prior to submitting first application for payment.

PART 2 PRODUCTS (Not Applicable)

PART 3 E EXECUTION (Not Applicable)

END OF SECTION

SECTION 01027

APPLICATION FOR PAYMENT

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Comply with procedures described in this Section when applying for progress payment and final payment under this Contract.

1.02 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.

B. Progress payments are described in the General Conditions.

C. Payments upon Substantial Completion and Completion of the Work are described in the General Conditions.

1.03 QUALITY ASSURANCE

A. Prior to start of construction, secure the Engineer's approval of the Schedule of Values required to be submitted under Section 01026, Schedule of Values.
   1. During progress of the Work, modify the Schedule of Values as approved by the Engineer to reflect changes in the Contract Sum due to change orders or other modifications to the Contract.
   2. Base requests for payment on the approved Schedule of Values.

1.04 SUBMITTALS

A. Informal Submittal: Unless otherwise directed by the Engineer;
   1. Make an informal submittal of Request for Payment by filling in, with erasable pencil, pertinent portions of AIA Document G702, "Application and Certificate for Payment," plus continuation sheet or sheets.
   2. Make this preliminary submittal to the Engineer at the end of each month.
   3. Revise the informal submittal of Request for Payment as agreed, between both parties, initialing all copies.

B. Formal Submittal: Unless otherwise directed by the Engineer;
   1. Make formal submittal of Request for Payment by filling in the agreed data, by typewriter or neat lettering in ink, on AIA Document G702, "Application and Certificate for Payment", plus continuation sheet or sheets.
   2. Sign and notarize the Application and Certificate for Payment.
   3. Submit the original of the Application and Certificate for Payment, plus six (6) identical copies of the continuation sheet or sheets, to the Engineer.
   4. The Engineer shall compare the formal submittal with the approved informal submittal and when approved, shall sign the Application and Certificate of Payment, will make required copies and will distribute:
      a. Two copies to Contractor
      b. Two copies to Owner
      c. Two copies to Engineer's file

PART 2 PRODUCTS (Not Applicable).

PART 3 EXECUTION (Not Applicable).

END OF SECTION

SECTION 01092

ABBREVIATIONS

PART 1 GENERAL

1.01 DESCRIPTION

A. Listing of Abbreviations: The listing of abbreviations in this Specification Section represent the Standard Organization named.

B. Related Work:
1. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. All related Specification Sections shall be used in conjunction with this Section.

1.02 QUALITY ASSURANCE

A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the Standard, except when more stringent requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date for receiving bids.

1.03 LISTING OF STANDARD ORGANIZATIONS AND THEIR ABBREVIATIONS

AA	Aluminum Association
AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ACPA	American Concrete Pipe Institute
ADC	Air Diffusion Council
AGA	American Gas Association
AGCA	Associated General Contractors of America
AHDGA	American Hot Dip Galvanizers Association
AI	Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Constructors
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
APA	American Plywood Association
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
AWPA	American Wood Preservers Association
AWS	American Welding Society
AWWA	American Water Works Association
BIA	Brick Institute of America
CRSI	Concrete Reinforcing Steel Institute
CSA	Canadian Standards Association
DCAM	Comm. of Massachusetts Division of Capital Asset Management
DEP	Department of Environmental Protection
DHI	Door and Hardware Institute
DIPRA	Ductile Iron Pipe Research Association
EJCDC	Engineers Joint Contract Documents Committee
EPA	Environmental Protection Agency
FM	Factory Mutual
Fed. Spec.	Federal Specification
HI	Hydraulic Institute

IEEE	Institute of Electrical and Electronics Engineers
ISA	Instrument Society of America
ISO	International Standards Organization
MIA	Masonry Institute of America
MIL.	Military Specification
MSBC	Massachusetts State Building Code
MSS	Manufacturers Standardization Society of the Valve and Fitting Industry
NAAMM	National Association of Architectural Metal Manufacturers
NCMA	National Concrete Masonry Association
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NRCA	National Roofing Contractors Association
NSPC	National Standard Plumbing Code
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PPI	Plastic Pipe Institute
PS	Product Standards of the National Bureau of Standards
SDI	Steel Door Institute
SIGMA	Sealed Insulating Glass Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SPI	Society of the Plastics Industry
SSPC	Steel Structures Painting Council
TCA	Tile Council of America
TPI	Truss Plate Institute
UL	Underwriters Laboratories

END OF SECTION

SECTION 01100

SPECIAL PROJECT PROCEDURES

PART 1 GENERAL

1.01 DESCRIPTION

A. The Work of this section consists of special project procedures during construction including:
   1. Construction Sequence
   2. Permits
   3. Contractor's Emergency Service
   4. Compliance with Reduction of Lead in Drinking Water Act and Section 1417 of the State Drinking Water Act (SDWA)
   5. Disposal of Pipe and Construction Debris
   6. Commonwealth of Massachusetts Covid-19 Guidelines and Procedures for All Construction Sites and Workers at All Public Work

PART 2 MATERIALS (Not Applicable)

PART 3 EXECUTION

3.01 CONSTRUCTION SEQUENCE

A. The construction sequence will be established at the preconstruction conference. Contractor shall construct water mains in sequence as requested by the Owner. No additional compensation will be provided due to the sequence selected or modification thereof during construction.

B. Contractor shall notify the City at least 5 business days in advance of any shutdown related to the four (4) chambers of the Waban Hill Reservoir.

C. The Work of this Contract generally consists of the rehabilitation of the Waban Hill Reservoir's central core standpipe, replacement and rehabilitation of associated valves and piping, and removal and replacement of the asphalt shingle roofing system. Work shall begin no earlier than October 15, 2020 and no later than November 1, 2020. The Contractor shall heat the interior of the tank during construction if needed due to weather conditions. The Owner reserves the right to delay the project until Spring 2021. Spring start will be weather permitting but no earlier than March 15, 2021 and no later than April 15, 2021.

3.02 PERMITS

A. The Contractor is required all City permits as required to complete the work.

3.03 CONTRACTOR'S EMERGENCY SERVICE

A. Any Contractor whose place of business is located beyond the vicinity of the site of the Work and who does not maintain local headquarters 24 hours a day must provide the following:
   1. Make satisfactory arrangements with the Owner to service emergencies or complaints which may occur at night, over the weekend, or when the job is shut down. If he does not, the Owner may make arrangements and the cost will be charged to the Contractor.

B. Before the final estimate is certified for payment, the Contractor shall make similar arrangements to cover the guarantee period.

3.04 COMPLIANCE WITH REDUCTION OF LEAD IN DRINKING WATER ACT AND SECTION 1417 OF THE SAFE DRINKING WATER ACT (SDWA)

A. All pipes, pipe fittings, plumbing fittings and fixtures must meet the requirements of the 2011 Reduction of Lead in Drinking Water Act and amendments to SDWA Section 1417 for potable water use.

B. Certification of compliance shall be provided for all applicable materials herein.

3.05 DISPOSAL OF PIPE AND CONSTRUCTION DEBRIS

A. The Contractor shall contact the Department of Environmental Protection, Division of Solid Waste, for approval of the demolition waste landfill chosen for disposal of the pipe and construction debris. All pipe and construction debris shall be disposed legally by the Contractor at no expense to the Owner.

3.06 COMMONWEALTH OF MASSACHUSETTS COVID-19 GUIDELINES AND PROCEDURES FOR ALL CONSTRUCTION SITES AND WORKERS AT ALL PUBLIC WORK

A. The General Contractor, as the responsible party for all safety practices and safety compliance measures at the construction site, shall bear sole responsibility for compliance with all guidelines, procedures, and directives outlined in the Commonwealth of Massachusetts COVID-19 Guidelines and Procedures for All Construction Site and Workers at All Public Work document, dated March 25, 2020. All costs associated with compliance with these guidelines and procedures, either in their current form or any future modifications thereof, which are current as of the time of the bid, shall be paid for by the General Contractor. A web link to the guidelines and procedures is provided below.

https://www.mass.gov/doc/march-25-2020-construction-guidance

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 GENERAL

1.01 DESCRIPTION

A. Preconstruction Conference:
1. The Contractor shall not commence work until a conference has been held at which representatives of the Contractor, Engineer, and Owner are present. The preconstruction conference will be arranged by the Engineer.
2. The sequence of construction will be established during the preconstruction conference.

B. Progress Meetings:
1. The Contractor shall be available for progress meetings on site during construction every two weeks, or as determined by the Engineer/Owner, dependent on the status of the project.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Make submittals required by the Contract Documents, and revise and resubmit as necessary to establish compliance with the specified requirements.

1.02 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   1. Individual requirements for submittals also may be described in pertinent Sections of these Specifications.

B. Work Not Included:
   1. Submittals which are not required shall not be reviewed by the Engineer.
   2. The Contractor may require his subcontractors to provide drawings, setting diagrams and similar information to help coordinate the Work, but such data shall remain between the Contractor and his subcontractors and will not be reviewed by the Engineer unless specifically called for within the Contract Documents.

1.03 SHOP DRAWINGS AND SAMPLES

A. The Contractor shall submit to the Engineer for review six (6) clearly legible copies of all shop drawings, catalog cuts, setting schedules, and such other drawings as may be necessary for the prosecution of the work in the shop and in the field as required by the Contract Documents.
   1. Submittals which are incomplete or difficult to read shall be rejected.
   2. Deviations from the Contract Documents shall be called to the attention of the Engineer at the time of the first submission of shop drawings and other drawings for consideration.
   3. The Engineer's review of any drawings shall not release the Contractor from responsibility for such deviations.
   4. Shop drawings shall be submitted with such promptness as to cause no delay in his work or the work of any other Contractor.
   5. Schedules for reinforcing steel shall receive the Contractor's immediate attention, upon award of Contract.

B. When submitted for the Engineers' review, all shop drawings shall bear the Contractor's certification that he has reviewed, checked and approved the shop drawings, that they are in compliance with the requirements of the Contract Documents, and that he has verified all field measurements and construction criteria, materials, catalog numbers and similar data.

C. All samples called for in the Specifications or required by the Engineer shall be furnished by the Contractor and shall be submitted to the Engineer for his review.
   1. Samples shall be furnished so as not to delay fabrication, and to allow the Engineer reasonable time for the consideration of the samples submitted.

D. Checking of submittals is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents.
   1. Any action shown is subject to the requirements of the Contract Documents.
   2. Contractor is responsible for: dimensions which shall be confirmed and correlated at the job site; fabrication processes and techniques of construction; coordination of his work with that of all other trades; and the satisfactory performance of his work.

E. The Contractor may only proceed with fabrication and construction for items on returned submittals marked "No Exception Taken" or "Make Corrections as Noted."
   1. Resubmit submittals if marked "Rejected," "Revise and Resubmit" or "Submit Specified Item”.

F. The Contractor shall identify each submittal numerically in accordance with the following format: [SPECIFICATION SECTION] - [SUBMITTAL NUMBER] - [RESUBMITTAL].
   1. The first number corresponds to the specification section under which the particular shop drawing is submitted.
   2. The second number is the numerical order of the submittal within a particular specification section based on when the submittal is transmitted.
   3. The third number is zero for an original submittal. The first resubmittal of a shop drawing previously reviewed by the Engineer, if necessary, shall be identified by the same numbering system with (-A) used as a suffix to indicate it is a resubmittal. Each additional resubmittal shall be identified by the same numbering system with the following letter alphabetically used as the suffix.
   4. For example, 02200-1-0 is the original submittal for the first shop drawing submitted under specification section 02200. 02200-2-A is the resubmittal for the second shop drawing submitted under specification section 02200.

G. The Contractor shall furnish such samples of material as may be required for examination and testing.
   1. All samples of materials for tests shall be taken according to ASTM specifications or as provided in the Contract Documents.

H. Within 14 days of the date fixed in the Notice to Proceed, the Contractor shall submit a Schedule of Submittals to the Engineer for review and approval in accordance with the General Conditions. The Schedule of Submittals including, but not limited to, shop drawings and samples shall include a list of required submittals, the date when each submittal will be transmitted for review and approval, and the time requirements for Engineer's review of the submittals and the performance of related construction activities.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION

SECTION 01310

CONSTRUCTION SCHEDULES

PART 1 GENERAL

1.01 SUMMARY

A. To assure adequate planning and execution of the work so that the Work is completed within the number of calendar days allowed in the Contract, and to assist the Engineer in appraising the reasonableness of the proposed schedule and in evaluating progress of the Work, prepare and maintain the schedules and reports described in this Section.

1.02 RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   1. Construction period: Contract Agreement

B. Definitions:
   1. "Day," as used throughout the Contract unless otherwise stated, means "calendar day."

1.03 QUALITY ASSURANCE

A. Employ a scheduler who is thoroughly trained and experienced in compiling construction schedule data and in preparing and issuing periodic reports as required by this Specification.

B. Perform data preparation, analysis, charting and updating in accordance with standards approved by the Engineer.

C. Reliance upon the approved schedule:
   1. The construction schedule as approved by the Engineer shall be an integral part of the Contract and shall establish interim completion dates for the various activities under the Contract.
   2. Should any activity not be completed within 15 days after the stated scheduled date, the Engineer may request the reason for the delay in schedule from the Contractor. The Contractor shall supply the requested information and the steps which he intends to take to get back on schedule.
   3. It is expressly understood and agreed that failure by the Engineer to exercise the option either to order the Contractor to expedite an activity or to expedite the activity by other means shall not be considered to set a precedent for any other activities.

1.04 SUBMITTALS

A. Comply with pertinent provisions of Section 01300.

B. Preliminary Analysis: Within ten (10) calendar days after the Contractor has received the Owner's Notice to Proceed, submit four (4) prints of a preliminary construction schedule to Owner and Engineer.

C. Construction Schedule: Within thirty (30) calendar days after the Contractor has received the Owner's Notice to Proceed submit a Critical Path Method (CPM) network and a computer generated print out of a construction schedule prepared in accordance with Part 2 of this Section to Owner and Engineer.

D. Periodic Reports: See paragraph 2.02-B of this Section.

PART 2 PRODUCTS

2.01 CONSTRUCTION ANALYSIS

A. Supplemental to the critical path schedule, the Contractor shall provide a detailed work schedule, projected at least a month in advance. The implementation of the work schedule and the coordination required shall constitute the basic agenda of the coordination and planning meetings.

B. The order of new construction shall be discussed with the Engineer well in advance of the contemplated construction and the intended schedule shall meet with his approval. The Contractor, prior to starting work, shall submit to the Engineer a written description of the methods he plans to use in doing the work, including any necessary plans depicting the proposed details as well as a schedule of expected dates for beginning and completing the various buildings, structures and appurtenances which make up the work. Work shall not commence on a given portion of the project until the schedule for that portion (and preferably the entire schedule) has been approved by the Engineer. The Contractor shall be required to update this schedule periodically as necessary.

C. A guideline CPM network shall be submitted for approval to include the following items: A feasible plan to complete the project within the time specified in this contract; Mandatory milestone dates - Milestones shall be designated in the guideline CPM network by asterisks; Calendar dates will be substituted when the construction start date is established.

2.02 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. This schedule shall include a Critical Path Network and a computer-generated print out. The schedule shall account for all subcontracts in addition to the work of the Contractor.

B. The network shall be provided in the form of a time scaled schedule. The computer printout shall include as a minimum, the earliest starting, earliest finish, latest starting, latest finish dates, and the total float for each activity. The Contractor shall update (monitor) and run the schedule at least monthly and shall submit to the Engineer both the network and computer printout, both in duplicate, at the same time the pay estimate is prepared. The schedule shall contain all of the items of the periodic estimate and pay schedule.

PART 3 EXECUTION

3.01 SCHEDULE AND UPDATES

A. The monthly schedule update (monitoring) shall include the following items.

1. Network: Activities that are completed or in process are to be identified on the network by contrasting heavy lines. Each activity and work done should be proportional to the percentage of progress achieved to date.
2. Computer printout: The percentage progress status of each activity shall be shown on the computer printout. The percentage progress status will be used to support the Contractor's periodic pay estimate. Actual start and completion dates are to be included in the computer printout. All activities started and in process should be flagged in the computer printout.
3. The Engineer reserves the right to modify any schedule as required to meet the prevailing conditions. Review of the work schedules by the Engineer shall not relieve the Contractor of responsibilities regarding specified project completion times and liquidated damages.

END OF SECTION

SECTION 01505

MOBILIZATION

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Includes: The transportation and storage of all equipment and materials necessary to the Work and the field offices.

B. RELATED WORK

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 thru Division 16 of these Specifications.

PART 2 MATERIALS (Not Applicable)

PART 3 EXECUTION

3.01 STORAGE AREA

A. It shall be the Contractor's sole responsibility to procure and maintain a suitable storage area for tools, materials, and equipment necessary to perform the work.

1. The storage area obtained by the Contractor shall not obstruct or interfere with pedestrian or vehicular movement and shall not occupy any space within the public right-of-way, except with specific permission from the Owner.
2. The storage area shall be kept neat at all times.
3. The Owner shall not be a party to negotiations related to acquisition of areas for storage or cleanup of the same (unless the storage area is on Owner's property), but reserves the right to inspect such area(s) for compliance with City regulatory requirements.
4. Contractor shall not use storage area for bulk storage of hazardous materials (e.g., gasoline, solvents, oil).

3.02 EQUIPMENT

A. Contractor shall transport all equipment to the site, assemble the equipment as needed to proceed with the work and maintain the equipment as needed during the work.

END OF SECTION

SECTION 01510

TEMPORARY FACILITIES

PART 1 GENERAL

1.01 DESCRIPTION

A. The work of this Section shall consist of providing the following temporary facilities:
   1. Water,
   2. Sanitary Facilities,
   3. Drainage,
   4. Heat and Weather Protection.

PART 2 PRODUCTS

2.01 TEMPORARY WATER

A. Drinking water shall be provided by the Contractor for his personnel and the personnel of his sub-contractors.
   1. Drinking water shall be tested and approved by the State Agency as "safe drinking water suitable for human consumption."
   2. Contractor shall furnish water for construction.

2.02 TEMPORARY SANITARY FACILITIES

A. Sanitary conveniences, properly screened from public observation, for the use of all persons employed on the work and beginning with the first man engaged in preliminary operations, shall be provided and maintained by the Contractor in sufficient numbers through the completion of the work.
   1. Contractor shall be diligent in maintaining sanitary facilities, pumping weekly, or more often as required to protect soil and water quality.

2.03 TEMPORARY DRAINAGE

A. Temporary drainage, as necessary shall be provided by the Contractor to keep the working area dry.

2.04 HEAT AND WEATHER PROTECTION

A. Temporary heat and weather protection shall be provided as required.

PART 3 EXECUTION (Not Applicable)

END OF SECTION

SECTION 01545

PROTECTION OF PROPERTY

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: The Contractor shall provide all necessary protection of existing property to prevent any damage to property adjacent to the construction.

1.02 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 thru Division 16 of these Specifications.

PART 2 MATERIALS (Not Applicable)

PART 3 EXECUTION

3.01 PROTECTION OF PROPERTY

A. The Contractor shall, at his own expense, preserve and protect from injury all property either public or private along and adjacent to the line of work, and be responsible for and repair any and all damage and injury thereto, arising out of or in consequence of any act or omission of the Contractor.

1. All existing pipes, culverts, poles, wires, fences, mailboxes, stone walls, curbs, bounds, etc., shall be temporarily removed, supported in place or otherwise protected from injury, and shall be restored to at least as good condition as that in which they were found immediately prior to the start of work.
2. Lawns, shrubs, bushes, planting beds and decorative trees disturbed or damaged shall be restored to a condition equal to that found prior to the start of construction, either by temporary transplant or replacement in kind, except as otherwise indicated on the Drawings.
3. Property, which has been damaged and replaced, shall be equal in quality and workmanship to the damaged property and shall be subject to the approval of the property owner.
4. Branches, which interfere with construction or access to the property, may be removed, only upon approval of the Tree Warden.
    a. Limbs and branches shall be trimmed off neatly and cleanly, close to the trunk of the tree or to its main branch. The cut surfaces shall be coated with an approved tree wound coating.

END OF SECTION

SECTION 01567

ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.01 DESCRIPTION

A. The work covered by this section of the specifications consists of furnishing all labor, materials, equipment, and services, and performing all work required for the prevention of environmental pollution during and as a result of construction operations under this contract.

B. The requirements set forth in this section of the specifications apply to any areas receiving water pumped during construction activities.

C. All erosion control devices shall be constructed or installed prior to beginning any form of general construction.

D. Insofar as possible, construction activities shall be confined to those areas defined by the plans and specifications. All land resources within the project shall be preserved in their present condition or be restored to a condition after completion of construction at least equal to that which existed prior to work.

E. The location of storage areas for equipment and/or materials shall be upon cleared portions of the job site or areas to be cleared, as approved.

F. Adequate measures for erosion and sediment control such as the placement of baled hay or straw around the downstream perimeter of pumping shall be employed to protect any downstream areas from siltation.

G. Any water that is pumped and discharged from construction activities shall be dechlorinated and filtered by an approved method prior to its discharge into a receiving water or drainage system.

H. The pumped water shall be filtered through baled hay, a vegetative filter strip or a vegetated channel to trap sediment occurring as a result of the construction operations. The vegetated channel shall be constructed such that the discharge flow rate shall not exceed a velocity of more than one foot per second. The sediment shall be cleared from the channel periodically.

I. In order to trap sediment and to prevent sediment from clogging drainage systems, baled hay or straw shall be used as shown on the following detail(s) or as directed by the Owner. Care shall be taken to keep them from breaking apart. The bales should be securely staked to prevent overturning, flotation, or displacement. All deposited sediment shall be removed periodically.

J. Where material or debris has washed or flowed into or has been placed in existing watercourses, ditches, drains, pipes or structures, such material or debris shall be entirely removed and satisfactorily disposed of during progress of the work, and the ditches, channels, drains, pipes, structures, and work shall, upon completion of the work, be left in a clean and neat condition.

PART 2 PRODUCTS

2.01 HAY BALES

A. Hay bales shall be made of hay with forty pounds minimum weight and one hundred and twenty-pounds maximum weight. Wood stakes shall be a minimum of one inch by one-inch nominal size by a minimum of three feet long.

2.02 SILT FENCE

A. The silt fence shall consist of a 3-foot wide continuous length sediment control fabric, stitched to a 25-foot wide continuous length support netting, and stapled to preweathered oak posts spaced at a maximum of 7-feet. The oak posts shall be 2-inches by 2-inches by 4-feet 6-inches and shall be tapered. The support netting shall be industrial strength polypropylene. The sediment control fabric should conform to the following properties:

1. Minimum weight of 2.5 oz/sy (ASTM D3776-79)

2. Minimum thickness of 17 mils (ASTM D1777-79)
3. Minimum tear strength of 65 lbs. (ASTM D1117-80)
4. Minimum burst strength of 210 psi (ASTM D3786-80)
5. Minimum coeff. of permeability of 0.0009 cm/sec.
6. Equivalent opening size (EOS) 20 (U.S. Standard Sieve)
7. Water flow rate of 40 gal/min/sf.

B. Sediment control fabric shall be non-rotting, acid and alkali resistant and have sufficient strength and permeability for the purpose intended, including handling and backfilling operations. Fibers shall be low water absorbent. The fiber network must be dimensionally stable and resistant to delamination. The fabric shall be free of any chemical treatment or coating that will reduce its permeability. The fabric shall also be free of any flaws or defects which will alter its physical properties. Torn or punctured fabrics shall not be used. For each specific use, only commercially available fabric which is certified in writing by the manufacturer for the purpose intended shall be used. The Contractor shall submit a two-foot square sample of each type of fabric to be used, along with technical data sheet and certified test reports. The Owner reserves the right to reject any fabric which he deems unsatisfactory for a specific use. The brand name shall be labeled on the fabric or the fabric container.

C. Fabrics which are susceptible to damage from sunlight or heat shall be so identified by suitable warning information on the packaging material. Fabrics susceptible to sunlight damage shall not be used in any installations where exposure to light will exceed 30 days, unless specifically authorized in writing by the Owner.

2.03 CATCH BASIN SILT FILTERING SYSTEM

A. Silt filtering system for catch basins accepting drainage from the site shall be Siltsack as manufactured by ACF Environmental Inc. Richmond, VA. And distributed by A. H. Harris, or approved equal.
1. Manufactured to fit opening of catch basins or drop inlet.
2. Two dump straps attached to the bottom to facilitate emptying the sack.
3. Lifting loops as an integral part of the Siltsack to be used in lifting the Siltsack from the basin
4. A restraint cord approximately halfway up the sack to keep the sides away from the catch basin walls.
5. Manufactured from woven polypropylene fabric with the following properties:

a.	Grab Tensile	ASTM D-4632	300 lbs.
b.	Grab Elongation	ASTM D-4632	20%
c.	Puncture	ASTM D-4833	120 lbs.
d.	Mullen Burst	ASTM D-4386	800 psi.
e.	Trapezoid Tear	ASTM D-4533	120 lbs.
f.	Apparent Opng.	ASTM D-4751	40 US Sieve
g.	Flow Rate	ASTM D-4491	40 gpm/sf

PART 3 EXECUTION

3.01 NOTIFICATION

A. The Owner will notify the Contractor in writing of any non-compliance with the foregoing provisions. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails to act promptly, the Owner may order stoppage of all or part of the work until satisfactorily corrective action has been taken. No claim for an extension of time or for excess costs or damage incurred by the Contractor as a result of time lost due to any stop orders shall be made unless it was later determined that the Contractor was in compliance.

3.02 AREAS OF CONSTRUCTION ACTIVITY

A. Insofar as possible, the Contractor shall confine his construction activities to those areas defined by the plans and specifications. All land resources within the project boundaries under this contract shall be preserved in their present condition or be restored to a condition after completion of construction at least equal to that which existed prior to work under this contract.

3.03 PROTECTION OF WATER RESOURCES

A. The Contractor shall not pollute drain lines, structures, streams, wetlands, or ponds with fuels, oils, bitumens, calcium chloride, acids or harmful materials. It is the Contractor's responsibility to comply with all applicable Federal, State, County and Municipal laws regarding pollution of rivers, wetlands and streams.

B. Special measures should be taken to insure against spillage of any pollutants into public waters.

3.04 LOCATION OF STORAGE AREAS

A. The location of the Contractor's storage areas for equipment and/or materials shall be upon portions of the job site and shall require written approval of the Owner. Plans showing storage facilities for equipment and materials shall be submitted for approval of the Owner.

B. Adequate measures for erosion and sediment control, such as the placement of baled hay or straw around the downstream perimeter of stockpiles, shall be employed to protect any downstream areas from siltation.

C. The Owner may designate an area or areas where the Contractor may store materials used in his operations.

3.05 DISCHARGE OF DEWATERING OPERATIONS

A. Any water that is pumped and discharged from construction activities as part of the Contractor's water handling shall be dechlorinated and filtered by an approved method prior to its discharge into a receiving water or drainage system.

B. The pumped water shall be filtered through baled hay, a vegetative filter strip or a vegetated channel to trap sediment occurring because of the construction operations. The vegetated channel shall be constructed such that the discharge flow rate shall not exceed a velocity of more than 1 foot per second. The sediment shall be cleared from the channel periodically.

3.06 PROTECTION OF AIR RESOURCES

A. During the progress of work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of water as necessary, so as to minimize the creation and dispersion of dust.
   1. If the Engineer decides that it is necessary to use calcium chloride for more effective dust control, then the Contractor shall furnish and apply the material as directed.
   2. Calcium chloride shall be commercial grade, furnished in 100-pound, 5-ply bags, stored under weatherproof cover and stacked alternately for ventilation.
   3. Application for dust control shall be at the rate of about 1/2 pound per square yard per application.

B. Burning of rubbish and waste material on the site shall not be permitted.

3.07 SEPARATION AND REPLACEMENT OF TOPSOIL

A. Topsoil shall be carefully removed and separately stored to be used again as directed. The topsoil shall be stored in an area acceptable to the Owner and adequate measures shall be employed to prevent erosion of said material.

3.08 BALED HAY OR STRAW

A. To trap sediment and to prevent sediment from clogging drainage systems, baled hay or straw shall be used where indicated on the drawings or where directed by the Owner. Care shall be taken to keep them from breaking apart. The bales should be securely staked to prevent overturning, flotation, or displacement. All deposited sediment shall be removed periodically.

B. Bales shall be maintained or replaced until they are no longer necessary for the program intended or are ordered removed by the Owner.

3.09 SILT FENCE

A. Where indicated on the drawings or where directed by the Owner, the Contractor shall erect and maintain a temporary silt fence. The silt fence shall be used specifically to contain sediment from runoff water and to minimize environmental damage caused by construction.

B. The 4.5 foot oak posts shall be driven so that 2-feet remain above the ground. A 6-inch by 6-inch trench shall then be excavated at the base of the fence for the purpose of laying, backfilling and tamping, a minimum of 6-inches of the filter fabric.

C. The Contractor shall remove the trapped sediment as soon as it reaches a depth of 1-foot or when directed by the Owner.

D. The silt fence systems will be completely removed from the project at the completion of the project, unless specifically authorized by the Owner to be left in place.

END OF SECTION

SECTION 01610

PRODUCT HANDLING

PART 1 GENERAL

1.01 DESCRIPTION

A. Work included: Protect products scheduled for use in the Work by means including, but not necessarily limited to, those described in this Section.

1.02 QUALITY ASSURANCE

A. Include within the Contractor's quality assurance program such procedures as are required to assure full protection of work and materials.

1.03 MANUFACTURER'S RECOMMENDATIONS

A. Comply with manufacturers' recommendations on product handling, storage and protection.

1.04 PACKAGING

A. Deliver products to the job site in their manufacturer's original container(s), with labels intact and legible.

1. Maintain packaged materials with seals unbroken and labels intact until time of use.
2. Promptly remove damaged material and unsuitable items from the job site, and promptly replace with material meeting the specified requirements, at no additional cost to the Owner.

B. The Engineer may reject as non-complying such material and products that do not bear identification satisfactory to the Engineer as to manufacturer, grade, quality and other pertinent information.

1.05 PROTECTION

A. Mechanical equipment subject to damage by the atmosphere if stored outdoors, shall be stored in a building with a controlled environment. The building may be a temporary structure on the site or a building off the site.

B. PVC pipe shall be covered to protect it from UV degradation.

1.06 REPAIRS AND REPLACEMENTS

A. In event of damage, promptly make replacements and repairs to the approval of the Engineer at no additional cost to the Owner.

B. Additional time required to secure replacements and to make repairs will not be considered by the Engineer to justify an extension in the Contract Time of Completion.

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 DESCRIPTION

A. The work of this Section consists of procedures and requirements for contract closeout, such as cleaning, restoration of project site to original condition, inspections, and guarantees.

PART 2 MATERIALS (Not Applicable)

PART 3 EXECUTION

3.01 CLEANING UP

A. During its progress, the work and the adjacent areas affected thereby shall be kept cleaned up and all rubbish, surplus materials, and unneeded construction equipment shall be removed, and all damage repaired so that the public and property owners will be inconvenienced as little as possible.

B. Where material or debris has washed or flowed into or been placed in water-courses, ditches, gutters, drains, catch basins, or elsewhere as a result of the Contractor's operations, such material or debris shall be entirely removed and legally disposed of during progress of the work, and the ditches, channels, drains, etc., kept in a neat, clean and functioning condition.

C. On or before the completion of the work, the Contractor shall, unless otherwise especially directed or permitted in writing, remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operation in a neat and satisfactory condition.

D. Unless otherwise specifically directed or permitted in writing, the Contractor shall perform the following tasks:
1. Tear down and remove all temporary buildings and structures built by him.
2. Remove all temporary works, tools, and machinery or other construction equipment furnished by him.
3. Remove, acceptably disinfect, and cover all organic matter and material containing organic matter in, under, and around privies, houses, and other buildings used by him.
    a. Subsequent to disinfection, remove or suitably neutralize disinfectant residuals from treated area(s).
4. Remove all rubbish from any grounds which he has occupied.
5. Leave roads and all parts of premises and adjacent property affected by his operations in a neat and satisfactory condition.

3.02 RESTORATION

A. The Contractor shall restore or replace, when and as directed by the Engineer, any public or private property damaged by his work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations.
1. To this end, the Contractor shall do as required all necessary highway or driveway, walk, and landscaping work.
2. Suitable materials, equipment, and methods shall be used for such restoration, or as required in other divisions of this Specification.

B. In restoring the disturbed areas, the Contractor shall:
1. Replace to an equivalent depth any loam that has been removed during the excavation.
2. Remove from the property and legally dispose of in an approved fashion all trees, brush, and other items that the Contractor has cut in order to prosecute his work.
3. Remove from the property upon completion of the work thereon, all excess materials of construction such as stone, pipe, concrete block, gravel, etc., that the Contractor may have stockpiled for use during the course of the work.

4. Leave the land in a smooth, even condition. All ruts, holes or other undesirable grading conditions which resulted from work under this Contract shall be filled and the area so graded to eliminate ponding.
5. All drainage course(s) shall be restored to their pre-existing condition or better.
6. Reset all public or private monuments, iron pipes or other types of property line and geodetic markers damaged or disturbed by operations under this Contract. This work shall be done by a licensed land surveyor at no additional cost.
7. Repair, reset or replace as directed all pipes, walls, utilities, fences, railings, stone walls, etc., and ornamental or utilitarian domestic accessories, such as, but not limited to, arbors, fireplaces, sheds and incinerators, or other surfaces, structures, or property which may have been damaged, either directly or indirectly by his operations under this Contract.
8. Restore to a condition at least equal to that in which they were found immediately prior to the beginning of construction all sidewalks, gutters, driveways and curbs which have been damaged by the Contractor's operations.

3.03 FINAL INSPECTION

A. At completion of all work, the Owner and Engineer, along with the General Contractor and each of the subcontractors shall conduct a final inspection jointly for "punch list" purposes and to determine the exact status of the project before final acceptance.

3.04 GUARANTEES

A. The Contractor shall take notice of special guarantees required in the technical Sections of these Specifications.
1. If, in the opinion of the Owner, any item requires excessive maintenance during guarantee periods, the item shall be considered defective and the Contractor shall correct the defects.
2. All defects so corrected shall be at the expense of the Contractor.

END OF SECTION

INDEX

DIVISION 2 SITE WORK

SECTION 02050

SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 DESCRIPTION

A. Provide selective demolition work as required by the Contract Documents and as further described herein.

B. In general, the work under this Section includes providing all labor, equipment and materials necessary to remove selected piping and valves prior to making the proposed improvements.

C. No demolition shall take place without the approval of Owner and Engineer. All demolition shall be conducted in accordance with the sequence of construction described in Section 01100 of these specifications.

1.02 RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1. Section 01100 Special Project Procedures
2. Division 15 Mechanical
3. Division 16 Electrical

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Use equipment adequate in size, capacity and numbers to accomplish the work of this Section in a timely manner.

C. Comply with requirements of governmental agencies having jurisdiction.

1.04 SUBMITTALS (Not Applicable)

1.05 STANDARDS

A. The Contractor shall comply with the provisions of the following agencies as they apply to this project and as referenced:

1. Associated General Contractors of America, Inc. (AGCA) "Manual of Accident Prevention in Construction".
2. Occupational Safety and Health Administration (OSHA), United States Department of Labor Requirements.
3. American National Standards Institute (ANSI) "Safety Requirements for Construction and Demolition".

1.06 COORDINATION

A. Owner and Engineer shall be contacted and advised of proposed work prior to the start of work by the Contractor. No demolition work shall proceed without the approval of Owner and Engineer.

1.07 PROJECT/SITE CONDITIONS

A. The Contractor acknowledges that he has satisfied himself as to the nature and location of the work, such as but not limited to:

1. Local conditions, particularly those bearing upon:
   a. Transportation, disposal, handling and storage of materials.
   b. Availability of labor, water and electric power.
   c. Access to the sites.

2. The character of equipment and facilities needed prior to and during the execution of the work, and all other matters which can in any way effect the work or the cost thereof.
3. The Contractor should visit the site to obtain as much information as is possible on the existing structure, as to:
   a. Access to building and building size.
   b. Materials of construction.
   c. Accessibility of items to be removed.
   d. Size and location of items to be removed.
4. Any failure by the Contractor to become acquainted with all available information concerning these conditions will not relieve Contractor from the responsibility for estimating the difficulty and cost of successfully performing the work.

B. Contractor shall protect from damage all portions of the existing structure which are to remain.
   1. Any damage to the items which are to remain resulting from the selective demolition shall be replaced or repaired at Contractors expense.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.01 SELECTIVE DEMOLITION

A. General:
   1. All debris from the selective demolition shall be removed from the site and disposed of legally.

3.02 EXISTING STRUCTURE AND FACILITIES

A. Condition: Existing floors, walls, doors, windows, ceilings, piping and equipment shall be protected from damage. Any damage shall be repaired by Contractor.

B. All items that are to be removed or temporarily relocated to allow removal and replacement of the specified equipment shall be protected from damage.
   1. All items shall be reinstalled in their original location at the completion of the Work.
   2. Damaged items shall be replaced with new items at Contractors expense.

END OF SECTION

SECTION 02675

DISINFECTION OF WATER MAINS AND
WATER STORAGE FACILITIES

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Disinfect water mains, and their appurtenances as required by the Contract Documents.

1.02 RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.03 SUBMITTALS

A. The Contractor shall submit plans of disinfection that outline the chemicals to be used, their strength, and the methods of application to be used for water mains.

B. Submit copies of the test results as specified herein.

1.04 STANDARDS

A. The following standards form a part of this specification as referenced:
   1. AWWA C651 Disinfecting Water Mains,
   2. AWWA C652 Disinfection of Water Storage Facilities

1.05 COSTS ASSOCIATED WITH TESTING

A. All costs associated with the testing of the potable water, as described in this Section, shall be paid for by the Contractor.

PART 2 MATERIALS

2.01 CHLORINE

A. Form of chlorine for disinfecting solutions shall be calcium hypochlorite or sodium hypochlorite and shall conform to the provisions of AWWA C651.

2.02 WATER SAMPLE BOTTLES

A. Sterile water sample bottles shall be obtained from an approved laboratory.
   1. Sterile bottles for bacteriologic analyses shall be treated with sodium thiosulfate.
   2. Two bacteriological samples are required at each sampling point, 1 coliform bacteria and 1 heterotrophic plate count (HPC).

PART 3 EXECUTION

3.01 WATER LINES

A. All water mains, valves, hydrants, hydrant connections, and other appurtenances built under this Contract shall, upon completion of all water supply related construction, except water service connections, be disinfected in accordance with AWWA Standard C651 as modified herein.
   1. Chlorine residual after 24 hours shall not be less than 25 mg/l.
   2. The location of the chlorination and sample points shall be determined by the Engineer in the field.

3. Taps for chlorination and sampling shall be installed by the Contractor at no additional expense to the Owner. The Contractor shall uncover and backfill the taps as required.
4. All mains shall be flushed prior to disinfecting.
5. No site for flushing shall be used unless it has been determined to have adequate drainage.
6. Hypochlorite solutions shall be applied to water mains with a gasoline or electrically-powered chemical feed pump designed for feeding chlorine solutions.
7. Chlorine application shall be made by connection of the chemical feed pump to water main upstream from the new main.
8. Hydrants shall not be used for chlorination or sampling points.
9. The rate of chlorine solution application shall be proportioned so that chlorine concentration shall be a minimum 50 mg/l of available chlorine.
10. In the absence of a meter, rate may be determined either by placing a pitot gage at discharge or by measuring time to fill a container of known volume.
11. The chlorine application shall not cease until the entire main is filled with chlorine solution, as indicated by the production of a red color when the orthotolidine reagent is added to the water discharging at the end of the main.
12. Chlorinated water shall remain in the main for a minimum of 72 hours. At the end of the 72-hour period, chlorine concentration shall be at least 25 mg/l.
13. All valves and hydrants shall be operated to insure their proper disinfection.
14. During application of chlorine, all valves shall be manipulated to prevent super-chlorinated water from flowing into the existing distribution system.
15. After the 72-hour retention period, chlorinated water shall be flushed from every hydrant branch on the main until the chlorine concentration leaving the main is no higher than that generally in the system or less than 1.0 mg/l.
16. Chlorinated water being flushed from the mains shall be neutralized:

Residual Chlorine mg/l	Sodium Sulfite Lbs.	Sodium Thiosulfate Lbs.
1	1.4	1.2
2	2.9	2.4
10	14.6	12.0
50	73.0	60.0

Chlorinated water shall be discharged in a manner that will not adversely affect flora and fauna, drainage courses and shall conform to applicable State regulations for waste discharge.

3.02 WATER STORAGE FACILITIES

A. All surfaces of the water storage facilities and their appurtenances shall be disinfected in accordance with these specifications and the requirements of the State/County Department of Health, the Local Water Department and AWWA C652, as modified herein.
1. All surfaces of the water storage facilities shall be cleaned thoroughly using a high pressure water jet, sweeping, scrubbing, or equally effective means.
2. All water, dirt and debris accumulated in this cleaning operation shall be removed before disinfecting.
3. Chlorination shall be by any of the three methods described in AWWA C652.
4. The surfaces to be chlorinated shall be the floor and walls in the wetwell.
5. Chlorinated water shall be pumped out of the wetwell and disposed of as described in subsection 3.01 A (16).

3.03 TESTING

A. A minimum of 48 hours after flushing and before the system is placed in service, coliform samples shall be collected from the end of the water main and tested for bacteriologic quality.
1. Coliform samples shall show the absence of coliform organisms.
2. Unless otherwise specified, the Contractor, under the supervision of the Local Water Department/Company, shall take the samples and have the same tested by an approved laboratory
3. If the number and frequency of samples is not prescribed by the public health authority having jurisdiction, at least one of each sample shall be collected from chlorinated supplies
4. From un-chlorinated supplies, at least two of each sample shall be collected at least 24 hours apart.
5. In the case of extremely long mains, samples will be collected along the length of the water main every 1,000 feet as well as its end.
6. Samples for bacteriologic analysis shall be collected in sterile bottles treated with sodium thiosulfate.
7. No hose or fire hydrant shall be used in collection of samples.

8. A suggested sampling tap consists of a standard corporation stop installed in the main with a PVC gooseneck assembly.
9. After samples have been collected, the gooseneck assembly may be removed, and retained for future use.
10. The water samples shall be taken and delivered to the laboratory by the Contractor.
11. Results of the samples shall be mailed directly to the Engineer from the Laboratory.
12. If the initial disinfection fails to produce satisfactory samples, disinfection shall be repeated until satisfactory samples have been obtained. When the samples are satisfactory, and upon approval of the State/County Department of Health, the City of Newton, the system may be placed in service.

END OF SECTION

INDEX

DIVISION 3 CONCRETE

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SCOPE

A. The work of this section includes all labor, materials, tools, and equipment required for the furnishing of all materials required for the concrete work and, where appropriate, applying or installing such materials for the various items of concrete work as shown on the Drawings, as specified herein, and evidently required.

B. Codes and Standards:

1. The concrete work included in this contract has been designed in accordance with the American Concrete Institute's "Building Code Requirements for Reinforced Concrete" (ACI 318).
2. The ACI Standards "Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete" (ACI 211.1) and "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete" (ACI 304) are also hereby made a part of this specification insofar as they apply and do not conflict with the provisions of this specification or any local codes or ordinances having jurisdiction over the work. In addition, the various ASTM, ACI, Department of Commerce, and Federal Specifications cited throughout this section are hereby included by reference. Concrete work shall be performed in accordance with the applicable provisions of the building code of the state wherein the work is done.

C. Strength:

1. All concrete shall be designed to have a minimum 28-day compressive strength of 4,000 psi except as otherwise noted on the Drawings or specified herein.

D. Contractor may use a low shrinkage concrete mix with crack-reducing admixtures as recommended by the admixture manufacturer, if submitted and approved by the Engineer. If the alternate concrete mix is submitted for approval, and the Contractor requests greater spacing between construction joints, the Contractor shall redesign the construction joints and submit a drawing for approval stamped by a structural engineer licensed in the Commonwealth of Massachusetts, at no additional cost to the Owner.

1.02 SUBMITTALS

A. Shop drawings, brochures and samples shall be submitted for all items to be furnished in accordance with the provisions of Section 01300.

B. Submittals required under this section include, but are not limited to the following:

1. Certified mill reports of cement.
2. Fine and coarse aggregate data resulting from tests performed as specified in this section for all aggregates proposed for use.
3. Samples shall be submitted for at least the following items:
   a. Cement, each type, one vial.
4. Brochures and technical data for at least the following items:
   a. Admixtures, each type.
5. Reports:
   a. Testing laboratory reports on all tests and design mixes for each different contemplated application to the Engineer for approval within 45 days after Notice to Proceed, or at least 14 days before initial placement of concrete, whichever date is earlier.
   b. Report shall include source of cement and aggregates.

1.03 PRODUCT HANDLING

A. It is intended that the major portion of the concrete be supplied from a commercial ready mix plant capable of meeting the following requirements for storage and handling of materials. Where no such plant exists within a reasonable distance from the site, and for small amounts of concrete which may be site mixed, the following requirements shall apply.

1. Cement shall be carefully stored immediately upon receipt. Cement in sacks shall be stored in a suitable weatherproof structure which shall be as airtight as practical to prevent the absorption of moisture. Sacks shall be stacked close together to reduce circulation of air but shall not be stacked against outside walls. The manner of storage shall permit easy access for inspection and identification of each shipment. Bulk cement shall be transferred to elevated airtight and weatherproof bins. At the time of use, all cement that has been in storage so long that there is doubt of its quality will be tested by standard mortar to determine its suitability for use, and such cement shall not be used without approval.
2. Aggregates shall be stored in a manner that will preclude the inclusion of foreign material. Aggregates of different sizes shall be stored in separate piles. Stockpiles of coarse aggregate shall be built in horizontal layers not exceeding four feet in depth to avoid segregation.

1.04 TESTING AND INSPECTION

A. General:
1. Concrete materials and operations shall be tested and inspected as the work progresses. Failure to detect any defective work or material shall not in any way preclude later rejection when such defect is discovered nor shall it obligate the Engineer for final acceptance.
2. The use of testing services shall in no way relieve the Contractor of the responsibility to furnish materials and construction in full compliance with the contract documents.

B. Responsibilities and duties of General Contractor:
1. Ingredient Tests: Prior to making design mixes, the Testing Laboratory conforming to ASTM E329 and subject to the approval of the Engineer shall conduct the following tests in accordance with the procedures referred to in the applicable Reference Standards, cited herein, to assure conformance with the applicable Specifications.
   a. Cement: Specific gravity and brand name of cement.
   b. Aggregates: Sieve analysis, specific gravity, soundness, percentage of voids, absorption, potential reactivity, moisture content of fine and coarse aggregate, dry-rodded weight of coarse aggregate, and fineness modulus of fine aggregate.
2. Design Of Concrete Mixes:
   a. The testing laboratory shall recommend, as determined by trial mixes and strength curves, the design mixes to be used for each application of concrete that will produce concrete of specified strengths and finishes with slumps and workability to meet all placing conditions.
   b. Design mixes shall indicate water-cement ratio, cement factor, water content, admixture content, cement content, aggregate content, aggregate gradations, slump, air content and strength. Design mixes and related tests shall be in accordance with the procedures referred to in the applicable reference specifications cited herein.
   c. Reference Standards: Concrete mixes shall be designed in accordance with Article 3.9 of Chapter 3 of ACI 301 “Specifications for Structural Concrete Buildings” and references referred to therein.
   d. Water cement ratio shall not exceed 0.45.
   e. The maximum allowable net water content shall be 5.00 gallons per sack of cement and cement factor shall be at a minimum 6.50 sacks per cubic yard of concrete.
   f. Limit of Changes for Pumping: If the Contractor elects to convey concrete by pumping, the established job mix may not be altered by more than the following:

Cement	plus 20 pounds per cubic yard
Fine Aggregate	plus 50 pounds per cubic yard
Coarse Aggregate	minus 50 pounds per cubic yard

   g. Any conveying method requiring a greater increase in FA/CA ratio will not be approved.
3. Sampling of Concrete:
   a. Samples of concrete for air, slump, unit weight, and strength tests shall be taken in accordance with ASTM C172.
   b. During the progress of the Work an independent testing agency acceptable to the Owner and Engineer shall be selected. The testing agency shall be accredited and qualified according to ASTM C1077 and ASTM E329. Testing work shall be paid for by the Contractor. The testing agency and its certified testing laboratory shall prepare test concrete cylinders. The Contractor shall assist the testing laboratory in completing concrete testing. One set of 4 cylinders each shall be taken for each 100 cubic yards, or fraction thereof, of each mixture design of concrete placed in any one day. When the total quantity of concrete with a given mixture design is less

than 50 cubic yards, the strength tests may be waived by the Engineer if, in his judgement, adequate evidence of satisfactory strength is provided, such as strength test results for the same kind of concrete supplied on the same day and under comparable conditions to other work. Cylinders shall be delivered to the testing labs within 24 hours. One cylinder shall be tested at 7 days and two at 28 days. The fourth cylinder shall be saved for a 56-day break should the average of the 28-day results not achieve the specified strength. Two copies each of the test results shall be submitted to the Engineer directly by the laboratory for review. In any case where the strength of the cylinders fail to meet the criteria of ACI 318, Chapter 4, Section 4.7.2.3, the Engineer shall have the right to order the defective concrete removed and proper concrete put in its place or to take such other action as they deem necessary to remedy the situation.

c. The concrete used shall have a maximum slump as herein specified unless otherwise directed by the Engineer. Slump shall be determined as per ASTM C143. Slump tests shall be taken by the testing lab for each set of cylinders taken.

d. Air Content: Test for air content shall be performed in accordance with ASTM C173 or ASTM C231. A minimum of one test per day shall be conducted.

4. Furnish necessary labor to assist the testing laboratory and the field observers in obtaining and handling samples at the project or other sources of materials.

5. Advise the Engineer and the field observers at least 24 hours in advance of placing concrete to allow for completion of quality tests and for the assignment of personnel.

6. Provide and maintain adequate facilities for safe storage and proper curing of concrete test specimens on the project site for the first 24 hours as required by ASTM C31, Article 7.2.

7. The Contractor, at no expense to the Owner, shall have the testing laboratory conduct additional tests on concrete ingredients and make new design mixes whenever the character or source of ingredients is changed or if the placed concrete fails to meet the specified strengths.

1.05 APPROVALS

A. Commencement of Work: Concrete work shall not begin until test results and design mixes have been approved by the Engineer.

B. Mix Variations: The Engineer reserves the right to vary in the field any previously approved design mix so as to compensate for field variables including but not limited to weather conditions, placing conditions, variations in size, gradation or characteristics of aggregate and end use of the concrete.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

A. General:

1. All concrete used in the work shall be composed of Portland Cement, fine and coarse aggregate, and admixtures as specified herein. Concrete for every part of the work shall be of a homogeneous structure which, when cured and hardened, will have the required strength and resistance to weathering.

2. The proportions of aggregate to cement for any concrete shall be such as to produce a mixture of the required strength which will work readily into the corners and angles of the forms and around reinforcement and that will produce finishes acceptable to the Engineer but without permitting the materials to segregate.

B. Cement: Cement shall meet the requirements of ASTM C150, Type II. Brands of cement shall be subject to the approval of the Engineer.

C. Aggregate:

1. All aggregates shall conform to the standard specifications for Concrete Aggregates, ASTM C33 as amended by the specification. Aggregates failing to meet these specifications but proved by special test or actual service to produce concrete of the required quality may be used under ACI 318, Section 3.3, where authorized by the Engineer.

2. Fine Aggregates:

a. Fine aggregates shall consist of sand or screenings of gravel or crushed stone, well graded from fine to coarse; clean and free from soft particles, clay, loam or organic matter, with the

volume removed by sedimentation not more than three percent. When tested in accordance with ASTM C40 for organic impurities, the color of the supernatant liquid above the test sample shall show not darker than organic plate No. 1.

b. Fine aggregate shall conform to the following grading:

U.S. Standard Sieve Size	Percent Passing
3/8-inch	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10

c. Fine aggregate shall not have more than 45 percent retained between any two consecutive sieves of those listed above, and its fineness modulus shall not be less than 2.3 nor more than 3.1. If the fineness modulus varies by more than 0.20 from the value assumed in selecting proportions for concrete, the fine aggregate shall be rejected unless suitable adjustments are made in concrete proportions to compensate for the difference in grading.

3. Coarse Aggregates:

a. Coarse aggregates shall consist of crushed stone or washed gravel having clean, hard, durable, uncoated particles, free from dust, dirt, or other deleterious substances; and free from thin, flat or elongated particles. The test for organic impurities specified for fine aggregate shall also apply to coarse aggregate. Maximum size shall be 3/4-inch for all concrete 8 inches and less in thickness. For heavier walls, footings and mass concrete, the maximum size may be increased to 1-1/2 inch, provided the space between the reinforcing bars therein is 1-1/3 greater than the maximum aggregate size.

b. Coarse aggregate shall conform to the grading given in Table 2 of ASTM C33 for sizes No. 467, 57, 67, 7, and 8.

D. Water: Water shall be clean, fresh and free from oil, acid, salt, alkali, sewage, organic matter, and other deleterious substances.

E. Admixtures: Admixtures shall be used as follows. The use of products other than those named herein will be allowed only with the written approval of the Engineer.

1. Air Entraining Agent: The air entraining admixture shall be a chloride free, purified and modified salt of a sulfonated hydrocarbon resin in liquid form conforming to ASTM C260.
2. Water Reducing Agents: Except when otherwise ordered by the Engineer or noted elsewhere herein, all normal structural concrete shall have a water reducing agent added. The admixture shall be a salt of lignosulfonic acid in liquid form conforming to ASTM C494, Type A. The air entraining action of the water reducing agent shall be taken into account and the air entraining agent limited accordingly.
3. Water Reducing-Retarding Agents: When the ambient temperature rises above 70 degrees F., the water reducing agent shall be replaced in whole or in part with a water reducing-retarding agent conforming to ASTM C494, Type D. The admixture shall be used in such amounts as will produce concrete with a set time equal to that which it would have at 70 degrees F. without the retarder.
4. Set Accelerator: Where a set accelerator is allowed under the provisions of Section 03345 Concrete Placing, Curing, and Finishing, it shall be non-chloride conforming to ASTM C494, Type C and Type E.
5. Superplasticizer: Superplasticizing admixtures used to produce flowing concrete may be approved for use in concrete in any part of the structure. The dosage rate depends on the slump of the base concrete which should be kept constant and low (2-1/2 to 3 inches). Superplasticized concrete can lose slump in 60 to 90 minutes, or sooner if temperature is above 70 degrees F, therefore the admixture should be added to the mix at the project site if there is a probable combination of long concrete haul and warm temperature during placing operation. Otherwise the admixture should be added in accordance with the manufacturer's instruction.
6. Crack-Reducing Admixture: Crack-Reducing Admixtures may be used to reduce the magnitude of drying shrinkage, minimize the potential for cracking, and reduce joint spacing between concrete pours of large structures. Apply admixture at the dosage rate recommended by the manufacturer. Crack-Reducing Admixture shall be MasterLife CRA007 by Master Builders or approved equal.

F. Epoxy Grout: Epoxy grout shall conform to ASTM C881, Type III, Grade 2, Class C. Color shall be selected by the Engineer.

PART 3 EXECUTION

3.01 CONCRETE MIX

A. Proportions:
1. The work has been designed for concrete having a minimum compressive strength at 28 days as specified in this section.
2. The cement factor and water cement ratio shall be determined by consideration of the specified strength, the water reducing admixtures, the slump required for proper placement, air-entraining requirements, the available and maximum allowable aggregate size and its specific gravity and the amount of water carried on the aggregates.
3. The slumps and maximum sizes of aggregate for various types of construction, as well as the computation of trial mixes shall be as described in ACI 211.1 "Recommended Practice for Selected Proportions for Normal and Heavyweight Concrete".

B. Water Cement Ratio: The water cement ratio shall be as determined from the approved design mixes as specified in this section.

C. Water Content:
1. In calculating the total water content in any mix, the amount of water carried on the aggregate and the effect of admixtures shall be included. The water on the aggregate shall be determined periodically by test and the amount of free water on the aggregate subtracted from the water added to the mix.
2. In all cases the amount of water to be used shall be the minimum amount required to produce a plastic mixture of the strength specified and of the required density, uniformity and workability. The consistency of any mix shall be at that required for the specific placing conditions and methods of placement.

D. Concrete Slumps:
1. The Contractor must satisfy himself that he is capable of producing, with the following slumps, concrete of satisfactory quality and strength, that will produce the specified finishes, free of voids, honey-combing, or excessive air bubbles.
2. Execution of this contract signifies that the Contractor accepts full responsibility for the production of concrete of satisfactory quality, strength and finishes within the slump limitations specified. Slump shall be determined as per ASTM C143.

Types of Construction	Maximum (inches)	Minimum (inches)
Reinforced Footings and Mats	3	1
Substructure Walls	4	1
Slabs, Beams and Reinforced Walls	4	1

E. Air Entrainment:
1. All concrete, except interior concrete slabs subject to abrasion, shall be air entrained. Percent of air versus aggregate size shall be added as a part of the computed mixing water requirements, and be used strictly in accordance with the manufacturer's directions and these specifications to produce a total entrained air content, by volume, to be determined in accordance with the procedure given in ASTM C173, as follows:

Nominal Maximum Size Coarse Aggregate (inches)	Air Content By Volume (percent)

3/8	6 to 10
1/2	5 to 9
3/4	4 to 8
1	3.5 to 6.5
1-1/2	3 to 6

F. Ready Mixed Concrete: It is intended that the major portion of the concrete required for the work be ready mixed in an off-site plant. Small amounts for miscellaneous purposes may be site mixed. All concrete produced in an off-site plant shall be mixed and delivered in accordance with the requirements of the "Standard Specifications for Ready Mixed Concrete," ASTM C 94 and these specifications.

G. Mixing: Concrete shall be mixed and transported in accordance with the applicable provisions of the "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete" (ACI 304) of the American Concrete Institute and these Specifications.

END OF SECTION

SECTION 03315

MISCELLANEOUS CONCRETE PLACEMENTS

PART 1 GENERAL

1.01 SCOPE

A. The work of this section includes all labor, materials, tools and equipment necessary for the construction of concrete specialties as specified herein, as shown on the Drawings or as necessary for the proper completion of the work.

PART 2 PRODUCTS

2.01 EQUIPMENT FOUNDATIONS

A. All floor-mounted mechanical and electrical equipment shall be installed on concrete pads constructed of 4,000 psi concrete, whether or not specifically indicated on the drawings to be pad mounted.

2.02 GROUTING

A. General: Grouting is required for structural items and mechanical items. The materials to be used for mechanical items and base plates shall be as specified in Section 03345 Concrete Placing, Curing and Finishing.

2.03 CONCRETE FILLS

A. All concrete fills shall be 4,000 psi.

B. Thin Set Fills: Concrete fills two inches thick shall have a maximum size aggregate of 1/2-inch.

C. Thick Set Fills: Concrete fills greater than two inches thick shall be structural concrete as specified in Section 03300 Cast-In-Place Concrete.

PART 3 EXECUTION

3.01 EQUIPMENT FOUNDATIONS

A. All equipment foundations shall be sized to suit equipment with reinforcement as shown on the equipment pad detail on the Drawings. Pads shall not be poured until all equipment sizes have been finalized.

B. All exposed surfaces shall be formed with smooth forms, all coarse aggregate spaded back from the forms so that all exposed surfaces shall have a smooth surface without excessive rubbing and shall be free from sandy streaks, coarse aggregate or stone pockets. All exposed surfaces shall have a smooth, even surface, with all exterior angles beveled and vertical surfaces coved to the floor.

C. The Contractor shall build in all anchor bolts, dowels, sleeves, and other built-in fittings as required for the equipment.

3.02 PITS, SUMPS AND TRENCHES

A. Care shall be required of the Contractor in the construction of all indicated pits, sumps and trenches to ensure provisions are made for all built-in or attached frames, embedded items, pipes and sleeves.

B. Waterstops shall be installed in all concrete joints as indicated.

C. Floors shall present a smooth evenly troweled surface, properly sloped to drains.

3.03 GROUTING

A. Surface Preparation:

1. The concrete surfaces shall be cleaned of all contamination and debris, chipping or roughening the surface if any laitance or poor concrete is in evidence.
2. Special care shall be taken with the grout in hot or cold weather to ensure proper setting and gain of strength. Aggravating conditions of placement are to be alleviated to an extent that the temperature of the grout up until time of set will be in about the range of 60 to 80 degrees F. Shields from the sun and hot winds shall be provided when required.
3. Following cleaning, the concrete shall be water-saturated for a period of six hours, the excess water then removed from the surface and non-absorbent edge forms erected.

B. Grouting of Equipment:

1. Grout shall be placed quickly and continuously, shall completely fill the space to be grouted and be thoroughly compacted and free of air pockets.
2. The grout may be poured in place, pressure grouted by gravity, or pumped. Whenever practical, grout shall be poured from one side only and made to flow across to the open side to avoid air-entrapment.

3.04 CONCRETE FILLS

A. Surface preparation for concrete fills shall conform to applicable portions of Section 03345 Concrete Placing, Curing and Finishing.

3.05 PADS AND BASES

A. All concrete work for the equipment pads shall be as specified herein and as detailed the Drawings. The Contractor shall be responsible for the excavation, installation of this concrete work, and backfill.

END OF SECTION

SECTION 03345

CONCRETE PLACING, CURING AND FINISHING

PART 1 GENERAL

1.01 SCOPE

A. The work of this section includes all labor, materials, tools and equipment necessary for the placing, curing and finishing of all cast-in-place concrete as shown on the Drawings, specified herein and evidently required to complete the work.

1.02 SUBMITTALS

A. Shop drawings, brochures and samples shall be submitted for all items to be furnished in accordance with the provisions of Section 01300.

B. Submittals required under this section shall include, but are not limited to the following:
   1. Manufacturer's Literature - including technical and installation information for:
      a. Cement Grout (Non-Shrink)
      b. Membrane Curing Compound
      c. Joint Sealant
      d. Concrete Sealer
      e. Floor Hardener
      f. Epoxy Bonding Compound
   2. Samples for at least the following items:
      a. Cement Grout (Non-Shrink); one vial.

1.03 ENVIRONMENTAL CONDITIONS

A. Protection:
   1. Fresh concrete shall be adequately protected from freezing, premature drying, heavy rains, flowing water and mechanical injury. Provisions shall be made for maintaining new concrete in a continuously moist condition for at least seven days after placement.

B. Cold Weather Requirement:
   1. When placing concrete in cold weather, the recommendations of the American Concrete Institute's Publication "Cold Weather Concreting" ACI-306R shall be followed insofar as the Engineer may direct. The use of set accelerators will be at his discretion except that no calcium chloride will be allowed. After the first frost of the winter and after the mean daily temperature at the site falls below 40 degrees F. for more than one day, concrete shall be protected from freezing for not less than the first 48 hours after is placed. In the spring, concrete shall be similarly protected until the mean daily temperature rises above 40 degrees F. for more than 3 consecutive days. When the mean daily temperature falls below 40 degrees F. for more than one day, concrete shall thereafter be placed at a temperature of between 50 and 55 degrees F. and maintained at that temperature for at least three days. During the next three days, it shall be protected from freezing.
   2. When it is necessary to heat the materials in order that the concrete when placed will have a temperature within the allowable range, water and aggregates shall be introduced into the mixer and the temperature allowed to stabilize before the cement is added. If heating of aggregates is not practicable, the water may be heated to any temperature required to produce a water-aggregate temperature in the 60 degrees to 80 degrees F. range. Cement should never be added to a mix having a higher temperature due to the danger of producing a flash set. When aggregate heating is required and steam in pipes is not available, steam jets may be the only practicable method. With this method the amount of free water on the aggregate will vary considerably and the mixing water will have to be adjusted for each batch. In general, there is more danger in overheating water and aggregates, and producing mix temperatures on the high side of the allowable than there is in being on the low side.
   3. Regardless of materials heating or the use of admixtures, protective measures shall be taken to maintain the temperature of freshly placed concrete as recommended by the ACI for the particular condition. Data on the duration of recommended protection, safe final removal of shores and forms, and the like appears in the ACI publication "Cold Weather Concreting" (ACI-306R).

4. The methods of protecting freshly placed concrete will be subject to the approval of the Engineer. In general, external heating will not be required during the first three days if measures are taken to retain the heat of hydration. Such measures shall be commercial batt insulation, insulating board, loose fill insulation, or other material approved by the Engineer. Canvas or plastic film shall be used to protect the insulations from precipitation. After three days, if heating is required to maintain the temperature of the concrete above freezing, it shall be provided as required. Exhaust steam is the best method, is fire safe, and does not dry the surface of the concrete. Airplane heaters, located outside the structure or enclosure and blowing hot air into it are acceptable but not preferred. Open fires and salamanders without proper ventilation will not be allowed due to the fire hazard and strong carbon dioxide atmosphere which is detrimental to freshly placed concrete.

C. Hot Weather Requirements:

1. For concrete placed during extremely warm weather, the aggregate shall be cooled by frequent spraying in such manner as to utilize the cooling effect of evaporation. Temperature of the concrete when placed shall not be more than 90 degrees F. If such a temperature cannot reasonably be maintained, the Engineer shall be notified in order to permit redesign of the mix at his direction to compensate for loss of strength resulting from higher mix temperatures. Newly placed concrete shall be protected from the direct rays of the sun and the forms and reinforcement, just prior to placing, shall be sprinkled with cold water.
2. During periods of excessively hot weather (90 degrees F., or above), ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels, all in accordance with the provisions of ACI 305R, "Hot Weather Concreting".
3. Temperature records shall be maintained giving air temperature, general weather conditions (calm, windy, clear, cloudy, etc.) and relative humidity. The record shall include checks on temperature of concrete as delivered and after placing in forms. Data shall be correlated with the progress of the work so that conditions surrounding the construction of any part of the structure can be ascertained. A copy of the weather data shall be included in the permanent records of the job. During excessively hot weather not more than one hour shall elapse between time of adding water to cement or cement to aggregate, and time of placing concrete.

1.04 EVALUATION OF CONCRETE

A. The Contractor shall comply with ACI 301, Chapter 17, Evaluation and Acceptance of Concrete.

B. Concrete test results and reports by the testing laboratory shall be the basis for evaluating concrete strength.

C. The strength of the structure in place will be considered potentially deficient if it fails to comply with any requirements which control the strength of the structure, including but not necessarily limited to the following conditions:

1. Low strength concrete as designated by ACI 301, Chapter 17.
2. Reinforcing steel size, quantity, strength, position or arrangement at variance with the requirements of Section 03200, Concrete Reinforcement and/or the Drawings.
3. Concrete which differs from the required dimensions or locations in such a manner as to reduce strength.
4. Curing less than specified.
5. Inadequate protection of concrete from extremes of temperature during early stages of hardening and strength development.
6. Mechanical injury, construction fires, accidents or premature removal of formwork likely to result in deficient strength.
7. Poor workmanship likely to result in deficient strength.

D. Where the strength of the structure is considered potentially deficient, core tests in accordance with ASTM C42 and/or load tests evaluated in accordance with ACI 318, Chapter 20 may be ordered by the Engineer. Should the Contractor elect to make core tests of questionable concrete, all expenses incidental thereto shall be paid by the Contractor. Should the Engineer direct that core tests be made, all costs will be paid for by the Owner if such tests prove the concrete to be satisfactory. If unsatisfactory, all costs including additional testing of replaced work shall be paid for by the Contractor.

E. Concrete work judged inadequate by results of core tests and/or load tests shall be removed and replaced if so directed by the Engineer at the Contractor's expense.

F. Water Tightness:

1. The following concrete basins shall be tested for water tightness:
   a. Spent Washwater Wetwell.
   b. Clearwell.
2. Testing Procedure:
   a. On completion of the tank, and prior to any specified backfill placement, the following test shall be applied individually to each basin to determine water tightness.
   b. Fill the tank with potable water to the maximum level and let it stand for at least 24 hours.
   c. Measure the drop in liquid level over the next 72 hours to determine the liquid volume loss for comparison with the allowable leakage. Evaporative losses shall be measured or calculated and deducted from the measured loss to determine net liquid loss (leakage). The net liquid loss for a period of 24 hours shall not exceed 0.1 of 1 percent of the tank capacity.
   d. If the leakage exceeds the maximum allowable, the leakage test shall be extended to a total of five days. If at the end of five days average daily leakage does not exceed the maximum allowable, the test shall be considered satisfactory. If the net liquid loss exceeds the maximum allowable, leakage shall be considered excessive and the tank shall be repaired, and retested until leakage falls within the appropriate limit.
   e. Damp spots on the exterior wall surface, or interior common walls, or measurable leakage of water at the wall base shall not be permitted. Damp spots are defined as spots where moisture can be picked up on a dry hand. The source of water movement through the wall shall be located and permanently sealed in an acceptable manner. Leakage through the wall-base joint shall likewise be corrected.

PART 2 PRODUCTS

2.01 CEMENT GROUT

A. Grout shall be Embeco Pre-Mixed non-metallic non-shrink grout as made by Master Builders, Inc., Five Star Grout as made by U.S. Grout Company, Upcon Construction Grout as made by USM, Upco Chemical Division, or equal.

2.02 ROD STOCK

A. Shall be a closed cell polyethylene foam furnished in sizes one third greater in diameter than the joint.

2.03 JOINT SEALANT

A. Shall be a one component, polyurethane-base non-sag elastomeric sealant, Sikaflex-1A as manufactured by Sika Corporation or equal. Joint sealant shall be NSF approved for potable water contact.

2.04 CONCRETE SEALER

A. All interior concrete floors to be exposed upon completion of this work, and for which no other surface treatment is specified, shall have an application of Dekote as produced by A.C. Horn, Inc., or equal as made by Sonneborn or Euclid. The material shall be applied and cured in accordance with manufacturer's directions at the rate of 200 to 350 sq. ft. per gallon.

2.05 MEMBRANE CURING COMPOUND

A. May be used only on walls and slabs not subject to further treatment such as painting, chemical hardening, special topping or coatings. If used, it shall be Horncure 30D or 30C as manufactured by A.C. Horn, Inc. or equal as made by Sonneborn or Sika Corporation, and conforming to ASTM C309, Type 1 or 1D, Class B. Compound shall be applied uniformly by spray, leaving no pinholes or gaps, at a coverage rate not to exceed 200 square feet per gallon. The curing compound shall be applied after finishing operations are completed and surface moisture has disappeared. Any compound used must be of a type which will not contaminate potable water.

B. If forms are removed prior to eight days after placing the concrete, the uncovered surfaces shall be coated with the curing compound as specified herein.

2.06 CURING PAPER

A. Shall be used to cure floors which are to have applied toppings or chemical hardeners. Curing paper shall also be used in other areas to protect newly poured concrete floors from damage. Material shall conform to ASTM C171, for regular or white waterproof paper.

2.07 EPOXY BONDING COMPOUNDS

A. Shall be Uniweld as made by Permagile Industries, Inc., Sikadur 32 Hi-Mod as made by Sika Corporation, or equal.

2.08 BOND BREAKER

A. Shall be 15-pound asphalt saturated roofing felt.

2.09 FLOOR HARDENER

A. Shall be used on floor areas shown on the Contract Drawings. Hardener shall be Hornolith as manufactured by A.C. Horn, Inc., or equal as made by Sonneborn or Sika Corporation. Compound shall be applied at a coverage rate recommended for heavy duty traffic and after concrete has cured, as per the manufacturer's specifications.

PART 3 EXECUTION

3.01 CONCRETE PLACING

A. Placing:
1. Concrete shall be placed in accordance with the applicable provisions of the "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete" (ACI 304) of the American Concrete Institute and these specifications.
2. Concrete shall be handled from the mixer, or truck if ready-mixed concrete is used, to the place of final deposit as rapidly as practicable by methods which will prevent separation or loss of ingredients but in no case shall the time elapsed between the addition of the water to the cement or the cement to the aggregates and the placing of concrete in the forms exceed one and one-half (1-1/2) hours. In periods of excessive hot weather as previously defined in paragraph 1.04 C. of this section, this time shall be reduced to one hour.
3. The concrete shall be deposited in the forms as nearly as practicable in the final position to avoid rehandling and shall be so deposited as to maintain a homogeneous plastic surface approximately horizontal. Water shall be removed from all forms, trenches, and excavations and the work shall be kept dry while the concrete is being placed. No water shall be thrown on or allowed to flow over or rise upon the concrete until it has had time to become thoroughly set.
4. The maximum free fall of any concrete shall be limited to three feet. Accumulation of concrete on the forms or reinforcement above level of the placement shall be avoided. Concrete that is partially hardened, or has been contaminated by foreign material or that has been retempered will not be permitted on this project. A concrete placement, once started, shall be carried on as a continuous operation until the placing of the section is completed.

B. Runways:
1. Runways shall be provided for wheeled concrete handling equipment. Such equipment shall not be wheeled over reinforcement nor shall runways be supported on reinforcement.

C. Chuting:
1. When concrete is conveyed in chutes, the equipment shall be of such size and design as to insure a continuous flow in the chute. The chute shall be of steel or be steel lined, and the different sections shall have the same slope throughout. Aluminum chutes will not be allowed. The slope shall be not flatter than 3 horizontal to 1 vertical or steeper than 2 horizontal to 1 vertical and, between these limits, the slope shall be that which will prevent segregation of ingredients. The end of the chute shall be provided with a baffle to prevent segregation of ingredients. If the end of the chute is more than three feet above the surface of the concrete in the forms, a spout shall be used. The spout shall be kept full of concrete and the lower end maintained as near to the surface of deposit as practical. The chute shall be

thoroughly flushed with water before and after each run. The water used shall be discharged outside the forms.

D. Bonding:

1. After a section has been completed, any laitance on the temporary top surface of construction joints shall be removed and the surface raked immediately after the initial set has taken place. If removal of the laitance is delayed until the concrete has set, so that laitance cannot be removed by shovels or scrapers, the Contractor shall remove it by power chipping tools.
2. Before depositing concrete on or against concrete which has set, the surface of the set concrete shall be roughened, thoroughly cleaned with wire brushes, air blasted, and then saturated with water. The new concrete placed in contact with hardened or partially hardened concrete shall contain an excess of cement to secure bond. The surface of the hardened concrete shall be slushed with a coating of neat cement grout against which the new concrete shall be placed before the grout has attained its initial set. Where noted or where an unplanned interruption in a concrete placement has occurred, bonding shall be with epoxy bonding compound used in accordance with the material manufacturer's recommendations.

E. Compaction:

1. Concrete shall be placed in layers not exceeding 12 inches in depth, and each layer shall be compacted by mechanical internal-vibrating equipment supplemented by hand spading, rodding, and tamping as required.
2. Form vibrators will be considered only where internal vibration is impractical and will be allowed only with the written permission of the Engineer. When allowed, the vibrator shall be placed so that motion is horizontal and vibration in any location shall not be continued to the extent that segregation occurs, but vibrators shall be relocated frequently. Vibrators shall not be used to transport concrete within the forms. Concrete shall be thoroughly worked around reinforcement, embedded fixtures and into the corners of the forms.
3. Compaction shall be in accordance with ACI 390, "Recommended Practice for Consolidation of Concrete" as modified by this specification.

F. Construction Joints:

1. Joints not indicated on the drawings shall be made and located so as to least impair the strength of the structure. Where a joint is to be made, the surface of the concrete shall be roughened, thoroughly wetted, and slushed with a coat of neat cement grout immediately before placing new concrete. Where the joint occurs in a portion of the structure which must be watertight, waterstops as specified in Section 03100, Concrete Formwork shall be used.
2. Reinforcement shall be continuous through all construction joints, unless otherwise noted on the drawings. Continuous keyways and waterstops shall be provided where called for on the drawings or as specified. Waterstops shall be as previously specified and shall be installed in accordance with the following: The Contractor shall take all necessary precautions to positively insure that the waterstop is properly located and aligned and remains so after the concrete placement has started and the waterstop is partially covered even to the extent of omitting form boards temporarily, if necessary. The Contractor shall likewise ensure that the vibrators are always kept several inches clear of the waterstop. In the event that the waterstop is improperly located, allowing a tolerance of plus or minus 1/2 inch, the Engineer may order the waterstop extended, or replaced, or such other action as they may deem necessary and all expenses incidental thereto shall be paid by the Contractor and he shall not be entitled to reimbursement therefor.

G. Contraction Joints:

1. Contraction joints may be constructed by inserting tempered hardboard strips or rigid PVC insert strips into the plastic concrete or by cutting the concrete with a saw after concrete has set.
2. Joints shall be approximately 1/8 inch wide and shall extend into the slab approximately 1/4 the slab thickness, but not less than 1 inch.

H. Sawed Joints:

1. Joint sawing shall be early enough to prevent uncontrolled cracking in the slab, but late enough that this can be accomplished without appreciable spalling.
2. Concrete-sawing machines shall be adequate in number and power, and with sufficient replacement blades to complete the sawing at the required rate. Joints shall be cut to true alignment and shall be cut in sequence of concrete placement. Sludge and cutting debris shall be removed.

I. Joint Sealant:

1. Sawed contraction joints in slabs shall be filled with joint sealant, unless otherwise shown. Types and locations of sealants shall be as indicated.
2. Joint surfaces shall be clean, dry, and free of oil or other foreign material which would adversely affect the bond between sealant and concrete. Joint sealant shall be applied as recommended by the manufacturer of the sealant. Joints sealed with field molded sealant shall be completely filled with sealant.

3.02 CURING AND PROTECTION

A. Curing:

1. Shall be accomplished by the use of waterproof paper, curing compounds, "wet" methods (fog spray, damp sand or burlap) or other methods dependent upon the end use of the concrete. Provisions shall be made for maintaining new concrete in a continuously moist condition for a minimum of seven days.
2. The use of curing compound on surfaces to receive coating or bonded finished will not be allowed.

B. Concrete Slab Protection:

1. Finished concrete slabs shall be covered with curing paper as specified, laid with side joints lapped four inches and end joints lapped six inches. Paper shall be applied no sooner than 24 hours and not over 30 hours after finishing the slab and shall be left in place at least ten days. Joints shall be taped and paper shall be weighted to prevent displacement. Rips or tears appearing in the paper during the first seven days after a floor is completed shall be immediately patched. No traffic will be permitted until five days after pouring. From 5 to 15 days only light traffic will be permitted.
2. Where the use of wrenches and other heavy tools may be required, the Contractor shall provide additional protection as required.

3.03 DEFECTIVE CONCRETE

A. Concrete work not formed as shown on the drawings, out of alignment or level, or showing a defective surface, shall be removed and completely replaced if directed by the Engineer.

B. Slight imperfections in appearance of the structure may be patched as specified herein provided the permission of the Engineer is obtained prior to patching.

3.04 REPAIR OF SURFACE DEFECTS

A. General:

1. Immediately after the forms are removed, all form ties shall be cut off below surface of concrete, all fins and irregularities shall be removed and all defective areas, holes, honeycombs, cavities and irregularities cleaned and patched with a stiff mortar of the same composition as the mortar in the original concrete mix, all as specified herein. Exposed patchwork shall be rubbed where and as specified herein or otherwise treated to match adjacent surfaces.

B. Patching:

1. Defective areas for which patching is allowed shall be cleaned of all dust, dirt, grease, laitance, and loose or spalling concrete, and be given a brush applied coat of an epoxy bonding compound approved by the Engineer.
2. The compound shall be mixed as directed by the manufacturer. The patching mortar shall be freshly mixed and be composed of the same materials and proportions as were used for the original concrete, including the admixture, except that the coarse aggregate shall be omitted and fine aggregate substituted therefor. The placing of mortar shall begin immediately after the bonding compound is applied and shall be completed within the contact time. The bonding compound shall be sticky to the touch during placing of mortar. The patching shall be finished to match adjoining concrete, and cured and protected as specified for concrete. The manufacturer's directions and precautions shall be followed when using such compounds.

C. Filling Form Tie Holes:

1. Holes left by withdrawal of rods or by removal of end ties shall be filled solid with mortar, using epoxy bonding compound in the same manner as specified under "Patching" above. Holes passing entirely through the wall shall be filled using small tools that will pack the hole solidly with mortar. Excess mortar at the surface of the wall shall be struck off flush with a cloth.

D. Rubbed Finish:

1. Surfaces requiring remedial work which are to be exposed to view whether painted or not, shall have all projections and irregularities carefully removed and all cavities filled with stiff mortar of the same composition as the mortar in the concrete. The same brand and color of cement, and the same kind and color of aggregate shall be used for filling cavities as was used in the original concrete mix. The surface film of all such pointed surfaces shall be carefully removed before setting occurs. The preceding operations shall be done within 24 hours after removal of the forms. If, after patching and smoothing, surfaces do not present a smooth surface of even texture and appearance, then the following finish shall be repeated as many times as the Engineer deems necessary. The Engineer shall be the sole judge of the amount of rubbing required.
2. Immediately after the forms are removed, and necessary patching and smoothing is done, the surface shall be wetted with clean water, without applying any cement or other coating, and rubbed with a No. 16 carborundum brick or other abrasive of equal quality until even and smooth and of uniform appearance.
3. The final finish shall be obtained by a thorough rubbing with a No. 30 carborundum brick or other abrasive of equal quality.
4. After final rubbing is completed, the surface shall be thoroughly drenched and kept wet for a period of five days, unless otherwise directed. No rubbing will be permitted in cold or freezing weather, except in heated enclosures.

3.05 FINISH OF FORMED SURFACES

A. General:

1. All exposed interior and exterior concrete surfaces shall be finished as specified herein and shall have a smooth and even surface when completed. "Exposed concrete" shall be defined as submerged and non-submerged concrete exposed to view upon completion of the work whether or not a painted finish is specified.
2. Exterior concrete which will be covered by fill such as exterior faces of walls, spread footings, etc., shall have no treatment other than required for repairs as specified elsewhere in this section.

B. Grout Rubdown:

1. While the concrete is still damp, a thin coat of medium consistency neat cement slurry shall be applied to the concrete surface by means of bristle brushes to provide a bonding coat in the parent concrete. Before the slurry has dried or changed color, a dry (almost crumbly) grout comprising one volume cement, the same as used for the parent concrete, adjusted with white cement to match color where exposed, to 1-1/2 volumes of sand, shall be applied. This grout shall be applied by means of slightly damp pads of coarse burlap approximately 6 inch square used as a float. The grout shall be well scrubbed into the surface to provide a dense mortar.
2. The mortar shall be allowed partially to harden from one to two hours depending upon the weather. Work in direct hot sunlight shall be avoided, and if the air is hot and dry, the concrete shall be kept damp during this period with a fine fog spray.
3. When the grout has hardened sufficiently, all the grout that can be removed shall be removed with a trowel. Grout shall not be allowed to remain on the concrete too long since it will become difficult to remove.
4. The surface shall then be allowed to dry thoroughly and then be rubbed vigorously with clean, dry burlap to completely remove any dried grout. There should be no visible film of grout remaining after this rubbing.
5. The entire operation shall be completed in one working day. No grout shall be left on the concrete overnight. Sufficient time shall be allowed for the grout to dry after it has been cut with a trowel so that it can be wiped off clean with burlap.
6. On the day following, the concrete shall again be wiped clean with dry burlap to remove any inadvertent dust. At this time, the use of a piece of burlap containing old hardened mortar may be helpful since it will act as a mild abrasive. After this treatment no build-up film should remain on the parent surface. If, however, such is present, a fine abrasive stone shall be used to remove all such material without breaking through the surface film of the parent concrete. Do not work up a lather.
7. After application of the surface grout, the surface shall be thoroughly washed down with stiff brushes and the concrete maintained in a continuously damp condition for at least three days above 50 degrees F. by the periodic application of a fine fog spray or by the use of a poultice of damp flannel covered with polyethylene taped to the concrete.

3.06 FINISHING OF RELATED UNFORMED SURFACES

A. Tops of exposed beams, walls, parapets and tops of similar unformed surfaces occurring adjacent to formed surfaces shall be struck off smooth and be hand steel troweled by cement masons assisted by a field party to continually verify and check correct lines and elevations, so as to produce a smooth hard level surface. Line and elevation shall be pre-established by means of preset wood screeds which shall be removed during the troweling operation.

B. After above troweling operations have been completed and after concrete has cured, the above troweled surface shall be dry honed to a smooth non-directional surface texture satisfactory to the Engineer.

3.07 FINISH OF FLOOR SLABS

A. General:
1. Concrete slabs shall be finished as hereinafter described. The dusting of wearing surfaces with dry materials will not be permitted. In preparation for finishing, floor slabs shall be struck off true to the required grade and level shown on the drawings. Floors shall be level with a tolerance of 1/8 inch in 10 feet, except where drains occur, in which case the floors shall be pitched to the drains as indicated on the Drawings, or as directed.

B. Floated Finish:
1. Concrete slabs to receive seamless floor finish, built-up roofing, wood sleeper as specified, or as indicated on the drawings shall receive a floated finish. After the concrete has been placed, struck off, consolidated and leveled, the concrete shall not be worked further until ready for floating.
2. Floating shall begin when the water sheen has disappeared, and/or when the mix has stiffened sufficiently to permit the proper operation of a power-driven float. The surface shall then be consolidated with power-driven floats. Hand floating with wood, aluminum or magnesium floats shall be used in locations inaccessible to the power-driven machine.
3. Trueness of surface shall be rechecked at this stage with a ten foot straightedge applied at no fewer than two different angles. All high spots shall be cut down and all low spots filled during this procedure such that the finished surfaces are true planes. The slab shall then be refloated immediately to a uniform, smooth, granular texture.

C. Troweled Finish:
1. Concrete slabs to receive carpeting, resilient and ceramic tiles, all interior slabs left exposed or as specified herein and as indicated on the drawings shall receive a trowel finish. After the concrete has been placed, struck off, consolidated, screeded and darbied, and as soon as the condition of the slab permits, and before it has hardened appreciably, all water, film and foreign material which may work to the surface, shall be removed by means of lutes, or bull floats.
2. The surface shall be finished first with power floats, as specified above, then with power trowels, and finally with hand trowels. The first troweling after power floating shall be done by a power trowel and shall produce a smooth surface which is relatively free of defects but which may still contain some trowel marks. Additional trowelings shall be done by hand after the surface has hardened sufficiently. The final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface. The surface shall be thoroughly consolidated by the hand troweling operations. The finished surface shall be free of any trowel marks and uniform in texture and appearance.

D. Broom Finish:
1. Sidewalks, platforms, ramps, exterior stairs or as specified herein or shown on the drawings shall receive a broom finish. After floating, and between the time of initial and final set, the surface shall be given a coarse transverse scored texture by drawing a broom or burlap belt across the surface.

E. Scratched Finish:
1. Concrete slabs to receive cement waterproofing, concrete, grout fill or finish material to be bonded to cement mortar or as indicated on the drawings or specified shall receive a scratched finish. After concrete has been placed, struck off, consolidated and level to a true plane, the surface shall be roughened with stiff brushes or raked before final set.
2. For metallic waterproofing, finish shall be in accordance with the manufacturer's requirements.

3.08 CLEANING CONCRETE

A. Cleaning Concrete:

1. The Engineer may require remedial action by the Contractor to remove blemishes, rust, stains, or discolorations from the exposed concrete. General cleaning shall be done with a non-etching cleaning agent used as per manufacturer's instructions. The cleaner shall be used on all surfaces to receive a painted finish.

B. In the event of a severe blemish or discoloration which cannot be removed with a non-etching agent, the Contractor shall notify the Engineer immediately and consider the following:

1. A clean down with mild solution of detergent and water applied by scrubbing vigorously with soft bristle brushes, then flushing with water. Rust stains may be removed by applying a bleaching agent such as oxalic acid.
2. Cleaning operation shall not begin until superstructure is entirely completed and then only where and as directed by the Engineer. Cleaning portions of building as work progresses is not permitted.
3. Cleaning by other methods, bleaching, acid etching, sandblasting or any other procedure suggested by the Contractor and proven to be effective.

END OF SECTION

INDEX

DIVISION 4 MASONRY

SECTION 04100

MASONRY

PART 1 GENERAL

1.01 DESCRIPTION

A. The work of this Section includes all labor, materials, tools, scaffolding and equipment necessary to complete the masonry work as required by the Contract Documents. The work shall include but not necessarily limited to the following:
   1. Providing brick surface rehabilitation to all exposed bricks on the core tank base structure.

1.02 RELATED WORK

A. Documents affecting Work of this Section include but are not necessarily limited to General Conditions, Supplementary Conditions and the Sections in Division 1 of these Specifications.
   1. Section 03300 Cast-In-Place Concrete

1.03 TECHNICAL REQUIREMENTS

A. Work for concrete masonry construction shall conform to National Masonry Association's "Specification for the Design and Construction of Load Bearing Concrete Masonry".
   1. Grout for masonry construction shall conform to Standard Specifications for "Grout for Masonry", ASTM Designation C-476 and as further specified herein.
   2. Mortar for masonry construction shall conform to Standard Specifications for "Mortar for Unit Masonry", ASTM Designation C-270.

B. Where conflict occurs between these specifications and the provisions of State codes having jurisdiction, the more stringent requirements shall govern.

1.04 SUBMITTALS

A. Comply with the pertinent provisions of Section 01300.

B. Product Data: Within 30 calendar days after the Contractor has received the Owner’s Notice to Proceed, submit:
   1. Materials list of items proposed to be provided under this Section.
   2. Manufacturer’s specifications and other data needed to prove compliance with the specified requirements.

1.05 SAMPLES AND SAMPLE PANEL

A. Samples:
   1. Piece of control joint material.
   2. Piece of prefabricated joint reinforcement.
   3. Sample color kit for masonry veneer.
   4. Sample color kit for mortar.

B. Sample Panel
   1. A sample panel shall be constructed at the project site, in accordance with paragraph 3.01 A., of this Section.

1.06 CERTIFICATES

A. Manufacturer's Certification of all requirements herein must accompany samples.
   1. Certificates shall be for this project only; be signed, dated and notarized.

B. Tests certifying the requirements for concrete masonry units, mortar, and grout specified herein, shall be made with manufacturer's materials intended for use on this project, prior to the construction of the sample panel and any time there is a change in materials or material suppliers.

1.07 ENVIRONMENTAL CONDITIONS

A. Masonry shall not be erected when, the sun, heat, wind or limitations of facilities furnished by the Contractor prevent setting and curing of mortar joints or obtaining proper bond in the mortar.

B. Masonry shall be protected against freezing for not less than 48 hours after installation, and shall not be constructed below 28 degrees F. on rising temperatures or below 36 degrees F. on falling temperatures without temporary heated enclosures, without heating the materials or other approved methods necessary to prevent freezing of materials.
   1. Frozen materials shall not be used nor shall frozen masonry be constructed upon.
   2. No mortar admixtures shall be used.
   3. Any masonry constructed without regard to the protective measures listed above, will be considered by the Engineer to be defective work and shall be removed and replaced at the Contractor's expense.

1.08 DELIVERY AND STORAGE

A. Cement, lime, and other cementitious materials shall be delivered to the site in unbroken bags, barrels, or other approved containers, plainly marked and labeled with manufacturer's names and brands.
   1. Mortar materials shall be stored in dry weathertight sheds or enclosures and shall be stored and handled in a manner which will prevent the inclusion of foreign materials and damage by water or dampness.
   2. Concrete masonry units shall be handled with care to avoid chipping and breakage. Damaged units shall not be used in the exposed work.
   3. Materials stored on newly constructed floors shall be stacked in such a manner that the uniformly distributed loading does not exceed 50 psf.
   4. Moisture controlled concrete masonry units (Type 1) shall be shipped with each pallet wrapped in 10 mil minimum polyethylene plastic film.
      a. The wrapping shall not be removed until the concrete masonry units are about to be placed in the wall so as to prevent moisture pickup.
      b. Any concrete masonry units left exposed overnight, in the rain or otherwise allowed to pick up moisture shall be rejected.

1.09 TESTING

A. Testing as specified shall be the responsibility of the mason contractor.
   1. A copy of the test results shall be sent to the Engineer directly from the testing laboratory.

B. Testing shall include prism test of one set (three specimens) of each "Class of Unit" in advance of beginning masonry work and at least one field test (one set) during construction for each five thousand square feet (5,000 sq. ft.) of wall but not less than three such tests for any building.

C. Prism Construction and testing shall conform to requirements of ASTM E447 and the height-to-thickness ratio of masonry prisms (specimens) shall not be less than 2.0 and not more than 3.0.

D. The average compressive strength of each set of masonry prisms shall equal or exceed the specified compressive strength of masonry f'm.

PART 2 PRODUCTS

2.01 CEMENT, MORTAR, GROUT, AND LIME

A. Cement shall be Portland Cement conforming to ASTM C150, Type II, “low alkali”.
   1. The brand of cement to be used shall be submitted to the Engineer for approval prior to use.

B. Masonry Cement shall conform to ASTM C91.

C. Hydrated Lime shall conform to ASTM C207, Type S.
   1. Hydrated lime shall not contain air-entrainment additives.

D. Aggregates for masonry mortar shall conform to ASTM C144.

E. Aggregates for masonry grout shall conform to ASTM C404.

F. Water shall be potable.

G. Grout color for tuckpointing of masonry work shall be as selected by the Owner.

2.02 JOINT REINFORCEMENT

A. Shall be factory fabricated from zinc coated cold-drawn steel wire conforming to ASTM A82, galvanized after fabrication in accordance with ASTM A 641, Class
1. Joint reinforcement shall consist of longitudinal, standard weight No. 9 gauge wires, weld connected to No. 9 gauge cross wires forming a truss type design.
2. The out-to-out dimension of the longitudinal wires shall be approximately 2" less than the nominal thickness of the width of the wall.
3. Prefabricated corners and tees shall be used.
4. Joint reinforcement shall be supplied in flat sections 10' to 20' in length.
5. Masonry joint reinforcement for the structural block shall be DUR-O-EYE as manufactured by DUR-O-WAL Inc., Baltimore, MD or an approved equal.
   a. The eye sections shall be welded on at a maximum of sixteen (16) inches on center.
   b. Shall include adjustable wall ties sized to fit the masonry wall width.
6. Masonry joint reinforcement for the block veneer shall be DUR-O-WAL Truss as manufactured by DUR-O-WAL Inc., Baltimore, MD. or an approved equal.

2.03. MASONRY CONTROL JOINTS

A. Shall be Rapid Poly-Joint as manufactured by Dur-O-Wal or an approved equal.
1. Designed for use with standard sash block.
2. PVC shall conform to ASTM D2287 type PVC 654-4 with a durometer hardness of 85 when tested in accordance with ASTM D2240.
3. Size shall be as required by wall width.

2.04 MORTAR AND GROUT PROPORTIONS

A. Mortar for reinforced, hollow, load-bearing concrete masonry, and interior non-load bearing concrete masonry shall be type M conforming to ASTM C270 consisting of one of the following proportions by volume:
1. 1 part Portland cement
   ¼ part hydrated lime
   2-1/4 to 3 parts damp loose aggregate
2. 1 part Portland cement
   1/4 part hydrated lime
   2-1/4 to 3 parts damp loose aggregate
3. Proposed mortar color, proportions, certification of all requirements herein and a sample of the proposed mortar must be approved by the Engineer prior to the execution of the work including construction of the sample panel or whenever the material supplier is changed.

B. Grout for reinforced concrete unit masonry and bond beams shall conform to ASTM C476 and consist of the following proportions by volume as applicable:
1. Fine Grout:
   1 part Portland cement
   0 to 1/10 part hydrated lime or lime putty
   2-1/4 to 3 parts fine aggregate
2. Coarse Grout:
   1 part Portland cement
   0 to 1/10 part hydrated lime or lime putty
   2-1/4 to 3 parts fine aggregate
   1 to 2 parts coarse aggregate

PART 3 EXECUTION

3.01 GROUTING

A. Grout shall be placed by low-lift grouting with maximum vertical lifts not to exceed four (4) feet.
   1. The level of grout for each lift shall be stopped 1-1/2 inches from the top of the masonry.
   2. Grout shall be consolidated in place during placement by vibration or other approved methods to insure complete filling of cells.
   3. Place grout within one hour after mixing.
   4. The consistency of grout shall be such that, at the time of placement it has a slump between 9” and 11", as determined by the Standard Specifications for "Method of Test for Slump of Portland Cement Concrete", ASTM C143.

3.02 CUTTING AND FITTING

A. Wherever possible, full units shall be used in lieu of cut units.
   1. Where cut units are required to accommodate the design, cutting shall be done by masonry mechanics using power masonry saws, except that cutting of units in unexposed work may be accomplished with masonry hammers and chisels.
   2. Wet-cut units shall be dried to the same surface-dry appearance as uncut units before being placed in the work.
   3. Cut edges shall be clean, true, and sharp.
   4. Openings to accommodate pipes, conduits, and other accessories shall be neatly formed so that framing or escutcheons required will completely conceal the cut edges.
   5. Cutting of webs of hollow units shall be kept to a minimum.
   6. Insofar as practicable, all cutting and fitting shall be accomplished while masonry work is being erected.

3.03 TOOLING

A. Mortar joints for masonry units shall be raked back in preparation for tuckpointing. All other masonry joints shall have a tooled concave joint.
   1. The jointer shall be slightly larger than the width of the mortar joint so that complete contact is made along the edges of the units, compressing and sealing the surface of the joint.
   2. Joints in unexposed surfaces shall be cut flush.

3.04 CLEANING

A. Cleaning
   1. The exposed faces of interior blockwork shall be cleaned thoroughly from top down of all stains, mortar deposits and efflorescence.
   2. Proprietary cleaning compounds that are proposed for use, shall be suitable for use within a municipal well area and be approved by the Engineer.
   3. Before applying the cleaning agent, it shall be applied to a sample wall area of approximately 20 sq. ft. in a location approved by the Engineer.
   4. No further cleaning work may proceed until the sample application has been approved.
      a. Note that colored mortars are adversely affected by strong acid solutions.
   5. High pressure water cleaning shall not be used.

3.05 CLEANUP

A. All work areas shall be kept clean and free from buildup of debris.
   1. At the conclusion of masonry work, remove all scaffolding and equipment used in the work, cleanup all debris and refuse and surplus material and remove same from premises.

END OF SECTION

SECTION 04520

MASONRY RESTORATION

PART 1 GENERAL

1.01 DESCRIPTION

A. Provide the masonry restoration as required by the Contract Documents.

1. General: The work of this Section includes all labor, materials, tools, scaffolding and equipment necessary to complete the cleaning, repair and re-pointing of the exterior masonry of the existing central core standpipe support as shown on the Drawings, specified herein, or evidently required to complete the work including, but not limited to, the following:

a. The removal of all dirt, grime, stains, and discoloration from the masonry face and cleaning the entire masonry surface.

b. Removal and replacement of broken or cracked brick work.

c. Removal and re-pointing of deteriorated mortar joints.

1.02 SUBMITTALS

A. The Contractor shall submit manufacturer's literature of all masonry materials proposed for the project prior to ordering materials, in accordance with the provisions of the General Conditions.

1. Literature and Certifications: Provide product labels and manufacturer's data sheets for all dry mortar ingredients.

1.03 ENVIRONMENTAL CONDITIONS

A. Mortar shall be protected against freezing for not less than 48 hours after installation.

1. Shall not be applied below 28 degrees F. on rising temperatures or below 36 degrees F. on falling temperatures without temporary heated enclosures, without heating the materials or other approved methods necessary to prevent freezing of materials.
2. Neither frozen materials nor mortar admixtures shall be used.
3. Any masonry re-pointing without regard to the protective measures listed above will be considered by the Engineer to be defective work.

1.04 QUALITY ASSURANCE

A. Workmanship: For actual re-pointing and its supervision, use only skilled journeyman pointers or masons who have had at least five years’ experience with the materials and methods specified.

1. In acceptance or rejection of masonry re-pointing, no allowance will be made for lack of skill on the part of the mechanics.

B. Coordination: Contractor shall coordinate work of all other trades related to the successful completion of this work. Do not proceed with the work of this Section in areas that first require the work of other trades, until all such other work is completed.

1.05 DELIVERY AND STORAGE

A. Cement, lime, and other cementitious materials shall be delivered to the site in unbroken bags, barrels, or other approved containers, plainly marked and labeled with manufacturer's names and brands.

1. Mortar materials shall be stored in dry weather tight sheds or enclosures, and shall be stored and handled in a manner, which will prevent the inclusion of foreign materials and damage, by water or dampness.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cement shall be Portland Cement conforming to ASTM C150, Type II.

B. Hydrated lime shall conform to ASTM C207, Type S, masons hydrated lime.
   1. Hydrated lime shall not contain air entrainment additives.

C. Dry Pigment: Lime proof inorganic pigment as manufactured by Empire White Products Company, Landers-Segal Company or an approved

D. Water shall be clean, fresh and potable.

E. Sand and aggregates for masonry mortar shall conform to ASTM C144.

F. Mortar and Grout:
   1. Mortar for brick pointing shall be Type N with a minimum compressive strength of 750 psi tested in accordance with ASTM C109 and shall consist of the following proportions by volume:

      1-part Portland cement.
      1-1/4-part hydrated lime.

   2. Sand measured in a loose damp condition shall be not less than 2-1/4 or not more than 3 times the sum of volumes of cement and lime used above.
   3. Add a small amount of dry pigment to dry mortar mix in such proportion to match existing brick mortar color.

G. Brick shall be as specified in Section 04100.

H. Masonry cleaner for brick masonry shall be manufactured by Sure-Klean or equal and shall be suitable for use within a municipal well site area.

PART 3 EXECUTION

3.01 PROTECTION

A. Before cleaning and pointing work begins, protect with approved coverings all adjacent surfaces not scheduled to receive work.
   1. Contractor shall take any necessary measures to ensure that existing work scheduled to remain intact is not in any way damaged by the execution of any work of this Section.

B. Protect masonry rebuilding and re-pointing work in progress from adverse weather conditions.
   1. Protect uncured mortar from exposure to frost or rain.
   2. Perform work only when outdoor temperature is between 40 degrees F. and 85 degrees F.

3.02 CLEANING

A. Prior to the re-pointing work the existing brick shall be cleaned of all dirt and other contaminants using the product specified herein and applied in accordance with the manufacturer's instructions.
   1. Cleaned surface shall be rinsed and left in a clean and dry condition.

3.03 JOINT PREPARATION

A. Removal of Old Mortar: Width of existing joints average 3/8 inch. Tools shall be sized for joints of less a dimension than actual.
   1. Contractor shall exercise all necessary diligence to avoid abrading joint faces at the outer edge of the arris, and to not chip edges or otherwise widen joints at the arris.
   2. Use chisels of constant rectangular cutting only.
   3. Remove old mortar to a depth of 3/4".
   4. Remove all loose mortar, even if it is deeper than the depths indicated, to reach sound existing mortar.
   5. Remove mortar from both surfaces of the adjacent masonry and square out at the back of the joint.

B. Rinsing: Thoroughly rinse raked joints with water to remove fine particles. Do not use compressed air.
   1. Clean and rinse joints sufficiently before filling the joints to allow evaporation of any freestanding water in the joints.

3.04 PREHYDRATED MORTAR PREPARATION

A. Dry Ingredients: Mix sand, cement, hydrated lime, and dry pigment (if required) thoroughly for at least three minutes before adding any water and until the even color of the mixed materials indicates that they have been thoroughly distributed throughout the mass.

B. Water: After mixing dry ingredients then mix again, adding only enough water to produce a damp unworkable mix which will retain its form when pressed into a ball.
   1. After 1 to 2 hours, add sufficient water to bring it to the proper consistency; that is, somewhat drier than conventional masonry mortars.

C. Use of Hardened Mortar: Clean mixing equipment thoroughly after each use to prevent hardened or partially hardened lumps of mortar from contaminating new batch.

D. Mortar Additives: Add no additional substances to the mortar without the written permission of the Engineer.
   1. Additional substances include but are not limited to anti-freeze compounds and air entraining agents.

E. Batch Life: Use mortar within twenty minutes of mixing. Do not add water ("re-tempering") in the attempt to make the mortar workable.

3.05 JOINT MOISTENING

A. If the joints have dried since being rinsed, moisten again with a fine water spray.
   1. Allow no freestanding water to be present.

3.06 JOINT FILLING

A. Apply mortar from mortarboard to joint with pointing tool sufficiently narrow to enter the joint, and to achieve good compaction.

B. Apply mortar in layers not exceeding 3/8" in depth. Apply first layers to deepest voids only, to enable applying each subsequent layer to a uniform depth.

C. Apply each layer fully compacted into the joint and allow to become thumb print hard prior to the application of the next layer.

3.07 JOINT FINISHING

A. Tool final layer of mortar, after it has become thumbprint hard, too slightly exceed depth of recess of adjacent sound joints.
   1. Mortar joints shall be tooled so that the arris stands free of the joint face.
   2. No feathering of mortar edges will be permitted.

B. Expose aggregate of mortar joints to match adjacent sound joints by applying water with stiff bristle brush just after mortar has set but before it has dried.

C. Remove excess mortar from masonry just after it has set but before it has dried to prevent smearing.
   1. As needed, use natural bristle brush and/or wood paddle, with water.
   2. Use of muriatic acid or any acid-based masonry cleaners is prohibited.

3.08 CLEANING

A. After mortar has completely set, remove any excess mortar from masonry.
   1. Clean entire area of brick with cleaning agent specified herein using a natural bristle brush.
   2. Rinse with clear water.
   3. Use of muriatic acid or any acid-based masonry cleaners is prohibited.

B. Leave the work area free of debris and accumulated matter.

END OF SECTION

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DIVISION 6 WOODS AND PLASTICS

SECTION 06100

CARPENTRY

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Provide rough and finish carpentry work as required by the Contract Documents.
   1. In general, the work of this Section includes all labor, equipment, materials and all operations required to furnish and install all rough and finished carpentry work, rough hardware, and all items incidental thereto.

1.02 RELATED WORK

A. Documents affecting work of this Section include but are not necessarily limited to General Conditions, Supplementary Conditions and the Sections in Division 1 of these specifications.
   1. Division 4 Masonry
   2. Division 7 Thermal and Moisture Protection
   3. Division 8 Doors

1.03 SUBMITTALS

A. Comply with the pertinent provisions of Section 01300.

B. Product Data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1. Materials list of items proposed to be provided under this Section.
   2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

1.04 PRODUCT HANDLING

A. Deliver and Storage of Materials: Lumber shall be delivered to the job site in an undamaged condition. Materials shall be protected against dampness before and after delivery.
   1. Materials shall be stored under cover in a well-ventilated enclosure and shall not be exposed to extreme changes in temperature and humidity that could cause damage to materials.
   2. Materials shall not be stored in the buildings until concrete and masonry are dry.
   3. Defective or damaged material shall be replaced by the Contractor at no additional cost to the Owner. Lumber delivered to the site shall be stacked off the ground in such a manner as to insure proper drainage, ventilation and protection from soil or the weather.

1.05 GENERAL PROVISIONS

A. Temporary Enclosures: Temporary batten panels and batten doors, complete with hinges and locksets shall be provided on all exterior openings as required to protect the structures and contents from intruders and the weather.

B. Temporary Supports: Centering and other supports necessary for temporary support of masonry shall be rigidly made, properly braced and secured in position.

PART 2 PRODUCTS

2.01 LUMBER

A. Lumber for general uses shall be sound, well-seasoned with moisture content suitable for intended use, square edged, free from shakes or other defects which would impair its strength and durability, and free from curves or warp which cannot be corrected in the process of erection.
   1. All dimensions given are nominal and the actual dressed sizes shall conform to the established sizes for dressed lumber.

B. Grading: Lumber shall conform to the current grading rules and bear the official grade mark of the association under whose rules it is produced, or each shipment shall be accompanied by a Certificate of inspection issued by the association.
   1. Lumber for plates, blocking, nailing strips and similar items shall be Construction Grade Dimension No. 2 Dense Southern Pine.
   2. Strapping: Shall be 1" by 3" spruce or equal.
   3. Framing Lumber shall be Douglas Fir, select structural as graded by the West Coast Lumber Inspection Bureau or Southern Pine, No. 2 Dense, or other lumber product having an allowable bending fiber stress of 1250 psi and a modulus of elasticity of 1,400,000 psi. All other framing lumber not carrying calculated stresses shall be WCLB Stud Grade Douglas Fir, Southern Pine or better.
   4. Plywood Sheathing: General: Sheathing shall conform to Product Standard, Structural I, Exposure 1 and be graded by the American Plywood Association.
   5. Plywood Sheathing: Roof: 5/8" APA Structural I rated sheathing.

2.02 TREATED LUMBER

A. General:
   1. All wood to be exposed to the weather, wood used for plates and nailers anchored to masonry and timber cribbing, and framing shall be pressure treated with Wolman salts.
   2. Treating plant equipment, conditioning of timber, method of treatment and determination of retention and penetration of preservative shall be in accordance with American Wood Preservers Association Specification applicable to the class or kind of timber to be treated.

B. Quantity of Preservative:
   1. Preservative shall conform with AWPA Spec. P5 and Federal Spec. TT-W-535C.
   2. All timber shall be treated so as to leave injected in the wood not less than .35 pound Wolman Salts, dry salts basis, per cubic foot of wood.
   3. Following treatment, lumber shall be air seasoned or kiln dried to a final moisture content as follows except that lumber intended for gluing shall be kiln dried only to a final moisture content of 16% maximum.
      a. Up to 2 inch nominal — 12% to 15%
      b. 2 inch nominal & up to 3 inch nominal — 15% to 18%
      c. 3 inch nominal — 18% to 22%
      d. Lumber over 3 inch nominal size shall be dried only to remove excessive moisture. No definite final moisture is required.
   4. Certificate: Treated lumber shall be accompanied by a certificate from a recognized lumber treating company certifying the amount of treatment and the percentage of moisture after drying.

2.03 INTERIOR WOOD TRIM

A. Wood trim shall be polyvinyl chloride as manufactured by AZEK Building Products or approved equal.
   1. Color and finish shall be determined by the Owner.

2.04 EXTERIOR WOOD TRIM

A. Wood trim shall be polyvinyl chloride as manufactured by AZEK Building Products or approved equal.
   1. Color and finish shall be determined by the Owner.

2.05 HEAD FLASHING

A. Flashing shall be provided as noted and wherever top surface of wood members are exposed to weather. Unless noted otherwise, flashing shall be fabricated from 16 oz. lead coated copper or 0.032 aluminum brake sections, with finish to match adjacent surfaces.

2.06 ROUGH HARDWARE

A. Steel Items:
   1. Sheathing clips, truss ties, purlin hangers, column base anchors and etc. shall be galvanized as manufactured by Teco, Simpson or an approved equal.
   2. Lag Bolts: Square head type complying with Fed. Spec. FF-B-561.

3. Nails: Galvanized at all locations.
4. Machine Bolts; Comply with ASTM A307, Grade A and be hot-dipped galvanized.
5. Carriage Bolts: Comply with ANSI B18.5.

B. Concrete and Masonry Anchors: Where anchors are not included in the concrete or masonry construction, anchors shall be galvanized machine screws or bolts with standard expansion-shield type concrete anchors, Phillips "Red Head" Masonry Anchors as manufactured by Phillips Drill Co., or approved equal, of the sizes and types noted on Drawings or as required.
1. Do not use expansion bolts or anchors where other type anchors are shown on the Drawings.
2. Where required, finish work shall be anchored to concrete with Tapcon masonry anchors.

C. Powder activated fasteners shall not be used.

PART 3 EXECUTION

3.01 GENERAL FRAMING

A. General:
1. In addition to framing operations normal to the fabrication and erection indicated on the Drawings, install wood blocking and backing required for the work of other trades.
2. Set horizontal and sloped members with crown up.
3. Do not notch, cut, or bore members for pipes, ducts or conduits or for other reasons except as shown on the Drawings or as specifically approved in advance by the Engineer.
4. When cutting or handling treated wood, comply explicitly with the manufacturer’s handling precautions.
5. All of the sawdust, chips and waste pieces of the treated wood are to be collected in their entirety and properly disposed of.

B. Bearings:
1. Make bearings full unless otherwise indicated on the Drawings.
2. Finish bearing surfaces on which structural members are to rest so as to give sure and even support.
3. Where framing members slope, cut or notch the ends as required to provide a uniform bearing surface.

C. Blocking:
1. Install blocking as required to support soffit, items of finish, and to cut off concealed draft openings, both vertical and horizontal, between ceiling and floor areas.

D. Alignment:
1. On framing members to receive a finished surface, align the finish subsurface to vary not more than 1/8” from the plane of surfaces of adjacent furring and framing members.

3.02 INSTALLATION OF PLYWOOD SHEATHING

A. Placement:
1. Place plywood with face grain perpendicular to supports and continuously over at least two supports, except where otherwise shown on the Drawings.
2. Center joints accurately over supports.
3. Stagger joints.
4. Install two (2) panel clips per every span between roof trusses.

B. Protect plywood from moisture by use of waterproof coverings until the plywood in turn has been covered with the next succeeding component of finish.

3.03 INSTALLATION OF FINISH WORK

A. Discard units of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned or too small to fabricate work with minimum of joints or optimum jointing arrangements, or which are of defective manufacturer with respect to surfaces, sizes or patterns.

B. Install the work plumb, level, true and straight with no distortions.

1. Shim as required using concealed shims.
2. Install to a tolerance of 1/8" in 8'-0" for plumb and level countertops; and with 1/16" maximum offset in revealed adjoining surfaces.
3. Scribe and cut work to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.

C. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum lengths of lumber available) to the greatest extent possible.
1. Stagger joints in adjacent and related members.
   a. Cope at returns, miter at corners, to produce tight fitting joints with full surface contact throughout length of joints.
   b. Use scarf joints for end-to-end joints.
1. Make exterior joints water-resistant by careful fitting.
2. Apply flat grain lumber with bark side exposed to weather.

D. Anchor finish carpentry work to anchorage devices or blocking built-in or directly attached to substrates.
1. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation.
2. Except where prefinished matching fastener heads are required, use fine finishing nails for exposed nailings, countersunk and filled flush with finished surface and matching final finish where transparent is indicated.

3.04 FASTENING

A. Nailing:
1. Use only common wire galvanized nails or spikes of the dimension required.
2. Provide penetration into the piece receiving the point of not less than one half the length of the nail or spike, provided, however, that 16d nails may be used to connect two pieces of two(2) inch (nominal) thickness.
3. Nail without splitting the wood.
4. Prebore as required.
5. Remove split members and replace with members complying with the specified requirements.

B. Bolting:
1. Drill holes 1/16” larger in diameter than the bolts being used.
2. Drill straight and true from one side only.
3. Do not bear bolt heads on wood (unless they are carriage bolts). Use washers under head and nut where both bear on wood, and use washers under all nuts.

C. Screws:
1. For lag screws and wood screws, prebore holes same diameter as root of threads, enlarging holes to shank diameter for length of shank.

D. Builders Hardware: Framing anchors, sheathing clips, rafter ty-downs, etc.
1. Position hardware accurately to ensure proper bearing and holding ability.
2. Attach to members in compliance with the manufacturer’s requirements.

3.05 ADJUSTMENT, CLEANING, FINISHING AND PROTECTION

A. Repair damaged and defective finish carpentry work wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace wood work.
1. Adjust joinery for uniform appearance.

B. Refer to Division 9 sections for final finishing of installed finish carpentry work.

C. Protection: Installer of finish carpentry work shall advise Contractor of final protection and maintained conditions necessary to ensure that work will be without damage or deterioration at time of acceptance.

END OF SECTION

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DIVISION 7 THERMAL AND MOISTURE PROTECTION

SECTION 07311

ASPHALT SHINGLE ROOFING

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:
   1. American Wood Preservers' Association (AWPA): U1, Use Category System: User Specification for Treated Wood.
   2. ASTM International (ASTM):
      a. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
      b. D1970, Standard Specification for Self-adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roof Underlayment for Ice Dam Protection
      c. D3018, Standard Specification for Class A. Asphalt Shingles Surfaced with Mineral Granules.
      d. D3462, Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules.
      e. D3909, Standard Specification for Asphalt Roll Roofing (Glass Felt) Surfaced with Mineral Granules.
      f. D4586, Standard Specification for Asphalt Roof Cement, Asbestos Free.

1.02 RELATED WORK

A. Documents affecting work of this Section include but are not necessarily limited to General Conditions, Supplementary Conditions and the Sections in Division 1 of these specifications.
   1. Division 6 Woods and Plastics

1.03 SUBMITTALS

A. Action Submittals:
   1. Roofing materials manufacturer's specifications selected for use.
   2. Color choices available.
   3. Manufacturer's product literature showing compliance with specification.

B. Informational Submittals:
   1. Manufacturer's Certificate of Compliance.
   2. Sample copy of guarantee to be provided.
   3. Roofing materials manufacturers' current printed installation instructions.

1.04 SPECIAL GUARANTEE

A. Furnish manufacturer's extended guarantee or warranty, with Owner named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for correction, or at the option of the Owner, removal and replacement of Work specified in this Specification section found defective during a period of 30 years after the date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work shall be as specified in the General Conditions.

PART 2 PRODUCTS

2.01 MATERIALS

A. Shingles: Self-sealing standard fiberglass-based asphalt shingles meeting ASTM D3018, Type I and ASTM D3462, and the following:
   1. Warranty: 30-year.
   2. Composition: Fiberglass roofing felt, asphalt, and ceramic-coated rock granules.
   3. Minimum Size: Length 36 inches, width 12 inches.

4. Application: Exposure 5 inches, head lap 2 inches.
5. Weight: 250 pounds per square minimum.
6. Features: Self-sealing, architectural, square butt, self-aligning notches at ends.
7. Compliances: UL Class A, fire- and wind-resistant.
8. Color: As selected from manufacturer's standard color range.

B. Ice and Water Shield: Cold applied, self-adhering, polyethylene-faced sheet, consisting of slip-resisting polyethylene-film reinforcing top surface laminated to SBS-modified asphalt adhesive with release-paper backing, 40-mil minimum thickness meeting ASTM D1970.

C. Valley Flashing: Shall be Ice and Water shield and installed per manufacturers recommendations for valleys. Architectural shingles shall be installed using the Closed Cut Valley method.

D. Underlayment: 5-ply, 100% asphalt and asbestos free, high strength performance roofing underlayment that can be used on stoop sloped roofs beneath composite, metal, clay, concrete, slate, wood and other roofing materials, woven HDPE with a polyethylene film laminated with black LDPE on one side and in addition a nonwoven polypropylene layer is laminated with LDPE on the other side of the woven HDPE. Installation shall be per manufacturers recommendations. Shall be Roof Top Guard II as manufactured by rkw or approved equal.

E. Plastic Cement: ASTM D4586, Type II.

F. Fasteners:
1. Nails: Hot galvanized or aluminum with minimum 12-gauge shank and minimum 3/8-inch head, or as recommended by shingle manufacturer.
2. Staples: Not allowed.
3. Furnish nails long enough to penetrate at least 3/4 inch into solid decking, or extend a minimum of 1/8 inch through plywood sheathing.

G. Treated Wood Nailers:
1. Waterborne salt preservatives; AWPA U1.
2. Apply two brush coats of same preservative used in original treatment to sawed or cut surfaces of treated lumber.
3. Minimum Grade: Standard or Better, or Stud Grade.
4. Conform to FM Loss Prevention Data, 1-49.
5. Creosote and asphaltic preservatives are not acceptable.

PART 3 EXECUTION

3.01 PREPARATION

A. Inspect roof deck for deficiencies and report same to Engineer.

B. Do not start Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Underlayment and Roofing Shingles: In accordance with roofing material manufacturer's printed instructions. Use closed valley application.

B. Before placement of each piece, remove protector strip covering self-sealing strip.

3.03 CLEANING

A. Clean roofing areas upon completion, leaving areas free from debris occasioned by installation.

3.04 PROTECTION

A. Protect the roofing materials before, during, and after installation and protect the installed Work and materials of other trades affected by this Work.

B. In the event of damage, immediately make repairs and replacements as necessary and acceptable to Engineer.

END OF SECTION

SECTION 07600

FLASHING AND SHEET METAL

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide all metal flashings for typical conditions shown on the Drawings and in all locations where the use of metal flashing may be reasonably inferred as necessary to make the work of this Section complete in its intent to provide leak proof conditions.

B. All accessories or other items essential to the completeness of the sheet metal installation, though not specifically shown or specified, shall be provided.

1.02 REFERENCE STANDARDS

A. ASTM C793 - Effects of Accelerated Weathering on Elastomeric Joint Sealants.

B. ASTM D412 - Rubber Properties in Tension.

C. ASTM D624 - Rubber Property - Tear Resistance.

D. ASTM D1149 - Rubber Deterioration - Surface Ozone Cracking in a Chamber (Flat Specimens).

E. ASTM D2240 - Rubber Property - Durometer Hardness.

F. SMACNA - Architectural Sheet Metal Manual.

1.03 SUBMITTALS

A. Submit product data in accordance with Section 01300.

B. Submit manufacturer's product data and installation instructions for flashing. Submit color chart for color selection by the Engineer.

PART 2 PRODUCTS

2.01 SHEET METALS

A. Aluminum - 0.032 and 0.040 inch Alloy 3003-H14.

2.02 BITUMINOUS COATINGS

A. SSPA - Paint 12.

B. Cold applied solvent-type bituminous mastic coating for application in dry film thickness of 15 mils per coat.

2.03 ACCESSORY MATERIALS AND COMPONENTS

A. Fasteners: Concealed hook strip or clip type; of same material as flashings; sized to suit application.

B. Solder and Flux: Type recommended for materials being used.

C. Bituminous Paint: Acid and alkali resistant type; black color.

2.04 FABRICATION

A. Comply with applicable recommendations and details of the architectural sheet metal manual.

B. Form sections square, true and accurate in size, free from distortion and other defects detrimental to appearance or performance.

C. On vertical surfaces, lap flashing seems a minimum of 3 inches.

D. Use minimum 0.032-inch aluminum for flashings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Secure flashings in place using concealed type fasteners. Only use exposed fasteners in locations approved by Engineer. When using exposed fasteners, they are to be of same finish as flashings.

B. Vertical joints of metal roof edgings, wall cap flashings, etc., shall be done with butt joints and overlapping and locking cover plate allowing space for thermal expansion at butt joint. Set cover plates in sealant, both sides of joint.

C. Provide soldered flat lock seams and end joints. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

D. Counter-flash mechanical and electrical items projecting through roof. Provide EPDM pipe seals where necessary.

END OF SECTION

SECTION 07700

ROOF SPECIALTIES AND ACCESSORIES

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:
   1. ASTM International (ASTM): D4586, Standard Specification for Asphalt Roof Cement, Asbestos-Free.

1.02 SUBMITTALS

A. Action Submittals:
   1. Shop Drawings of each item specified showing materials, details, flashing, anchorage, and relation to adjacent structure.
   2. Catalog cuts of each item specified item.

1.03 SEQUENCING AND SCHEDULING

A. Coordination: Schedule and coordinate work of this section with work of Sections 07530, EPDM Membrane Roofing; 15410, Plumbing Fixtures; 15720, Air Handling; 15830, HVAC Fans; and Section 07620, Sheet Metal Flashing.

PART 2 PRODUCTS

2.01 ROOF CURBS

A. Prefabricated Galvanized Steel: Minimum 12-inch-high curb with treated wood nailer, liner panel, and factory installed insulation as required for conditions shown on Drawings.

B. Insulation: Minimum 1-1/2 inches thick, 3 pounds per cubic foot density, rigid mineral fiberboard insulation with metal liner.

C. Metal Gauge and Reinforcement: To suit imposed loads of equipment to be supported.

D. Fabricate curbs to fit roof slope.

E. Manufacturers and Products:
   1. Pate Co.; PC-2.
   2. Thy Curb; Model TC-3.
   3. RPS Corporation; RC-2A.

2.02 EQUIPMENT SUPPORT CURBS

A. Prefabricated Galvanized Steel: Minimum 12-inch-high curb with counterflashing, factory installed insulation, and treated wood nailer as required for conditions shown on Drawings.

B. Metal Gauge and Reinforcement: To suit imposed loads of equipment to be supported.

C. Fabricate curbs to fit roof slope.

D. Manufacturers and Products:
   1. Pate Co.; ES-2.
   2. Thy Curb; Model TEMS-3.
   3. RPS Corporation; ER-2A.

2.03 PIPE CURB ASSEMBLY

A. Prefabricated Galvanized Steel: Minimum 12-inch high curb for pipe penetrations of roof, complete with cover, liner panel, factory installed insulation and accessories as required for conditions shown on Drawings.

B. Fabricate to fit roof slope and furnish covers to suit pipe penetrations indicated on Drawings.

C. Manufacturers and Products:
   1. Pate Co.; PCA-2, with cover.
   2. Thy Curb; Model TC-3, with cover.
   3. RPS Corporation; Pipe Portal System.

2.04 PIPE SEALS

A. Prefabricated one-piece aluminum flanged base with stepped, graduated EPDM cap and adjustable stainless steel clamps.

B. Manufacturers and Products:
   1. Pate Co.; Pipe Seal.
   2. Portals Plus, Inc.; Alumi-Flash.
   3. RPS Corporation; Alumi-Flash.

2.05 ANCILLARY MATERIALS

A. Sealer Tape: Polyisobutylene sealer tape.

B. Isolation Paint: As specified in Section 09900, Painting.

C. Coat aluminum surfaces in contact with concrete or dissimilar metals as specified in Section 09900, Painting.

D. Isolation Tape: Butyl or polyisobutylene, internally reinforced, or 20-mil thick minimum polyester.

E. Plastic Roof Cement: ASTM D4586, Type II.

F. Fasteners: Stainless steel of type required.

PART 3 EXECUTION

3.01 PREPARATION

A. Examine surfaces and structures to receive the Work of this section.

B. Take measurements at Site and fabricate work to suit. No changes shall be made in supporting structure to accommodate this Work.

3.02 INSTALLATION

A. General:
   1. Install roof specialties and accessories as detailed in approved shop drawings and in conformance with manufacturer’s instructions, recommendations, and standards.
   2. Use appropriate pipe curb assembly, pipe seal, or vent pipe flashing where pipe, conduit, or cable, etc., penetrate roofing membrane.
   3. Factory Finished Units: Place color variations in pieces so no extremes are next to each other.
   4. Make Work weathertight and free of expansion and contraction noise.
   5. Maintain separation between aluminum surfaces and concrete or dissimilar metals as specified in Section 09900, Painting.

END OF SECTION

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DIVISION 8 DOORS

SECTION 08100

METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Provide metal doors and pressed metal frames as required by the Contract Documents.

1.02 RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
1. Section 04100 Masonry
2. Section 06100 Carpentry
3. Section 08710 Finish Hardware
4. Section 10440 Signs

B. Related Work Not Included:
1. Installation of doors and frames is included in Section 06100, Carpentry Work, but as specified in this Section.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Provide all products of this Section from a single manufacturer, who specializes in the production of this type of work.

C. Templates for the approved hardware shall be furnished to the door and frame manufacturer by the Contractor for hardware alignment and reinforcing.

1.04 SUBMITTALS

A. Comply with the pertinent provisions of Section 01300.

B. Product Data:
1. Materials list of items proposed to be provided under this Section.
2. Manufacturer’s specifications and other data needed to prove compliance with the specified requirements.
3. Shop drawings showing details of each frame type, elevations of door designs, details of openings and details of construction, installation and anchorage.
4. Manufacturer’s recommended installation procedures will be the basis for accepting or rejecting actual installation procedures used on the work.

C. A copy of this specification section with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.
1. If deviations and clarifications form the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up specifications and justifications are submitted in a complete package.

1.05 PRODUCT HANDLING

A. Deliver materials in manufacturer's original unopened and undamaged packages with labels legible and intact.

1. Doors and panels shall be on vertical edges and banded with metal straps.
2. Store materials in unopened packages in a manner to prevent damage from the environment and construction operations.
3. Handle in accordance with manufacturer's instructions.
4. Should the priming coat be faulty, or should rust scale appear, the Contractor shall have all exposed surfaces cleaned to bright metal, and a suitable approved priming coat applied before the application of finish coat at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

A. Shall meet the following requirements:
1. Galvanized steel sheets complying with ASTM A526, G90 coating designation.
2. Supports and anchors to be fabricated with no less than 16-gauge sheet metal galvanized after fabrication in compliance with ASTM A153, Class B.
3. Bolts and fasteners to be hot dip galvanized in compliance with ASTM A153, Class C or D.
4. Rust-inhibitor metal primer capable of being baked and compatible with the finish painting system as specified in Section 09900.

2.02 FABRICATION

A. Doors:
1. Doors shall be fabricated from 16-gauge galvanized material.
2. Doors shall have smooth, flush surfaces free from visible joints or seams on exposed faces of stile edges except at glazed or louvered panel inserts.
4. Door top to be waterproof and door bottom shall be provided with weep holes.
5. Doors shall be flush type, hollow steel construction, 1-3/4 inches thick.
6. Doors shall be sound deadened, reinforced, stiffened and insulated with impregnated Kraft honeycomb core, completely filling the inside face of both panels.
7. Reinforce doors with rigid tubular frame where stiles and rails are less than 8 inches wide.
8. Bevel door, hinge, and lock edges 1/8 inch in two inches.
9. Provide additional reinforcement for all finish hardware, mortise and surface mounted.
10. Fire Rated Doors:
    a. Conform to NFPA 80 when tested by Underwriters Laboratories, Inc., Inchcape Testing Services, or Factory Mutual for the class of door or door opening shown.
    b. Shall have a 60-minute fire protection rating.
    c. Fire rated labels of metal, with raised or incised markings of approving laboratory shall be permanently attached to doors.
    d. Close top and vertical edges of doors flush. Vertical edges shall be seamless. Apply steel astragal to the meeting stile of the active leaf of pairs of fire rated doors, except where vertical rod exit devices are specified for both leaves swinging in the same direction.
    e. Construct fire rated doors in stairwell enclosures for maximum transmitted temperature rise of 230 °C (450 °F) above ambient temperature at end of 30 minutes of fire exposure.

B. Door Frames:
1. Provide galvanized pressed metal frames with profiles as shown on the Drawings.
2. Frame material shall be a minimum of 14 gauge.
3. Frame shall be of the integral construction type, welded continuous to full depth of frame with a minimum 5/8-inch-deep stop.
4. Jamb anchors shall be of the corrugated or perforated T shape and extend not less than 8 inches into the masonry and lag bolted into solid blocking at metal stud walls. Provide a minimum of three anchors for each jamb up to 7 feet 6 inches in height.
5. Floor anchors shall be provided for each jamb and have a minimum of two holes for anchoring purposes. Floor anchors shall be fabricated from a minimum of 14-gauge galvanized steel.
6. Provide mortar boxes in back of hardware cut outs and weld to frame.
7. Frame shall have cut outs and reinforcement for mortise and surface mounted finish hardware.
8. Provide removable spreader bars at the bottom of the frame tack welded to jambs.
9. Frame shall have provisions for silencers.
10. Frames for labeled fire rated doors.

a. Comply with NFPA 80. Test by Underwriters Laboratories, Inc., Inchcape Testing Services, or Factory Mutual.
b. Fire rated labels of approving laboratory permanently attached to frames as evidence of conformance with these requirements. Provide labels of metal or engraved stamp, with raised or incised markings.
c. Shall have a 60-minute fire protection rating.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Frames:
1. Frame setting is to be coordinated with the carpentry, masonry and concrete work.
2. Set frames accurately into position, plumbed, aligned and securely braced.
3. Fill jambs and head solid with mortar as masonry work progresses.
4. Install all built-in anchoring devices as required.
5. Frames in exposed masonry or concrete walls shall be placed to provide sufficient space between the inside back of trim, and masonry or concrete to receive caulking compound.
6. Remove spreader bars after frames are permanently in place.

3.03 ADJUSTMENT AND TOUCH-UP

A. Remove and replace any doors or frames which are warped, bowed or damaged in any other way.

B. Immediately after erection, sand smooth all rusted and damaged areas of prime coat and apply touch-up of compatible air-drying primer.

3.04 CLEANING

A. Upon completion, the exposed surfaces of doors and frames shall be cleaned thoroughly. All smears and other unsightly marks shall be removed.

END OF SECTION

SECTION 08710

FINISH HARDWARE

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Provide finish hardware as required by the Contract Documents.

1.02 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   1. Section 06100 Carpentry Work
   2. Section 08100 Metal Doors and Frames.

1.03 DEFINITIONS

A. "Hardware Sets" are described in the Hardware Schedule in Part 3 of this Section.

1.04 QUALITY ASSURANCE

A. The hardware supplier shall have in his employment a member of the Door and Hardware Institute who shall be responsible for the finish hardware section of this Specification.

B. Be present at completion of construction, and:
   1. Inspect installation of all finish hardware items.
   2. Make all necessary adjustments.
   3. Report to the Engineer on completeness of the installation.

C. In a timely manner to assure orderly progress of the work, deliver templates or physical samples of the approved finish hardware items to pertinent manufacturers of interfacing items such as doors and frames.

1.05 SUBMITTALS

A. Comply with the pertinent provisions of Section 01300.

B. Product Data:
   1. Materials list of items proposed to be provided under this Section.
   2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

C. A copy of this specification section with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.
   2. If deviations and clarifications form the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.

   Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up specifications and justifications are submitted in a complete package.

PART 2 PRODUCTS

2.01 GENERAL

A. Unless specifically stated otherwise, all door hardware shall be stainless steel with satin finish (US32D).

B. Fasteners:
1. Furnish necessary screws, bolts and other fasteners of suitable size and type to anchor the hardware into position for long life under hard use.
2. Where necessary, furnish fasteners with toggle bolts, expansion shields, hex bolts and other anchors approved by the Engineer, according to the material to which the hardware is to be applied and the recommendations of the hardware manufacturer.
3. Provide fasteners that harmonize with the hardware as to finish and material.

C. Butts:
1. Where butts are required to swing 180 degrees, furnish butts of sufficient throw to clear the trim.

D. Silencers:
1. Provide silencers for doorframes at the rate of three for each single door.

2.02 KEYING

A. Factory key locks as directed by the Engineer.
1. Locks shall be keyed to Owner's existing locks.
2. Furnish two keys for each lock.
3. Master key system shall be Builders Hardware Manufacturers Association (BHMA) ANSI/BHMA A156.28-2007, American National Standard for Master Keying Systems.

B. Identification and delivery:
1. Factory stamp permanent keys "DO NOT DUPLICATE"
2. Identify keys with tags and turn over to Owner by receipted personal delivery.

C. Construction Keying:
1. Provide a construction key system.
2. Use only the construction keys during construction.
3. Upon Substantial Completion of the Work void the construction key system.

2.03 ACCEPTABLE PRODUCTS

A. Single source for items:
1. Except as specified otherwise approved in advance by the Engineer, furnish for each item (such as, "door butt type 1") only the product of a single manufacturer.
2. To the maximum extent practicable, furnish similar items (such as door butts) only as the product of a single manufacturer.

B. All hardware shall be of the best grade entirely free from imperfections in manufacture and finish.

C. For each of the required items of finish hardware, provide from the specified manufacturer or from one of the indicated acceptable substitutes.

ITEM	MANUFACTURER	ACCEPTABLE SUBSTITUTE
Hinges	Stanley	Bommer, McKinney, ABB
Mortise Locksets	Best (H Series)	Sargent, Schlage, Dorma
Closers	Sargent	Norton, L.C.N., Dorma
Exit Devices	Sargent	Von Duprin, Dorma
Kick Plate	(see par. 2.03-H)	
Thresholds	Wooster Products	
Drip Strip	National Guard Prod. Inc.	Zero, Reese
Mortised Auto Door Bottom	Pemko	Zero, National Guard Prod.
Stops	Stanley	Sargent, Ives
Weather Seal	Pemko	Zero, Reese
Padlocks	Best 11B722 (rem. core)	Corbin
Silencers	Glyn Johnson	Baldwin
Door Bottom Seal	Pemko	Reese, Sealeze
Rain Drip	Reese	National Guard Prod.

Astragal	Pemko	National Guard Prod.
Latch Protectors	Rockwood Model No. 320	
Flush Bolts	Ives	Stanley
Piano Hinges	Monroe Hinge and Stamping	

D. Unless specifically stated otherwise, all door hardware shall be stainless steel with satin finish (US32D).

E. Hinges: shall be Stanley Model FBB 199 with satin stainless steel finish (US32D).
1. Shall be furnished in 1-1/2 pairs per door,
2. Shall have security studs.
3. Shall be heavy weight ball bearing with five (5) knuckles.

F. Mortise locks: Shall be H Series as manufactured by Best Access Systems, Indianapolis, IN.
1. Series 45H Lever
2. Interchangeable cores.
3. Lever Style: Solid tube/return
4. Trim Style: Forged, Type-M.
5. Functions: Refer to Section 3.03 "Finish Hardware Schedule" for specific door function. Function definitions are generally as follows:
   a. Function "N"-Passage: Latchbolt by lever either side.
   b. Function "A"-Office: Latchbolt operated by lever either side except when outside lever is locked by button in faceplate; latch is retracted by key outside. Auxiliary latch deadlocks latchbolt.
   c. Function "TA"-Dormitory: Latchbolt operated by lever either side except when outside lever is locked by button in face plate or when deadbolt is projected; latch is retracted by key outside, or keypad as appropriate. Deadbolt operated by key outside or lever inside. When deadbolt is projected operating inside lever retracts latchbolt and deadbolt simultaneously.
   d. Function "L"-Privacy: Latchbolt by either lever. Deadbolt by turn piece inside or emergency key outside.
   e. Function "D"-Storeroom: Rotating inside lever or turning key in outside cylinder. Outside lever always locked.
   f. Function "AD"-Deadlock" – Latchbolt operated by lever outside and by exit device on inside.

G. Door Closers:
1. Shall be parallel arm with holder and stop.
2. Shall have 85 to 110 degree door opening.

H. Kick plates: Shall be satin stainless steel finish (US32D), eight (8) inches high, two (2) inches less wide than door and a minimum thickness of 0.050 inches.

I. Thresholds: Shall be Alumogritt (abrasive cast aluminum) as manufactured by Wooster products type 115 (all interior doors) and 115S (all exterior doors).

J. On double doors flush bolts shall be provided at the top and bottom of the inactive door leaf.

K. Latch protectors shall be provided on all exterior doors.

L. Piano hinge: Contractor shall submit proposed size and design for piano hinge on triple door. Design shall be subject to approval of engineer and door manufacturer.

2.04 OTHER MATERIALS

A. Provide other material, not specifically described but required for a complete and proper installation, as selected by the Contractor, subject to the approval of the Engineer.

PART 3 EXECUTION

3.01 DELIVERIES

A. Stockpile items sufficiently in advance to assure their availability and make necessary deliveries in a timely manner to assure orderly progress of the total work.

3.02 COORDINATION

A. Coordinate as necessary with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

B. Upon completion of the work, and as a condition of its acceptance, provide the inspection, adjustment, and report described in paragraph 1.05-B.

3.03 FINISH HARDWARE SCHEDULE

A. Furnish the following Hardware Sets.

B. Model numbers given in the Hardware Sets are for the manufacturer listed in par. 2.03-C.

C. Hardware Sets:

1. Hardware Set No. One:

1 1/2 pr. hinges. FBB 199 (5 x 4 1/2)	S. S.
1 Mortise Lockset (Dormitory) w/ Levers, “TA” Funct.	S. S.
1 Closer w/ Stop Arm Bracket. 351 25-PSH	Alum.
1 Kick Plate.	S. S.
1 Weather Seal (head and jambs). 319CN	S. S.
1 Mortised Auto Door Bottom. 420APKL	Alum.
1 Threshold. Alumogrit, Type 115S	Alum.
1 Stop SP57-5465	Brass
1 Latch Protector, Rockwood Model No. 320	
1 Drip Strip 17B	Bronze Alum.

END OF SECTION

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DIVISION 9 FINISHES

SECTION 09860

ABRASIVE BLAST CLEANING CONTROLS

PART 1 GENERAL

1.01 DESCRIPTION

A. This section specifies requirements for paint removal via abrasive blast cleaning operations and includes requirements for worker protection, protection of the environment, abrasive requirements, procedures for containment, collection, storage, testing and disposal of the blast cleaning residuals, and other regulatory requirements pertaining to the abrasive blast cleaning operation.

LEAD PAINT TESTING All Contractors bidding on this project are hereby notified that the interior and exterior coatings have been tested for total lead content in accordance with US EPA, SW-846, Method 6010B. The results indicating a total lead content as listed here:

Tank Name:	Location:	Test results:
Waban Hill Reservoir Core	Interior coating	286 mg/Kg (ppm)
Waban Hill Reservoir Core	Exterior coating	3,940 mg/Kg (ppm)

CHROMIUM PAINT TESTING All Contractors bidding on this project are hereby notified that the interior and exterior coatings have been tested for chromium presence. The results indicating chromium content as listed here:

Tank Name:	Location:	Test results:
Waban Hill Reservoir Core	Interior coating	0 mg/Kg (ppm)
Waban Hill Reservoir Core	Exterior coating	59.8 mg/Kg (ppm)

1.02 DEFINITIONS

A. Containment Efficiency - The containment efficiency is a measure of the effectiveness of the measures taken to prevent dust and debris from escaping beyond the area of work. Also, precautions shall be taken to make certain that airborne materials cannot contaminate the water in any way.

B. Hazardous Waste - Paint debris is classified as hazardous due to the characteristic toxicity, if after testing by Toxicity Characteristic Leaching Procedures (TCLP), the leachate contains any of the elements in the concentrations listed below (or greater):

Barium	100 ppm
Cadmium	1 ppm
Chromium	5 ppm
Lead	5 ppm
Mercury	0.2 ppm

Note: Other elements can cause a material to be hazardous as defined in 40 CFR 261 and must be taken into consideration. The list above includes only those elements typically associated with paints.

C. Lead-Containing Paint - The Consumer Product Safety Commission classifies paint as lead containing if it contains 600 ppm (.06%) lead or greater. This can be determined from prior knowledge of the coating or through laboratory testing in accordance with ASTM D-3335.

D. PM-10 - Particulate matter (dust) less than 10 microns in aerodynamic equivalent diameter. (Aerodynamic equivalent diameter is defined as the diameter of a unit density sphere having the same settling velocity as the particle in question of whatever shape and density.)

E. PEL - Permissible Exposure Limit - Maximum allowable employee average airborne exposure to hazardous elements. In the case of lead, limits are 0.05 mg/m3 (50 ug/m3) per OSHA Industry Standard 29 CFR 1910.1025.

F. Time Weighted Average (TWA) is the employee's average airborne exposure in any 8 hour work shift of a 40-hour workweek.

G. Ventilation System - Ventilation systems include both natural ventilation and artificial ventilation (mechanical fans, hoods, and duct work) to provide air movement across the work area, and dust collectors to clean the discharged air.

1.03 PERMITS

A. The Contractor shall obtain all permits that are required to perform the specified abrasive blast cleaning:

B. The Contractor is responsible for obtaining all Permits required by Federal, State and Local Laws.

C. A copy of all said permits shall be furnished to the Owner/Engineer.

1.04 REQUIREMENTS OF REGULATORY AGENCIES

A. The following Federal regulations are applicable to the specified abrasive blast cleaning:

1. Occupational Safety and Health Standards Code of Federal Regulations:

29CFR1926.62	Construction Industry Standards
29CFR1910	General Industry Standards
29CFR1910.134	Respiratory Protection
29CFR1910.20	Access to Employee Exposure and Medical Records
29CFR1910.141	Sanitation
29CFR1910.146	Permit required confined spaces
29CFR1910.1025	Lead

2. Protection of the Environment Code of Federal Regulations:

40CFR50	National primary and secondary ambient air quality standards
40CFR50.6	National primary and secondary ambient air quality standards for particulate matter
40CFR50.12	National primary and secondary ambient

3. Solid Waste Code of Federal Regulations:

40CFR261	Appendix II - Toxicity Characteristic Leaching Procedure (TCLP)
40CFR262	Packaging and labeling requirement
40CFR178	Shipping Container specifications
40CFR268.7	Waste analysis
40CFR300	National oil and hazardous substances pollution contingency plan
40CFR302	Designation, reportable quantities and notification

B. Compliance with Environmental Regulations:

1. Compliance with local, state and federal regulations concerning emissions or disposal of solid, particulate, liquid, or gaseous matter as a result of the cleaning, painting, or other operations under this Agreement shall be the responsibility of the CONTRACTOR. This compliance shall be accomplished without supervision from the CITY OF NEWTON, FIELD OBSERVER, or other direct or indirect agents of the CITY OF NEWTON. No additional compensations for changes in the laws, Regulations, or the interpretation thereof shall be granted by the OWNER. No burning of trash (including abrasive bags or other paper or wood products) on the site shall be permitted. All shielding, abrasive retrieval, or other methods of using precautions required by regulating agencies shall also be accomplished at no additional cost to the OWNER unless otherwise provided herein. Any fines imposed on the CITY OF NEWTON, or FIELD OBSERVER by any regulatory agency as a result of the CONTRACTOR'S noncompliance with environmental regulations shall be paid or reimbursed by the CONTRACTOR.

1.05 SUBMITTALS

A. Submitted with the Bid:

1. The type, name and size of the exhaust air filtration (dust collection) system to be used.

2. A description of the proposed worker safety plan for the project.
3. A description of the proposed abrasive(s) for paint removal.

B. Owner's acceptance of Contractor's Bid, and subsequent execution of an Agreement in no way guarantees Contractor's abrasives and worker safety plan will comply with Laws and Regulations and the requirements of this specification and does not relieve the Contractor from his responsibility to meet all requirements.

C. After Contract Award, within 15 days of Contractor's receipt of the Notice to Proceed, prepare and submit the following:
1. The type, name and size of the exhaust air filtration (dust collection) system including the efficiency rating and filter maintenance records.
2. A written description of the safety plan proposed for the Work. The plan is to address compliance with regulations pertaining to worker safety including the specific requirements contained herein.
3. Waste collection and storage plan demonstrating compliance with the requirements of this specification.
4. Technical data for proposed abrasives.

1.06 ALTERNATIVES

A. Alternative paint removal methods which will achieve the level of containment efficiency specified or alternative abrasives meeting specification requirements shall be submitted with the bid. Recyclable steel grit blast systems will be considered.

1.07 WORKING CONDITIONS

A. Under no circumstances will any abrasive blasting operation be conducted when the relative humidity is 85% or above, when the temperature is within 5 degrees of the dew point, or when the surface of the steel is wet. No work is to be done during damp, foggy weather or when it is raining.

B. The interior of the tank shall be adequately lighted at all times during the abrasive blasting process, using explosion-proof floodlights. Lights are to be so arranged as to illuminate the immediate area where work is in progress.

C. At all times, the CONTRACTOR will provide ventilation inside the tank throughout the course of the work as required to meet manufacturers minimum application and curing requirement and to maintain a vapor-free condition. The CONTRACTOR will use exhaust fans; either explosion proof electrically operated or air driven. The fans shall have sufficient capacity to hold vapor concentrations below 4% of the lower explosive limit as determined with an approved explosion meter which will be supplied by the CONTRACTOR and available on-site at all times. Fans shall be kept in operation whenever workmen are in the tank and as long as may be necessary for proper application and curing of the coatings. Ventilation shall meet at least minimum safety requirements appropriate to thinners or chemicals used. During abrasive blasting, provide a minimum of 10 air changes per hour. Where this is not feasible due to the size of the tank or limitations in the number of manhole openings then provide suction ductwork extending to areas of heaviest concentrations including the lowest levels of the tank. In no case shall exhaust fan capacity be less than 10,000 CFM except for small tanks of 250,000 gallons capacity or less. Ventilate tanks thoroughly during abrasive blasting and during application and curing of the coating. Provide heating, cooling or dehumidification if required to satisfy special conditions.

D. If authorized by the OWNER or OWNER' representative, fans shall operate overnight during drying times or complete applications. All openings in the structure shall be kept open whenever possible during the progress of the work.

E. Extreme care and precautions must be taken by the CONTRACTOR that the dust in the air resulting from the abrasive blasting of interior areas will not damage surrounding property or cause adverse dust problems to others. The CONTRACTOR shall synchronize his work with favorable weather conditions and wind flow directions.

F. Gloves shall be worn by workmen at all times to prevent contamination of the newly blasted surfaces by oils or moisture of hands. Nozzle blast operators exposed to blast dust shall wear a U. S. Bureau of Mines approved helmet connected to a source of clean, filtered, fresh air. Filter type air respirators shall be worn at all times on the interior of the tank. Safety goggles shall be provided for all personnel working in the vicinity of the blast operation.

G. Proper spray techniques, where specified, shall be followed at all times. Only competent workmen, experienced in the application of the specified coatings, shall operate spray equipment. The use of pole guns or spray gun extensions exceeding 12" is prohibited. Brushes shall be used to work paint into cracks, corners, or "blind" spots not adequately painted by spray.

H. The rigging used in painting this tank will be left in position, in order that all surfaces may be observed after the coatings have cured.

I. The CONTRACTOR is to be aware that all cleaning operations are to conform to all Federal, State and Local regulations. The possibility exists that cleaning residues may contain elevated percentages of lead and/or other toxins and will require proper containment and disposal methods established by these agencies. If elevated lead and/or other toxin levels are discovered by any of the governing agencies, the CONTRACTOR will be solely responsible and be prepared to contain and dispose of these materials in an established fashion which meets with the written approval of these governing agencies. The CONTRACTOR shall assume all costs in meeting these governing agencies' requirements and shall not delay or suspend any abrasive blasting or painting operations in the process. The cleaning operations will also be regulated by wind velocity and/or direction. Abrasive blasting and/or painting operations may be suspended by the on-site observer or the OWNER if the wind velocity is constantly 20 MPH or greater, or if in his opinion the wind is adversely affecting the quality of the work being performed. Failure to comply with the regulations stated herein shall be cause to suspend the CONTRACTOR's work at no further cost to the OWNER, until the containment operation functions within the stipulated requirements.

PART 2 PRODUCTS

2.01 ABRASIVES

A. Abrasive shall be in conformance with Type 1 or Type 2, Class A, Grade 3 as outlined in SSPC-AB1. A Type 1 abrasive is a natural mineral, Type 2 is a slag abrasive, Class A contains Crystalline silica less than or equal to 1% and Grade 3 is an abrasive that produce surface profiles of 2.0 to 3.5 mils. The abrasive shall be properly stored, and it shall be free from contaminants, including but not limited to paint, earth, moisture, oil or chlorides, which can cause premature failure of the coating. Use of abrasive on the interior and exterior surfaces of the tank shall be based not only on its compliance with the technical application of the coatings, but also on its lack of nuisance to surrounding property. The Contractor shall submit to the Owner for approval manufactures published product data sheets for the type of abrasive, grade, and the resulting profile of the abrasive to be used for the work prior to the start of any cleaning operations.

B. The abrasive is to be premixed with a hazardous waste minimization material such as Blastox™ or equal to compensate for the disposal requirements for lead based paint. The Blastox™ or equal is to be mixed with the abrasive at the abrasive suppliers facility in the proper quantities and ratios to compensate for the existing lead levels in the coatings. On site mixing of the Blastox™ or equal will not be allowed.

C. Recyclable steel grit will be accepted as an alternate abrasive media provided it is new and has not been used on any other lead paint removal project.

D. Documentation stating the grit has not been used on previous lead paint removal projects is required.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

Compliance with State and Local Laws and Regulations, will be verified through the tests and inspections listed in Part I.

A. Abrasive Waste Certification

1. After Contractor’s submittal of proposed abrasive(s) for paint removal and prior to approval by the Owner, the Contractor shall perform a field test to assist the Owner in certifying that the residuals from the interior and/or exterior blasting operation will not be classified as a hazardous waste. The Contractor shall use the proposed abrasive(s) to clean individual test areas, each a minimum of three (3) square feet in surface area, to achieve the specified level of cleaning (i.e. SP6, SP10 etc.). The Owner shall select the test area locations based on the lead concentrations (if any) of existing coatings and their

locations on the tank and/or appurtenances. The Contractor shall include in his bid the cost of performing test blasts at four separate locations.

2. The paint removal tool and/or the test area shall be contained such that all test blast residuals are captured. The test blast residuals for each area shall be kept separately and stored in sealed containers from which the Contractor will collect samples for TCLP testing. Two (2) consecutive TCLP tests will be performed on each sample with the results of the first test used to determine the acceptability of the proposed abrasive(s) and the results of the second test used as a preliminary indication of disposal requirements (see abrasive blasting residuals handling, paragraph 3.03). The minimum amount of abrasive necessary to achieve the specified cleaning shall be used. Excessive abrasive use in any area will be cause for rejection by the Owner for the test area affected and another test area will be selected. The Owner shall be notified in advance by Contractor such that Owner and/or his representative may be present during the test.

B. Monitoring the Environment.

1. The Contractor is responsible for all aspects of monitoring the environment in accordance with current Federal, State and local requirements and will employ a qualified air quality monitoring company to set up, maintain and perform the required testing outlined below.
2. The Contractor shall furnish PM-10 ambient air monitors and total suspended particulate (TSP) monitors at required locations. The requirements of 40 CFR 50.6 for particulate matter (PM-10) and 40 CFR 50.12 for TSP shall apply unless local laws or regulations impose more stringent requirements. Also, see part I of this section for additional tests and/or inspections required by the State or local Laws and Regulations.
3. To establish the background level of respirable dust, prior to beginning the work, the Contractor shall conduct Ambient Air Quality Monitoring using high volume air samplers equipped for the collection of respirable dust (PM-10). The Contractor shall monitor for 8 hours per day for 2 days. Test results shall be communicated to the Owner/Owners representative.
4. Additional PM-10 air quality monitoring shall be conducted by the Contractor during paint removal operations. To determine the level of dust originating from the paint removal operations the Contractor shall monitor every day when exterior abrasive blasting operations are being performed. A minimum of two PM-10 monitors shall be placed at the perimeter of the tank, and/or at points of maximum environmental impact, i.e., homes, etc., as directed by the Owner/Owners representative. Monitors shall be moved to maintain this condition due to shifting wind patterns. Placement shall be at the discretion of the Owner/Owners representative. The PM-10 filters shall be analyzed by gravimetric analysis, pursuant to the EPA method G in 40 CFR Part 50. The National Ambient Air Quality Standard for respirable dust is 150 micrograms dust per cubic meter of air, as a 24 hour average, averaged over a 90 day period. Emissions in excess of 400 micrograms per cubic meter of PM-10 respirable dust over an 8-hour workday shall be cause for shutdown of the project until corrections to the ventilation or paint removal equipment are made to comply with this level.
5. Monitoring of containment efficiency shall be performed by the OWNER or Owners Consultant through the observation of visible emissions in accordance with 40 CFR 60, Appendix A, Method 22. Visible emissions are permitted from the work area at the frequency and duration's specified below provided the emissions do not extend beyond the OWNER'S property line. Unacceptable emissions shall be cause for project shutdown until corrections to the ventilation or paint removal equipment are made to comply with this level.
6. Level 1 Emissions - Random emissions of a cumulative duration of no more than 1% of the workday (e.g., 5 minutes in an eight-hour workday).
7. To establish the background level of lead dust, prior to beginning the work, the Contractor shall conduct Ambient Air Quality Monitoring using high volume air samplers equipped for the collection of total suspended particulate (TSP). The Contractor shall monitor for 8 hours per day for 2 days. Test results shall be communicated to the Owner/Owners representative prior to the start of the work.
8. The Contractor shall conduct additional TSP air quality monitoring during paint removal operations. To determine the level of lead emissions originating from the paint removal operations the Contractor shall monitor every day when exterior abrasive blasting operations are being performed. A minimum of three TSP monitors shall be placed at the perimeter of the tank, and/or at points of maximum environmental impact, i.e., homes, etc., as directed by the Owner/Owners representative. Monitors shall be moved to maintain this condition due to shifting wind patterns. Placement shall be at the discretion of the Owner/Owners representative.
9. The TSP filters shall be analyzed for lead in accordance with the EPA 40 CFR Part 50, Appendix G. The National Ambient Air Quality Standard for lead according to 40 CFR Part 50 is 1.5 micrograms per cubic meter as a 90-day average. Emission in excess of the value attained by the following formula

shall be cause to shut down the project until improvements are made to the ventilation or paint removal equipment to comply with the allowable value.

Allowable 8-hour Emission in microgram per cubic meter (mcg/m3) = AE

AE = (90/PD x 1.5 mcg/m3 x 3) - (2 x Background) where PD is the Project Duration in Days.

10. The discharge of abrasive blasting residuals or any paint removal debris into a storm drain system, sanitary sewer, stream, river, brook, creek, etc. or other body of water is prohibited. The Contractor shall take this into consideration when alternative coating removal methods involving the use of water or other liquids are being proposed.

3.02 WORKER PROTECTION

A. The Contractor is required to follow all OSHA requirements for worker protection including but not limited to the following.

1. Only Mine Safety and Health Administration (MSHA) and National Institute of Occupational Safety and Health (NIOSH) approved respirators shall be used and a respiratory protection program complying with 29CFR 1910.134 is required. NOTE: According to the National Institute for Occupational Safety and Health (NIOSH) Logic 87-108, standard abrasive blasting helmets provide respiratory protection for up to 25 times the PEL for lead. This shall be considered a worker protection requirement of this specification.
2. A change room equipped with separate storage facilities for work clothing and personal clothing is required.
3. No food, beverages, tobacco or other consumable type products are allowed in the work area.
4. Protective work clothing and respiratory equipment must be removed from the work area during breaks.

3.03 ABRASIVE BLAST CLEANING RESIDUALS HANDLING

A. General:

1. This section describes the requirements for collection, storage, sampling, testing, classification and disposal of paint abrasive blast cleaning residuals that have been removed from this tank. The Contractor is to follow the SSPC-Guide 7 (DIS) Guide for the disposal of lead-contaminated Surface preparation debris (if any). Collection, storage, sampling, testing and disposal of abrasive blasting residuals from portions of the tank which do not contain lead-based paints is the responsibility of the Contractor and these materials shall be physically segregated from lead paint residuals at all times.
2. This project is subject to the U.S. Environmental Protection Agency (EPA) Regulations, with particular attention to the following sections contained in 40 CFR 260 thru 268.
   a. 40 CFR 260 Hazardous Waste Management System – General
   b. 40 CFR 261 Identification and Listing of Hazardous Wastes
   c. 40 CFR 262 Standards Applicable to Generators of Hazardous Wastes
   d. 40 CFR 263 Standards Applicable to Transporters of Hazardous Wastes
   e. 40 CFR 268 Land Disposal Restrictions
3. This project is also subject to the U.S. Department of Transportation (DOT) with particular attention to Subchapter C – Hazardous Materials Regulation (49 CFR Parts 171 – 177)

B. Method of Collecting Debris:

1. Upon completion of abrasive blasting work each day or at mutually agreeable intervals the Contractor shall collect all abrasive blast cleaning residuals. Bulk collection as outlined in SSPC-Guide 6 Section 5.2.2.1 will be allowed.

C. Storage:

1. The Contractor shall store the material in containers, which comply with Department of Transportation Regulation No. 49 CFR 178 "Shipping Container Specifications". The containers shall be stored on pallets or dunnage in a dry, well drained, secure area beyond the limits of the 100-year floodplain. If the job site does not provide for secure storage the Contractor shall furnish temporary fencing or a box trailer for secure storage. If the job site is entirely within the 100-year flood plain the Owner will designate the required storage location. Once material has been stored, the Owner and/or his representative shall have control over access to the storage area.

D. Sampling, Testing and Disposal:

1. The Contractor or his representative shall sample and test paint blasting residuals a minimum of once after the first day of abrasive blast cleaning and once prior to disposal of abrasive blast cleaning residuals. The Inspector shall assist the Contractor or his representative in obtaining the required samples. Two (2) consecutive TCLP tests will be performed on each sample. The results of this testing will be provided to the Owner and will determine subsequent storage, treatment and disposal requirements. If the TCLP testing conducted on the samples collected on the first day of abrasive blasting determine the material to be hazardous, the Contractor shall immediately discontinue the abrasive blasting operation and assist the Owner in an investigation (including additional sampling and TCLP testing) of the reason(s) for the failure of the previously tested and approved abrasive.
2. The results of the second consecutive TCLP test(s) conducted on the samples collected by the Contractor prior to disposal will determine the disposal requirements. If the test yields leachable lead values of less than 5 ppm the material shall be disposed of by the Contractor in accordance with applicable laws and regulations for non-hazardous solid waste. The Owner shall furnish a written notification in accordance with 40 CFR 268.7 (a)(2)(ii), which is required for disposal. The Contractor shall furnish evidence satisfactory to the Owner that the material has been properly disposed of. Upon approval by Owner, the Contractor may, in lieu of disposal, reuse the material as a raw material for another process.
3. Should the results of the second TCLP test yield leachable lead values in excess of 5 ppm, all materials classified as hazardous, as determined by the aforementioned TCLP Testing or subsequent testing required by RCRA, shall be transported to an approved recycling facility; an approved treatment facility to reduce the leachable concentration levels to below the allowable regulatory limits and disposed in a Local and/or State approved waste landfill. All transporting, recycling, treatment and disposal shall be in strict accordance with Federal and State laws including but not limited to RCRA, TSCA, HMTA, the USEPA and the State of Massachusetts regulations. The name of the recycling, treatment and/or disposal facility shall be submitted to the Owner for approval prior to removing any material from the project site. The disposal or recycling facility shall have or shall obtain an identification number from the EPA. This identification number shall be submitted to the Owner for preparation of the "manifest" form.
4. The Contractor shall be responsible for obtaining the proper signatures of the hauler and designated receiving facility on the "manifest" form.

E. Final Cleanup:

1. The Contractor will be responsible for removal of all dust and spent abrasive from the interior and/or exterior upon completion of the abrasive blasting operations. The use of brooms, vacuums and/or power washers may all be required to ensure complete removal of all dust and debris generated by the Contractor.

END OF SECTION

SECTION 09900

PAINTING

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Provide painted surfaces as required by the Contract Documents.
   1. In general, the work of this Section includes all labor, materials, tools, scaffolding, and equipment whether of a permanent or temporary nature, and all operations necessary and required in connection with painting or repainting of all required surfaces.

1.02 RELATED WORK

A. Documents affecting the work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   1. Section 03300 Cast-In-Place Concrete
   2. Section 06100 Carpentry Work

B. Work Not Included:
   1. Unless otherwise indicated, painting is not required on surfaces in inaccessible areas.
   2. Metal surfaces of anodized aluminum, stainless steel, chromium plate, and bronze will not require painting under this Section unless otherwise specified or noted on the Drawings.
   3. Do not paint moving parts of operating units: mechanical or electrical parts such as valve shafts, sensing devices and motor shafts unless otherwise indicated.
   4. Do not paint over required labels or equipment identification, performance rating, name or nomenclature plates.

C. Definitions:
   1. “Paint”, as used herein, means coating systems materials including primers, emulsions, epoxy, enamels, stain, sealers, fillers and other applied materials whether used as prime, intermediate or finish coats.

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Paint Coordination:
   1. Provide finish coats which are compatible with the prime coats actually used.
   2. Review other Sections of these Specifications as required, verifying the prime coats to be used and assuring compatibility of the total coating system for the various sub-strata.
   3. Upon request, furnish information on the characteristics of the specific finish materials to assure that compatible prime coats are used.
   4. Provide barrier coats over non-compatible primers, or remove the primer and reprime as required.
   5. Notify the Engineer in writing of anticipated problems in using the specified coating system over prime coatings supplied under other Sections.
   6. Apply paint of specified Dry Film Thickness (DFT), which thickness shall be absolute minimum coverage at any point of measurement.

1.05 SUBMITTALS

A. Comply with the pertinent provisions of Section 01300.

B. Product Data:
   1. Complete listing of all products he intends to use, indicating the surfaces and areas for each product, and stating the number of coats and the DFT of each coat.
   2. Product data sheets,
   3. Color chip fans or books showing the manufacturer’s complete line of color selections,

4. Performance criteria indicating the proposed coating meets or exceeds ASTM test requirements for abrasion resistance, chemical resistance, adhesion and accelerated weathering.

C. The Contractor shall this submittal at least 30 days prior to any field work so as to allow the Engineer to select colors at the Owner's discretion.

PART 2 PRODUCTS

2.01 PAINT MATERIALS

A. Acceptable Materials:
1. The Painting Schedule in Part 3 of this Section is based, in general, on paint materials of Tnemec Coatings Kansas City, MO and International Paint/Devoe (IP).
2. Equal products of Carboline or Dupont, approved in advance by the Engineer, may be substituted in accordance with provisions of this Contract.
3. Where products are proposed other than those specified by name and number in the Painting Schedule, provide under the product data submittal required by article 1.05 of this Section a new painting schedule compiled in the same format used for the Painting Schedule included in this Section.
4. All coatings shall comply with air pollution regulations and shall limit volatile organic compounds (VOCs) to a maximum of 340 grams per liter or 2.8 pounds per gallon or most current OTC regulations.

B. Undercoats and Thinners:
1. Provide undercoat paint produced by the same manufacturer as the finish coat.
2. Use only the thinners recommended by the paint manufacturer, and use only to the recommended limits.
3. Insofar as practicable, use undercoat, finish coat and thinner material as parts of a unified system of paint finish.

2.02 COLOR SCHEDULES

A. The Engineer will prepare a color schedule from the approved manufacturer's color cards.
1. The Engineer, at the discretion of the Owner, may select, allocate and vary colors on surfaces throughout the work.

2.03 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper coating system, as selected by the Contractor subject to the approval of the Engineer.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.02 MATERIALS PREPARATION

A. General:
1. Mix and prepare paint materials in strict accordance with the manufacturer's recommendations as approved by the Engineer.
2. When materials are not in use, store in tightly covered containers.
3. Maintain containers used in storage, mixing and application of paint in a clean condition, free from foreign materials and residue.

B. Stirring:
1. Stir materials before application, producing a mixture of uniform density.
2. Do not stir into the material any film which may have formed on the surface, but remove the film and, if necessary, strain the material before using.

3.03 APPLICATION EQUIPMENT

A. For application of the approved paint, use only such equipment and procedures as is recommended by the manufacturer of the particular paint.

B. Prior to use of application equipment, verify that the proposed equipment is actually compatible with the material to be applied, and that the integrity of the finish will not be jeopardized by use of the proposed equipment.

3.04 SURFACE PREPARATION

A. Unless otherwise specified, the following surface preparation procedures will be the minimum acceptable.

B. Surface Preparation for Ferrous Metals:
1. Steel: The term "Steel" as used herein includes cast iron, ductile iron and other ferrous metals. Surface preparation for steel shall be as defined by the Steel Structures Painting Council (SSPC) and as follows:
   a. Abrasive blast to near white metal per SSPC SP-#10 Standard_- shall be used for all steel in submerged service.
   b. SSPC-6 Commercial blast - shall be used for all steel in non-submerged service.

   c. Ductile Iron Pipe shall be prepared in accordance with NAPF 500-03-04 Standard.
   d. Steel acceptably cleaned and primed by fabricators will require cleaning by solvents and/or detergents only. This in no way relieves the Contractor from the obligation of repairing damage to shop coats or applying barrier coats if primer is incompatible with specified top coats.
   e. All steel surfaces shall be primed the same day as cleaned.

C. Surface Preparation for Non-Ferrous Metals:
1. Where required to be painted, remove surface contamination and any surface protective films per SSPC SP #1 Standard. Uniformly scarify/abrade surfaces to produce a 1.0 mil profile.

D. Surface Preparation for Plastics:
1. Shall depend on the surface to be cleaned, per SSPC SP #1 Standard. Any glazed surface shall be roughened by sanding.

E. Surface Preparation for Concrete:
1. Grease dirt, and other contaminants shall be removed with a solution of tri-sodium phosphate and water or with commercial compounds approved by the Engineer.
2. Prior to painting of all concrete surfaces, all holes, voids and cracks shall be patched to provide a smooth unblemished surface, with a compound compatible with the coating specified herein, (Tnemec Series 218/219). Concrete in immersion shall be prepared in accordance with SSPC SP #13 Standard, and for non-immersion, manufactures surface preparation requirements. Test all concrete for moisture migration per manufacturers printed requirements prior to coating.

F. Surface Preparation for Wood:
1. Clean wood surfaces until free from dirt, dust and any other foreign substances.
2. Smooth finished wood surfaces exposed to view, using the proper sandpaper. Where so required, use varying degrees of coarseness in sandpaper to produce a uniform smooth and unmarred wood surface.
3. Unless specifically approved by the Engineer, do not proceed with painting of wood surfaces until the moisture content of the wood is 12 percent or less as measured by a moisture meter approved by the Engineer.
4. All knots and pitch streaks shall be scraped, sanded and spot primed before the full priming coat is applied.
5. All nail holes, or small openings shall be caulked after priming coat has been applied.

G. Surface Preparation for Pre-Painted Surfaces:
1. All surfaces to be coated shall be clean, dry and free from contamination from oil, grease, or any other contaminate which would prevent the paint from bonding to the surface.
2. Remove all accumulated surface contamination per SSPC SP #1 Standard.

3. All loose or flaking coatings, rust, rust scale and underfilm corrosion shall be removed per SSPC SP #11 Standard.

a. Edges of remaining coating shall be feathered back to provide a smooth transition for the new coatings.

4. Glossy finishes shall be uniformly sanded prior to coating to "de-gloss" existing coatings.

5. Surface defects shall be repaired.

a. All holes, voids and cracks shall be patched to provide a smooth unblemished surface, with a compound compatible with the coating specified herein.

3.05 PAINT APPLICATION

A. General:

1. Touch-up shop applied prime coats, which have been damaged and touch-up bare areas prior to start of finish coat application.
2. Slightly vary the color of succeeding coats.
   a. Do not apply additional coats until the completed coat has been inspected and approved.
   b. Only the inspected and approved coats of paint will be considered in determining the number of coats applied.
3. Sand and dust between coats to remove defects visible to the unaided eye from a distance of five (5) feet.
4. On removable panels and hinged panels, paint the back sides to match the exposed sides.
5. No painting shall be done when temperatures are below 50 degrees F., when the surface temperature is less than 5 degrees F. above the dewpoint or when the relative humidity is above 85 percent.
6. No open flame heaters shall be used during the painting work. Only indirect, hot-air heating is permitted. Vent all fumes from working spaces. Provide working conditions during application and curing of coatings.

B. Drying:

1. Allow manufactures required drying time between coats, modifying the curing period as recommended by the material manufacturer to suit adverse weather conditions.
2. Consider oil-base and oleo-resinous solvent type paint as dry for recoating when the paint feels firm, does not deform or feel sticky under moderate pressure of the thumb, and when the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

C. Brush Applications:

1. Brush out and work the brush coats onto the surface in an even film.
2. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness and other surface imperfections will not be acceptable.

D. Spray Application:

1. Except as specifically otherwise approved by the Engineer, confine spray application to metal framework and similar surfaces where hand brush work would be inferior.
2. Where spray application is used, backroll all primer/first coats on masonry surfaces.
3. Do not double back with spray equipment to build up film thickness of two coats in one pass.

E. For completed work, match the approved samples as to texture, color and coverage. Remove, refinish or repaint work not in compliance with the specified requirements.

3.06 COLOR CODING (Pipes and Equipment)

A. Color coding shall consist of standard color code painting as specified in this Section.

1. All exposed pipelines for the transportation of air, potable and non-potable water, gas and including accessories such as valves, fittings and pipe coverings shall be painted.
2. All hangers, pipe supports, braces and floor stands shall be painted with the same paint and color as the pipe it is supporting.
3. The piping systems shall be painted up to, but not including the flange attached to the mechanical equipment.

3.07 ITEMS TO BE PAINTED:

A. It is not the objective of this Specification to name every item that will require a painter's finish. Where items are noted, it is intended that all items of a similar material shall have the same decorative or protective coating

within the same space or use area of the facility. However, as a guide to the Contractor, the following list is given as typical of the items and surfaces requiring a painter's finish:

1. All interior pipe, fittings, valves and accessories.
2. Steel Core tank

3.08 PAINTING SCHEDULE

A. Provide the Following Paint Finishes:

Exterior & Interior Ferrous Metal

1 coat	Tnemec 394 or IP CathaCoat 302	3.0 DFT
2 coats	Tnemec N69 (interior) or IP DEVRAN 224 HS	6.0 DFT
2 coats	Tnemec N69 & V73 (exterior) or IP DEVRAN 224 HS & DEVTHANE 378	6.0 DFT

Galvanized Metal

2coat	Tnemec N69 (interior) or IP DEVRAN 224 HS	5.0 DFT
2 coat	Tnemec N69 & V73 (exterior) or IP DEVRAN 224 HS & DEVTHANE 378	4.0 DFT

Interior Ductile Iron Piping

1 coat	Tnemec Series 394 or IP DEVRAN 205	2.5 DFT
2 coats	Tnemec Series N69 or IP DEVRAN 224 HS	10.0 DFT

Plastic Piping

1 coat	Tnemec Series N69 or IP DEVRAN 224 HS	3.0 DFT
1 coat	Tnemec Series N69 or IP DEVRAN 224 HS	3.0 DFT

Concrete (non-immersion)

2 coats	Tnemec Series N69 or IP DEVRAN 224 HS	12.0 DFT

Interior Concrete Masonry Units

1 coat	Tnemec Series 130 or IP Tru-Glaze 4015	80 sq. ft. gallon
2 coat	Tnemec Series N69 or IP DEVRAN 224 HS	12.0 DFT

The pipes shall be coated and identified in accordance with the following schedule:

Piping	Color Scheme	Markings
Water, Potable	Dark Blue	White

Direction of flow arrows shall be painted on the base in the band color.

The size of lettering and width of color bands, shall be as follows:

Outside diameter of pipe or covering (Inches)	Width of Color Band (Inches)	Size Legend (Inches)
3/4 to 1-1/4	8	1/2
1-1/2 to 2	8	3/4
2-1/2 to 6	12	1-1/4
8 to 10	24	2-1/2
Over 10	32	3-1/2

NOTES:

(1) Exposed-to-view means not covered by other construction such as wall panels or ceilings.
(2) All exposed piping except stainless steel shall be painted.

END OF SECTION

INDEX

DIVISION 10 SPECIALTIES

SECTION 10346

CUPOLAS

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Included: Provide cupolas as required by the Contract Documents.
   1. In general, the work of this Section includes all labor, materials, tools and equipment required to furnish and install cupolas as specified in this Section.

1.02 RELATED WORK

A. Documents affecting work of this Sections include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   1. Section 06100 Carpentry
   2. Section 07311 Asphalt Shingle Roofing

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. For purposes of designating type and quality for the work of this Section, Drawings and Specifications are based on cupolas as manufactured by Webb and supplied by Brosco.

1.04 SUBMITTALS

A. Comply with the pertinent provisions of Section 01300.

B. Product Data:
   1. Shop drawings of all units showing materials of construction, thickness of all materials, finish, hardware, and details of construction.
   2. Manufacturer's recommended installation procedures which, when approved by the Engineer will become the basis for accepting or rejecting actual installation procedures used on the Work.
   3. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

PART 2 PRODUCTS

2.01 CUPOLAS

A. Shall be Model No. 25x33-C (Governor) as manufactured by Webb as supplied by Brosco. Cupolas of equal or better quality will be considered.
   1. Base shall be constructed of redwood.
   2. Base size of 22"x22"x9 ¼".
   3. Copper covered roof.
   4. Roof opening 12"x14".
   5. Approximately 130-square inches of free air.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Cupolas shall be installed in accordance with manufacturer's approved shop drawings at the location shown on the Drawings.

1. Coordinate work with carpenters and roofers to ensure the correct size roof opening is provided and any required headers or blocking are provided also.
2. Verify the roof pitch, and after doing so cut the cupola base to conform to the roof pitch.
3. Provide all necessary fasteners required for a complete installation.
4. All fasteners shall be stainless steel or galvanized steel.
5. Provide the necessary flashing to insure a weatherproof installation.

3.03 CLEANING AND PROTECTION

A. Upon completion of the cupola installation clean all dirt and grime and remove any protective coverings.

END OF SECTION

INDEX

DIVISION 15 MECHANICAL

SECTION 15060

PIPE HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 DESCRIPTION

A. Work included: Provide pipe hangers and supports as required by the Contract Documents.
   1. In general, provide all hanging and supporting devices for hanging or supporting piping systems throughout the Work.
   2. The contractor shall be responsible for providing all piping supports required to conform with the requirements of this Section whether or not indicated on the drawings.
      a. Additional supports may be required to be provided by the contractor to restrain pipe movement noted during systems operations.

1.02 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions and Sections in Division 1 of these Specifications.
   1. Section 15107 Stainless Steel Pipe and Fittings

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

B. Hangers and supports shall be of an approved standard design capable of supporting the load under all operating conditions.
   1. All hangers, supports, and appurtenance shall conform to the latest applicable requirements of ANSI 31.1.0.
   2. The minimum working factor of safety for all supporting equipment, with the exception of springs, shall be five times the ultimate tensile strength of the material, assuming 10-foot of waterfilled pipe being supported.

C. All pipe and appurtenances connected to equipment shall be supported in such a manner as to prevent any strain being imposed on the equipment.
   1. When manufacturers have indicated requirements that piping loads shall not be transmitted to their equipment, submit certification stating that such requirements have been complied with.

D. Codes and Regulations:
   1. In addition to complying with the specified requirements, comply with pertinent regulations of governmental agencies having jurisdiction.
   2. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirement shall govern.

E. Coordinate the work of this Section with the work of other Sections.

1.04 SUBMITTALS

A. Comply with the pertinent provisions of Section 01300.

B. Product Data:
   1. Materials list of items proposed to be provided under this Section.
   2. Manufacturer’s specifications and other data needed to prove compliance with the specified requirements.
   3. Shop drawings and other data as required to indicate method of installing the pipe hangers and supports, except where such details are fully shown on the Drawings.

1.05 PRODUCT HANDLING

A. Handle in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GENERAL

A. All of the equipment specified herein is intended to support the various types of pipe and piping systems.
   1. The details shown on the drawings are intended to indicate the generally desired methods of support under normal conditions.
   2. It shall be the responsibility of the Contractor to develop final details and any details associated with special conditions not already covered to meet the system conditions specified in the piping specifications.

B. All pipe shall be supported as required to prevent significant stresses in the pipe material, valves, fittings, and other pipe appurtenances and to support and secure the pipe in the intended position and alignment.
   1. All supports shall be designed to adequately secure the pipe against excessive dislocation due to thermal expansion and contraction, internal flow forces, and all probable external forces such as equipment, pipe and personnel contact.

C. Hangers and supports shall be spaced in accordance with ANSI B31.1 except that the maximum unsupported span shall not exceed 10 feet unless otherwise specified herein.

D. Where flexible couplings are required at equipment, tanks, etc. the opposite to the piece of equipment, tank, etc. shall be rigidly supported.

E. All pipe and appurtenances connected to the equipment shall be supported in a manner to prevent any strain from being imposed on the equipment or piping system.

F. All rods, clamps, hangers, inserts, anchor bolts, brackets, and components for interior pipe supports shall be furnished with galvanized finish, hot dipped or electro-galvanized coated, except where field welding is required.
   1. Supports for copper pipe shall be copper plated or shall have a 1/16-inch plastic coating.
   2. All rods, clamps, hangers, inserts, anchor bolts, brackets, and components shall be Type 316 Stainless Steel.

G. Supports shall be sufficiently close together such that the sag of the pipe is within limits that will permit drainage and avoid excessive bending stresses from concentrated load between supports.

H. Where pipe hangers and supports come in contact with copper piping, provide protection from galvanic corrosion by; wrapping pipe with 1/16-inch thick neoprene sheet material and galvanized protection shield; isolators similar to ELCEN figure No. 228; or copper plated or PVC coated hangers and supports.

I. Pipe supports shall be provided as follows:
   1. Support spacing for steel and stainless-steel piping two inch and smaller in diameter and copper tubing shall not exceed five feet.
   2. Pipe supports shall not induce point loadings but shall distribute pipe loads evenly along the pipe circumference.
   3. Supports shall be provided at changes in direction and elsewhere as shown in the drawings or specified herein.
      a. No piping shall be supported from other piping unless specifically directed or authorized by the Engineer.
   4. Pipe supports shall be provided to minimize lateral forces through valves, both sides of a split type couplings, and sleeve type couplings, and to minimize all pipe forces on pump housings.
      a. Pump housings shall not be utilized to support connecting pipes.
   5. Effects of thermal expansion and contraction of the pipe shall be accounted for in the pipe support selection and installation.

J. Unless otherwise specified herein, pipe hangers and supports shall be as manufactured by Grinnell Co. Providence R.I.; Carpenter and Patterson, Inc Woburn MA; F & S Central Brooklyn NY; Elcen Metal Products Co. Franklin Park IL; Unistrut Northeast Cambridge MA; or approved equal.
   1. Any reference to a specific figure number of a specific manufacturer is for the purpose of establishing a type and quality of product and shall not be considered as proprietary in this specification.
   2. Any item comparable in type, style, quality, design, and performance, shall be considered as equal.

K. Any required pipe supports for which the supports specified in this section are not applicable shall be fabricated or constructed from standard structural steel shapes, concrete, and anchor hardware similar to items previously specified herein and shall be subject to the approval of the Engineer.

L. Anchor bolts shall be equal to Kwik-Bolt as manufactured by the McCullock Industries Minneapolis MN; Wej-It manufactured by Wej-It Expansion Products Bloomfield CO; or approved equal.
   1. The length of expansion bolts shall be sufficient to place the wedge portion of the bolt a minimum of 1-inch behind the steel reinforcement.

2.02 SINGLE PIPE SUPPORTS

A. Single pipes located in a horizontal plane close to the floor shall be supported by one of the methods specified herein or as shown on the drawings.

B. Pipes less than 3-inch in diameter shall be held in positions by supports fabricated from steel C channel, welded post base similar to Unistrut figure P2072A and pipe clamps similar to Unistrut figure P1109 through P1126.
   1. Where required to assure adequate support, fabricate supports using two vertical members and post bases connected together by horizontal member of sufficient load capacity to support pipe.
   2. Wherever possible, supports shall be fastened to nearby walls or other structural members to provide horizontal rigidity.
   3. More than one pipe may be supported from a common fabricated support.
   4. All supports unless specified otherwise shall be galvanized.

C. Where shown on the drawings, pipe shall be supported using concrete anchor posts.
   1. Pipe shall be securely fastened to concrete anchor posts using suitable 316 stainless steel metal straps as required and approved by the Engineer.

PART 3 - EXECUTION

3.01 DELIVERY AND STORAGE

A. All supports and hangers shall be crated, delivered and uncrated so as to protect against any damage.

B. All parts shall be properly protected so that no damage or deterioration shall occur during a prolonged delay from the time of shipment until installation is completed.

C. Finished iron or steel surfaces not galvanized or painted shall be properly protected to prevent rust and corrosion.

3.02 INSTALLATION

A. All pipes, horizontal and vertical, requiring rigid support shall be supported from the building structure by approved methods.
   1. Supports shall be provided at changes in direction and elsewhere as shown in the drawings and specified herein.
   2. No piping shall be supported from metal stairs, ladders and walkways unless specifically directed or authorized by the Engineer.

B. All pipe supports shall be designed with liberal strength and stiffness to support the respective pipes under the maximum combination of peak loading conditions to include pipe weight, liquid weight, liquid movement, and pressure forces, thermal expansion and contraction, vibrations, and all probable externally applied forces.
   1. Prior to installation, all pipe supports shall be approved by the Engineer.

C. Pipe supports shall be provided to minimize lateral forces through valves, both sides of split type couplings and sleeve type couplings, and to minimize all pipe forces on pump housings.

D. Inserts for pipe hangers and supports shall be installed on forms before concrete is placed.
   1. Before setting these items, all drawings and figures shall be checked which have a direct bearing on the pipe location.
   2. Responsibility for the proper location of pipe supports is included under this section.

E. Continuous metal inserts shall be embedded flush with the concrete surface.

3.03 TESTING

A. All pipe support systems shall be tested for compliance with the specifications.
   1. After installation, each pipe support system shall be tested in conjunction with the respective piping pressure tests.
   2. If any part of the pipe support system proves to be defective or inadequate, it shall be repaired or augmented under this section to the satisfaction of the Engineer.

END OF SECTION

SECTION 15102

COPPER PIPE, FITTINGS AND APPURTENANCES

PART 1 GENERAL

1.01 DESCRIPTION

A. Work included: Provide copper pipe, fittings and appurtenances as required by the Contract Documents.

1.02 RELATED WORK

A. Documents affecting Work of this Section include but are not necessarily limited to General Conditions, Supplementary Conditions and the Sections in Division 1 of these Specifications.
   1. Section 15060 Pipe Hangers and Supports
   2. Section 15110 Valves and Appurtenances

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. All copper pipe and fittings shall be of domestic manufacture.

C. The Drawings are diagrammatic and indicate the general arrangement of piping systems and work included.
   1. Information and components shown on isometric but not shown in plan view or vice versa, shall apply and be provided as if shown on both.
   2. It is not intended to specify or to show every offset, fitting or component, however, it is the intent of these Specifications and Drawings that all required components and materials, whether or not indicated or specified, shall be provided in such a manner as to make the entire piping installation fully complete and operational in all respects.

D. Codes and Regulations:
   1. In addition to complying with the specified requirements, comply with pertinent regulations of governmental agencies having jurisdiction.
   2. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirement shall govern.

1.04 SUBMITTALS

A. Comply with pertinent provisions of Section 01300.

B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
   1. Materials list of items proposed to be provided under this Section.
   2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
   3. Shop Drawings showing piping layouts, dimensions, location of supports and braces, and interfacing with piping and equipment furnished under other Sections of this Specification.

1.05 PRODUCT HANDLING

A. Comply with manufacturer's recommendations.

PART 2 PRODUCTS

2.01 PIPE

A. Copper Tubing:
   1. Meet or exceed the requirements of ASTM B88,

2. Shall be hard drawn Type L for long runs of piping.
3. Shall be soft tempered Type K for connection to valve operators and instrumentation.

2.02 FITTINGS

A. Copper Fittings:
1. Meet or exceed the requirements of ANSI B16.18,
2. Cast brass or bronze,
3. Solder joints,
4. Unions shall be brass with ground joints,
5. Dielectric unions shall be used to join dissimilar materials,
6. Brass compression type for connections to valve operators and instrumentation.

2.03 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which the work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.02 FIELD MEASUREMENTS

A. Make necessary measurements to assure precise fit of the tubing system.

3.03 COORDINATION

A. Coordinate the work of this Section with equipment suppliers to ensure all dimensions and elevations are compatible.

3.04 INSTALLATION

A. All tubing shall be installed to the proper line and grade and be rigidly supported.
1. Directional changes shall be made using the proper fittings.
2. Run parallel and at right angles to walls,
3. Systems shall be pitched to provide for complete drainage of the system.
4. Unions shall be provided close to main pieces of equipment and in branch lines to permit ready dismantling of tubing without disturbing main lines or adjacent branch lines.
5. Joints shall be made with solder composed of 95 percent tin and 5 percent antimony.
6. Underground joints shall be made up with 1000-degree F. silver solder.
7. Threaded joints shall be made tight with graphite paste or other approved compounds.
8. Once a joint has been made it shall not be remade without a thorough cleaning of the joint.

3.05 TESTING

A. Pressure Piping Systems:
1. Provide material and bracing required to isolate the piping system from equipment during the test.
2. Test at a hydrostatic pressure of 50 psi for one (1) hour.
3. Leaks shall be repaired under this Section and the test repeated.

END OF SECTION

SECTION 15107

STAINLESS STEEL PIPE AND FITTINGS

PART 1 GENERAL

1.01 DESCRIPTION:

A. Provide and test stainless steel pipe, fittings and appurtenances as indicated and specified.

1.02 Related work:

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions and Sections of Division 1 of these Specifications.
1. Section 15110 Valves and Appurtenances
2. Section 15120 Piping Specialties

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements of the work of this Section.
B. Provide manufacturer's certification in writing, that materials meet or exceed minimum requirements as specified.
C. Welder Qualifications:
1. Quality and certify welding procedures, welders, and operators in accordance with ANSI B31.1, paragraph 127.5 for shop and project site welding of piping work.
D. Job Conditions:
1. Coordinate dimensions and drillings of flanges with flanges for valves and equipment to be installed in the piping systems.

1.04 SUBMITTALS:

A. Submit the following in accordance with Section 01300:
1. Pipe manufacturer’s technical specification and product data.
2. Certified shop and erection drawings. Contractor shall submit electronic files of the piping layout including the following.
a. Pipe layouts in full detail.
b. Location of hangers and supports.
c. Location and type of anchors.
d. Location of couplings and expansion joints.
e. 1/2-inch = 1 foot scale details of all wall penetrations and fabricated fittings or special fittings.
f. Schedules of pipe, fittings, expansion joints and other appurtenances.
3. Certificates: Sworn certificates in duplicate showing compliance with material used and shop tests performed with appropriate standard.
4. Catalog cuts and technical data for expansion joints, couplings, gaskets, pipe supports and other accessories.
5. Submit reports required for welding certifications per ASME B31.1 paragraph 127.6.
6. Manufacturer's descriptive literature and technical data on insulation and proposed method of installation.

B. Material Certification:
1. Provide certification from the piping and fittings manufacturer that the materials of construction specified are recommended and designed for the service conditions specified and indicated. If materials other than those specified are proposed based on incompatibility with the service conditions, provide technical data and certification that the proposed materials are recommended and designed for the service conditions specified and indicated including an installation list of a minimum of five (5) installations in operation for a minimum of five (5) years. Provide proposed materials at no additional cost to the Owner.
2. Where materials are not specified, provide technical data and certification that the proposed materials are recommended and designed for the service conditions specified and indicated.

C. A copy of the contract mechanical process drawings, with addenda that are applicable to the equipment specified in this section, marked to show all changes necessary for the equipment proposed for this specification section. If no changes are required, mark all drawings with "No changes required" or provide a statement that no changes are required.
   1. Failure to include all drawings or a statement applicable to the equipment specified in this section will result in submittal return without review until a complete package is submitted.

D. A copy of this specification section with addenda and all referenced specification sections with addenda, with each paragraph check-marked to indicate specification compliance or marked and indexed to indicate requested deviations and clarifications from the specified requirements.
   1. If deviations and clarifications from the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.
   2. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up specifications and justifications are submitted in a complete package.

1.05 DELIVERY, STORAGE AND HANDLING:

A. During loading, transportation and unloading, prevent damage to pipes and fittings. Load and unload each pipe under control at all times. Under no circumstances will a dropped pipe be used unless inspected and accepted by Engineer. Place skids or blocks under each pipe in the shop and securely wedge pipe during transportation.

PART 2 PRODUCTS

2.01 STAINLESS STEEL PIPE:

A. Manufacturers:
   1. Douglas Brothers
   2. Felker
   3. Bristol Metals

B. Material:
   1. Type 316L sheet and plate per ASTM A240.
   2. Maximum carbon content of 316L material limited to 0.03 percent.
   3. Finish: #1 HRAP.

C. Fabrication:
   1. Fabricate in accordance with ASTM A778 in NPS sizes shown with dimensional tolerances per ASTM A530.
   2. Perform welding by qualified welders conforming to standard procedures. Weld piping with wall thickness up to 11 gauge, 0.125-inch, with the TIG (GTAW) process. Properly bevel heavier walls and use a root pass with the TIG (GTAW) process followed by subsequent passes with the TIG (GTAW), MIG (GMAW), or Metallic Arc (SMAW) process.
   3. Add filler wire of ELC grades to all welds to provide a cross section at the weld equal to or greater than the parent metal. Distribute smooth and evenly weld deposit and provide a crown of no more than 1/16-inch on the I.D. and 3/32-inch on the O.D. of the piping.
   4. Concavity, undercut, cracks or crevices are not acceptable.
   5. Butt Welds: Full penetration to the interior surface, with inert gas shielding provided to the interior and exterior of the joint.
   6. Remove excessive weld deposits, slag, spatter, and projections by grinding.
   7. Continuously weld angle face rings on both sides to the pipe or fitting.
   8. Grind all welds on gasket surfaces smooth.
   9. Contour pipe branches, taps and bosses to the radius of the main pipe run and bevel and weld with full penetration. No projections to the inside of the branch or main run are acceptable. Provide a smooth transition from ID of run to ID of branch.
   10. Wire-brush inside and outside weld areas with brushes of stainless steel that are specifically designed to be used only on stainless steel.
   11. After manufacture, passivate stainless steel pipe, fittings, and appurtenances by immersion in a pickling solution of 6 percent nitric acid and 3 percent hydrofluoric acid. Temperature and detention time to be sufficient for removal of oxidation and ferrous contamination without more than superficial etch of

surface. Perform a complete neutralizing operation by immersion in a trisodium phosphate rinse followed by clean water wash. Perform in accordance with ASTM A380.

12. After fabrication, either passivate by immersion (see above paragraph) or scrub interior and exterior of welds with same solution or pickling paste and stainless steel wire brushes to remove weld discoloration and then neutralize and wash clean. Perform in accordance with ASTM A380.
13. Perform all welding in the shop. Field welding is not acceptable.
    a. If field welding is allowed for certain circumstances, the Contractor shall submit the welders qualifications and an acceptable method of cleaning the pipe and fittings for review prior to start of any field welding.
14. Fittings: Butt weld type manufactured in accordance with ASTM A774 of the same raw material and in the same thicknesses as the pipe. Socket weld fittings are not acceptable.
    a. Elbows up to 24-inch Diameter: Provide smooth flow-die formed, long radius; with centerline to end of elbow equal to 1.5 times the nominal pipe size.
    b. All short radius, special radius, and reducing elbows and long radius elbows greater than 24-inch diameter: Fabricate with pieces in accordance with the following table with dimensions in accordance with AWWA C208:

Bend, degrees	**Number of Pieces**
0 to 22.5	2
23 to 45	3
46 to 67.5	4
68 to 90	5

15. Fabricate tees and branch connections true and square with wall thickness same as pipe.
16. Reducers evenly tapered with tangent ends for butt weld connection.
    a. Reducers may be straight tapered cone construction.
17. Secure flanges to pipe ends and plug openings prior to shipment.

D. Design:

1. Stainless steel pipe: Nominal pipe size diameter pipe fabricated of Schedule 10S stainless steel sheets.
2. Joints: Flanged or, bolted split sleeve type couplings as indicated and specified. Split couplings requiring cut or roll grooving of the pipe not allowed unless specifically called for.
3. Flanged Joints: Van Stone back-up flange type, ANSI 150 lb.
4. Provide stainless steel back-up flanges of A240-316/L or A240-304/L. Galvanized steel and ductile iron flanges are not acceptable.
5. Hardware: Type 316 stainless steel.
6. Fabricate flanged joint face rings fabricated of rolled stainless steel angles.
7. Use angle face rings with thickness equal to or greater than the wall of the pipe or fitting to which it is welded. Continuously weld on both sides to the pipe or fitting. Fabricate angle legs so as not to interfere with the flange bolt holes.
8. Isolate stainless steel flanges from other ferrous metal connections at valves and equipment with flange insulating kit.
    a. Pipe flange insulating kit, double washer type:
        (1) Flange gasket: Type E, 1/8-inch thick neoprene-faced phenolic.
        (2) Insulating sleeves: 1/32-inch thick polyethylene, full length, one for each flange bolt.
        (3) Insulating washers: 1/8-inch thick phenolic, two for each flange bolt.
        (4) Mechanical washers: 1/8-inch thick Type 316 stainless steel, two for each flange bolt.

2.02 BOLTED SPLIT SLEEVE TYPE COUPLINGS:

A. Provide stainless steel couplings in accordance with Section 15120.

2.03 EXPANSION JOINTS:

A. Provide in accordance with Section 15120.

2.04 PIPE SUPPORTS:

A. Provide in accordance with Section 15060.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.02 COORDINATION

A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this section.

3.03 INSTALLATION:

A. Ensure pipelines parallel to building walls wherever possible. Install piping to accurate lines and grades. Where temporary supports are used, ensure rigidity to prevent shifting or distortion of pipe. Provide for expansion where necessary.

B. Pitch piping toward low points. Provide for draining low points.

C. Before assembly, remove dirt and chips from inside pipe and fittings.

D. Make flanged joints with bolts; bolt studs with nut on each end; or studs with nuts where one flange is tapped.
1. Except as otherwise specified, provide number and size of bolts conforming to same ANSI standards.
2. Provide Type 316 stainless steel hardware.
3. Provide ring gaskets of materials designed for the service specified and indicated, 1/16-inch thick gaskets.
4. Make up flanged joints tight with care being taken to prevent undue strain upon valves or other pieces of equipment.

3.04 FIELD TESTING:

A. Clean of dirt, dust, oil, grease and other foreign material, before pressure and leakage tests.

B. Pressure and Leakage Tests:
1. Conduct combined pressure and leakage test in pipelines.
2. Furnish and install temporary testing plugs or caps; pressure pumps, pipe connections, meters, gages, equipment, and labor.
3. Test when desired and comply with Engineer's orders and specifications.
4. Fill section of pipe with water and expel air.
5. Pressure and leakage test consists of first raising water pressure (based on elevation of lowest point of section under test and corrected to gage location) to pressure 25 psi (bar).
6. No visible leakage in joints.
7. If unable to achieve and maintain specified pressure for one hour with no additional pumping, section failed to pass test.
8. If section fails pressure and leakage test, locate, uncover, and repair or replace defective pipe, fitting, or joint, at no additional expense and without time extension. Conduct additional tests and repairs until section passes test.
9. Immediately upon completion of testing, drain and dry piping to remove all traces of water and condensation.
10. Modifications to test procedure only if permitted by Engineer.

END OF SECTION

SECTION 15110

VALVES AND APPURTENANCES

PART 1 GENERAL

1.01 DESCRIPTION

A. Work included: Provide valves and appurtenances as required by the Contract Documents.

B. The items of this Section include but are not necessarily limited to:
   1. Butterfly Valves
   2. Ball Valves
   3. Sampling Ports

1.02 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   1. Section 15102 Copper Pipe, Fittings, and Appurtenances
   2. Section 15107 Stainless Steel Pipe and Fittings

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. All of the types of valves and appurtenances shall be products of established firms who are experienced in the manufacture of the particular item to be furnished.
   1. All valves and their appurtenances shall be of domestic manufacture

1.04 SUBMITTALS

A. Comply with the pertinent provisions of Section 01300.

B. Product Data:
   1. Materials list of items proposed to be provided under this Section.
   2. Manufacturer’s specifications catalog cuts, and other data needed to prove compliance with the specified requirements.

1.05 PRODUCT HANDLING

A. Handle in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. General:
   1. All valves and appurtenances shall be of the size shown on the Drawings and as far as possible all equipment of the same type shall be from one manufacturer.
   2. All valves and appurtenances shall have the name of the manufacturer, flow directional arrows and the working pressure for which they are designed, cast in raised letters upon some appropriate part of the valve body.
   3. All valves shall open counterclockwise. Operators shall have arrows cast thereon to indicate direction of rotation to operate the valve.
   4. All iron valves shall have:
      a. An exterior coating of red oxide primer FDA approved for potable water use.

b. An interior coating of an NSF/ANSI 61 certified fusion bonded epoxy.
1) The interior of valves with seats that are bonded to the valve body, with the exception of disc edge, rubber seat and finished portions, shall be evenly coated with an NSF61 approved 2-part liquid epoxy. Minimum dry film thickness shall be 8 Mils minimum.

2.02 BUTTERFLY VALVES

A. Butterfly Valves:
1. Comply with ANSI/AWWA C504.
2. Flanges conform to ANSI B16.1, Class 125 cast iron flange.
3. Cast iron body in compliance with ASTM A126, Class B.
4. Cast iron waterway surfaces shall be NSF 61 epoxy coated at the factory, minimum 8 mils DFT.
5. Shaft: Type 304 stainless steel in compliance with Table 3 of AWWA C504
6. Shaft seals: "V" type chevron packing.
7. Bearings: Permanently self-lubricated sleeve type.
8. Disc:
   a. Ductile iron meeting the requirements of ASTM A536, or
   b. Cast iron meeting the requirements of ASTM A126, Class B.
   c. Iron discs shall have a Type 316 stainless steel edge.
d. Seat: BUNA-N.
e. Zero leakage at a pressure differential of 150 psi.
f. Operator:
   a. Hand wheel actuator of the geared type with enclosed and sealed housing.
   b. Clearly indicates the valve's position.
   c. Holds the valve in any intermediate position between full open and fully closed without creeping or fluttering.
   d. Furnish extension bonnet mounted between the valve and handwheel operator of length required so that center of handwheel is approximately 30" above the existing grating.

2.03 BALL VALVES

A. Ball Valves (2-inches and Smaller):
1. Two piece bronze body,
2. WOG pressure rating: 600 psi,
3. Teflon seats and seals,
4. Full port design,
5. Adjustable packing gland,
6. Screwed or soldered ends.

2.04 SAMPLING PORTS

A. Sampling ports shall be smooth-nosed wall-type faucets, Elkay Model No. LK69CP or equal.
1. Material Brass
2. Valve type Brass stem assembly
3. Connection ½" NPT male

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.02 COORDINATION

A. Coordinate the work of this Section with equipment suppliers that the piping system shall be connected to, to ensure that all dimensions and elevations are compatible.

B. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

3.03 VALVE INSTALLATION

A. The valves and appurtenances shall be installed at the locations shown on the Drawings.
   1. Valve operators shall be easily accessible and rigidly supported.
   2. Valves shall be installed with valve shaft in vertical position for accommodation of extension bonnet and handwheel operator.
   3. After installation check valve operation. Valve shall operate smoothly through its entire operating range.

END OF SECTION

SECTION 15120

PIPING SPECIALTIES

PART 1 GENERAL

1.01 DESCRIPTION

A. Work included: Provide expansion joints, filler rings, and flexible mechanical pipe couplings, for the piping systems all as required by the Contract Documents.

1.02 RELATED WORK

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   1. Section 15107 Stainless Steel Pipe and Fittings

1.03 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Coordinate the work of this Section with the work of other Sections.

1.04 SUBMITTALS

A. Comply with the pertinent provisions of Section 01300.

B. Product Data:
   1. Materials list of items proposed to be provided under this Section.
   2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

1.05 PRODUCT HANDLING

A. Handle in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 EXPANSION JOINTS

A. Expansion joints shall be Redflex Type J-1 as manufactured by Red Valve Co. Inc., Carnegie, PA. The expansion joint shall have the following attributes:
   1. Redflex Model:
      a. Type J-1 for "straight thru" joints.
      b. Type J-10 for concentric reducers
      c. Type J-11 for eccentric reducers
   2. Size as shown on the Drawings,
   3. Materials of construction: Buna-N,
   4. Single "filled" arch, open configuration,
   5. Flanges shall be 125 lb. conforming to ANSI Standards:
      a. Constructed integral with body.
   6. Pressure rating: 140 lb standard, 190 lb high,
   7. Retaining rings.

B. Control Units:
   1. Gusset plate thickness: 1/2-inch,
   2. Rod diameter: 5/8-inch,

3. Number of rods: 3,
4. Materials: Galvanized steel.

2.02 Annular Seals:

A. The annular space created by the wall sleeve and the pipe shall be positively sealed with "Link Seal" manufactured by GPT Industries or an approved equal.
1. Seals shall be the modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening.
2. Links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt head and nut.
a. After the seal assembles positioned in the sleeve, tightening of the bolts shall cause the rubber sealing elements to expand and provide an absolutely watertight seal between the pipe and wall opening.
3. The seal shall be constructed so as to provide electrical insulation between the pipe and wall, thus reducing chances of cathodic reaction between these two members.
4. All wall sleeves of which any portion is below main floor slab and penetrates an exterior wall, or where the wall sleeve penetrates a wall between a tank and an interior room shall have link seals on both the interior and exterior faces of the wall. All wall sleeves above this elevation shall have link seals on the interior wall only.
5. The Contractor shall determine the required inside diameter of each individual wall opening or sleeve before ordering, fabricating or installing the seals.
a. The inside diameter of each wall opening shall be sized as recommended by the manufacturer to fit the pipe and Link-Seal to assure a water-tight joint.
6. The Contractor shall familiarize himself with the installation of the seals through the manufacturer's instruction bulletin which illustrates the proper procedure for installing and tightening the seal to provide a water-tight pipe penetration.

2.03 FLEXIBLE MECHANICAL PIPE COUPLINGS

A. Flexible mechanical cast iron pipe couplings for jointing of plain ends of ductile iron pipe shall be suitable for a 200 psi water working pressure and shall be of the proper size and suitable for use on the piping on which it is installed.
1. Couplings shall be of ductile iron construction and shall be provided with middle ring not less than 12-inches in length.
2. Tee head alloy steel bolts with heavy hex nuts, molded rubber gaskets, follower rings and accessories as required for the complete installation.
3. Where indicated, the coupling shall be provided with not less than two tie rods extended from flange connections on each side of the couplings.
4. Follower rings shall be amply proportioned to take, without deformation, the strains imposed on the coupling by the installation.

2.04 FILLER RINGS

A. Filler rings of the same materials, facing and drilling as the flanges they are used with shall be provided in flanged piping where necessary and approved for the proper fitting and layout of the piping.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Expansion Joint: The expansion joints and appurtenances shall be installed at the locations shown on the Drawings.
1. Misalignment of piping shall not exceed 1/8-inch.

2. Install control unit per manufacturer’s requirements.

END OF SECTION

INDEX

DIVISION 16 ELECTRICAL

SECTION 16050

BASIC ELECTRICAL

PART 1 GENERAL

1.01 DRAWINGS

A. Reference Drawings
   1. The work of this Section is shown on Drawing(s) numbered M-1.

1.02 SCOPE

A. The CONTRACTOR shall provide the labor, tools, equipment, and materials necessary to furnish and install the complete electrical work in accordance with the plans and as specified herein. The work shall include but not be limited to the following:
   1. Complete electric service including primary and secondary duct banks, conductors, main circuit breaker, grounding, metering, etc.
   2. Complete power distribution systems including switchboards, panelboards, motor control centers, transformers, over current devices, wiring devices, raceway, cable, wire and etc.
   3. All motor wiring, safety disconnects, and motor starters unless integral with equipment.
   4. Complete emergency power system including generator, transfer switches, and associated equipment, at designated sites.
   5. Control wiring not provided by other Divisions.
   6. Complete grounding and surge protection system.
   7. Indoor and outdoor lighting system.
   8. Telephone system.
   9. Fire and security alarm systems.
   10. All support material and hardware for raceway, cable tray and electrical equipment.
   11. Underground system.
   12. Termination of all cable and wire unless otherwise noted. This includes, but is not limited to, final termination of all control and instrumentation wiring in Process Equipment and PLC control panels and consoles.
   13. Building wall, floor and roof penetrations for raceway and cable tray.
   14. Fire rated sealing of all electrical penetrations.
   15. Miscellaneous equipment.
   16. Start up, acceptance testing test reports and instruction of systems operation to the OWNER.

B. This section also includes general construction materials and methods for application with electrical installations as follows:
   1. Miscellaneous metals for support of electrical materials and equipment.
   2. Joint sealers for sealing around electrical materials and equipment; and for sealing penetrations in fire and smoke barriers, floors, and foundation walls.
      a. Concrete used for the following:
         1. Housekeeping pads.
         2. Pipe supports.
      b. Temporary utilities and connections include the following:
         1. Temporary electric service.
         2. Temporary service.
         3. Temporary lighting to provide adequate illumination of work areas and security.

C. Related Work. Division 16 is responsible for installation, wiring and raceways for electrically operated equipment, cabinet, starters, controls, instrumentation, PLC's, control panels and related items furnished under other divisions. Division 16 shall furnish and install disconnect switches for equipment furnished under other divisions. This shall include but not be limited to the following:
   1. Process equipment control panels.
   2. PLC control panels, consoles, and instrumentation.
   3. HVAC and mechanical equipment starters, disconnects, panels, etc.

D. Related Work Not Included:

1. Excavation and backfilling including gravel or sand bedding for underground electrical work, concrete encasement for conduit shall be performed by the GENERAL CONTRACTOR under other divisions of this specification.
2. Furnishing and/or installing temperature control for mechanical trades under division 15.

E. Examination of Site:
1. Before submitting a bid, the CONTRACTOR shall visit and carefully examine site to identify existing conditions and difficulties that may affect the Work of this Section. No extra payment will be allowed for additional work caused by unfamiliarity with site conditions.

1.03 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.04 QUALITY ASSURANCE

A. Codes and Standards. Perform all work associated with basic electrical materials in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein. Where provisions of the pertinent codes and standards conflict with this specification, the more stringent provision shall govern.
1. Massachusetts Electrical Code (MEC).
2. National Fire Protection Association (NFPA).
3. Underwriters Laboratories, Inc. (UL).
4. Local and State Building Codes.
5. All electrical equipment shall be listed and labeled by UL or an approved independent nationally recognized electrical testing laboratory.

B. Inspector Certifications
1. Provide two copies of the electrical inspector's certificate of approved showing acceptability of work done under this contract.

1.05 SUBMITTALS

A. Furnish manufacturer's product data, test reports, and materials certifications as required.

B. Follow the procedures specified in Division 1 Section "Submittals" and in addition, the CONTRACTOR shall prepare and submit a complete submittal list to the Owner's Representative. The submittal list shall include all submittal items covered in the Division 16 specification sections.

C. Shop drawings shall be submitted to the Owner's Representative for approval. Shop drawings shall identify the specific equipment and material being supplied; the quantity being supplied; and all accessories, dimensions, descriptions, mounting and connection details, wiring diagrams, elementary control diagrams, equipment interface diagrams and any other information necessary to determine compliance with the plans and specifications. Fabrication and installation shall be in accordance with the approved shop drawings.

D. As-built copies of all shop drawings shall be submitted to the ENGINEER. This shall include but not limited to the following:
1. Switchboards.
2. Motor Control Centers.
3. PLC and Control Panels.

E. Permits and Easements. Submit copies of reports, permits, and easements necessary for installation, use, and operation.

F. Test Reports. Submit copies of reports of tests, inspections, and meter readings as specified. Tests, inspections, and meter readings shall be performed using the CONTRACTOR's temporary power source unless otherwise specified.

1.06 RECORD DRAWINGS

A. The CONTRACTOR shall maintain a complete and separate set of prints of Contract Drawings and specifications at job site for duration of the contract. The CONTRACTOR shall record work completed and all changes from original Contract. Drawings shall clearly and accurately include work installed as a modification or as an addition to the original design.

B. At completion of work and prior to final request for payment, the CONTRACTOR shall submit a complete set of reproducible record drawings showing all systems as actually installed.

1.07 JOB CONDITIONS

A. Existing Conditions:
1. Maintain and protect existing building services, which transit the area affected by selective demolition.
2. Existing Utilities. Locate existing underground utilities in excavation areas. If utilities are indicated to remain, support, and protect services during excavation operations.
3. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
4. Verify that the electrical installation may be made in complete accordance with all pertinent codes and regulations and the original design.

B. Coordination.
1. Coordinate the installation of electrical items with the schedules for work of other trades to prevent unnecessary delays in the total work.
2. Coordinate with all utility and telephone companies and make all installations for their services in accordance with all utility company requirements.
3. Any changes shall be done at the CONTRACTOR'S expense.
4. Where lighting fixtures and other electrical items are shown in conflict with locations of structural members and mechanical or other equipment, furnish and install all required supports and wiring to clean the encroachment.
5. Any work installed contrary to or without acceptance by the ENGINEER shall be subject to change as directed by the ENGINEER, and no extra compensation will be allowed to the CONTRACTOR for making these changes.

C. Accuracy of Data:
1. The Drawings are diagrammatic and functional only, and are not intended to show exact circuit layouts, number of fittings, components and place in satisfactory operational power, lighting, and other electrical systems shown. Install additional circuits, components and material wherever needed to conform to the specific requirements of the equipment whether or not indicated or specified.
2. Information and components called for in the specification but not shown on plans or vice versa, shall apply and shall provide as though required expressly by both.
3. The locations of equipment, fixtures, outlets and similar devices shown on the Drawings are approximate only. Field measurements shall take precedence over scaled dimensions from Drawings. Exact locations shall be as accepted by ENGINEER during construction. Obtain in the field all information relevant to the placing of electrical work and, in case of any interference with other work, proceed as directed by the ENGINEER and furnish all labor and materials necessary to complete the work in an acceptable manner.
4. The Contract Drawings and the specifications are intended to comply with all pertinent codes, regulations and standards. In the event of discrepancy, the CONTRACTOR shall immediately notify the ENGINEER in writing of said discrepancies and apply for an interpretation and, unless an interpretation is offered in writing by the ENGINEER prior to the execution of the Contract, the applicable rules and regulations shall be complied with as a part of the Contract.
5. In case of difference between building codes, specifications, state laws, industry standards and the Contract Documents, the most stringent shall govern. Should the CONTRACTOR perform any work that does not comply with the requirements of the applicable building codes, state laws, and industry standards, he shall bear all cost arising in correcting these deficiencies.
6. Verify size and ratings of motors and other electrically operated devices supplied by others.
7. Check with ENGINEER before installation of work for outlets not specified as to location or for work that interferes with other trades.

1.08 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Protection. Use all means necessary to protect electrical system materials before, during and after installation and to protect the installed work and materials of all other trades.

B. Replacements. In the event of damage, immediately make all repairs and replacements necessary to the acceptance of the ENGINEER and at no additional cost to the OWNER. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such special tests as directed by the ENGINEER, at the cost and expense of the CONTRACTOR, or shall be replaced by the CONTRACTOR at his own expense.

C. Protect the work of other trades. Restore any damage caused to other trades to the condition existing prior to damage at no additional cost to the OWNER.

D. Investigate each space in the building through which equipment must pass to reach its final location. If necessary, the manufacturer shall be required to ship his material in sections sized to permit passing through such restricted areas in the building.

1.09 SPECIAL WARRANTY

A. Compile and assemble the warranties specified in Division 16 into a separate set of vinyl covered three ring binders, tabulated and indexed for easy reference.

B. Provide complete warranty information for each item. Information to include:
1. Product or equipment list.
2. Date of beginning of warranty or bond.
3. Duration of warranty or bond.
4. Names, addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services.

1.10 DEFINITIONS

A. As used in this specification, “provide” means “furnish and install”, “furnish” means “to purchase and deliver to the project site complete with every necessary appurtenance and support and to store in a secure area in accordance with manufacturer’s instructions”, and “install” means “to unload at the delivery point at the site or retrieve from storage, move to point of installation and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project”.

B. Finished Areas. In general, areas with carpet or tile floors, lay-in or fixed ceiling tile, special architectural ceiling treatment, or tiled, plastered, or paneled walls shall be considered finished areas.

C. Interior. For the purposes of this specification, interior is any area within the boundaries of the foundation of any building within the superstructure or other structures not classified as a building.

D. Hazardous (Classified) Areas. Hazardous (classified) areas are designated on the drawings in conformance with the Massachusetts Electrical Code (MEC). All equipment and the installation shall conform to requirements for installation in the designated hazardous area as described in Articles 500, 501, and 502 of the MEC.

1.11 TEMPORARY POWER:

A. The CONTRACTOR shall furnish, install, maintain, and remove the temporary electrical power and lighting systems, including lamps, and pay for all labor, materials, and equipment required therefore. All such temporary electrical work shall meet the requirements of the National Electrical Code, the local utility company, and OSHA.

B. The CONTRACTOR shall make all necessary arrangements with the local utility company as to where the temporary electric service can be obtained from.

C. The CONTRACTOR shall secure and pay for all required permits and back charges for work performed by others, and other expenses incidental to the installation of the temporary electric service.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials and equipment shall be listed by UL unless it can be demonstrated that no UL standards exist for a specific item or class of equipment.

B. All other materials, not specifically described but required for a complete and operable electrical installation, shall be new, first quality of their respective kinds, specification grade or better, and as selected by the CONTRACTOR subject to the acceptance by the ENGINEER.

2.02 INTERCHANGEABILITY

A. In all design and purchasing, interchangeability of items of equipment, subassemblies, parts, motors, starters, relays and other items is essential. All similar items shall be of the same manufacturer, type, model and dimensions.

B. For ease of maintenance and parts replacement, to the maximum extent possible, use equipment of a single manufacturer.

C. The ENGINEER reserves the right to reject any submittal which contains equipment from various manufacturers if suitable materials can be secured from fewer manufacturers and to require that source of materials be unified to the maximum extent possible.

PART 3 EXECUTION

3.01 COORDINATION

A. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

B. Field verify all locations and dimensions to ensure that the equipment will be properly located, readily accessible, and installed in accordance with all pertinent codes and regulations, the contract documents, and the referenced standards.

C. The work shall be carefully laid out in advance, and where cutting, drilling, etc., of floors, walls, ceilings, or other surfaces is necessary for the proper installation, this work shall be carefully done, and any damage to building, piping, or equipment shall be repaired by skilled mechanics of the trades involved at no additional cost to the Owner.

D. In the event any discrepancies are discovered, immediately notify the Owner's Representative in writing. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 INSTALLATION

A. Install all equipment and fixtures in complete accordance with the manufacturer’s recommendations and all pertinent codes and regulations.

B. Thoroughly inspect all items of equipment and any items dented, scratched, or otherwise damaged in any manner shall be replaced or repaired and painted to match original finish.

1. All items so repaired and refinished shall be brought to the attention of the ENGINEER for inspection and acceptance.

C. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete or supported from or on other structural components, as they are constructed.

D. 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 and equipment which must be placed in service before further construction can take place.

E. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.

F. The final routing of raceways shall be determined by structural conditions, interference with other trades and by terminal locations on apparatus. The ENGINEER reserves the right of a reasonable amount of shifting at no extra cost up until time of roughing in the work.

G. Where circuits are shown as "home-runs" all necessary fittings and boxes shall be provided for a complete raceway installation.

H. In general, wiring and raceway systems for security alarm, fire alarm, telephone and intercommunications systems are not indicated on the drawings but shall be furnished and installed under this section.

I. Each lighting and each receptacle circuit shall have its own neutral, dedicated to that circuit. A common neutral for more than one signal phase circuit is not allowed.

J. Surface mounted panel boxed, junction boxes, conduits, etc., shall be supported by spacers to provide a clearance between wall and equipment.

K. Upon completion of all installation, lamping, and testing, thoroughly inspect all exposed portions of the electrical installation and completely remove all exposed labels, soils, markings and foreign material.

3.03 MARKING AND LABELING

A. All panelboards, indoor transformers, cabinets, control panels and other specified equipment shall be labeled with engraved laminated plastic plates, minimum ¾" high with 3/8" engraved letters. Punch tapes with mastic backings are not acceptable.

B. All starters, disconnect switches and other specified equipment shall be marked with engraved laminated plastic plates, minimum ½" high with ¼" engraved letters. Where individual switches are circuit breakers in power or distribution panelboards do not have cardholders, they shall be marked with ½" high labels.

C. All empty conduits shall have labels tied to the pull string at each end of each empty conduit, marked as to identification of each end. Junction boxes with circuits provided for future use shall be labeled with appropriate circuit designation.

D. All panelboards directories shall be filled out with typewritten identification of each circuit.

3.04 TESTS & SETTINGS

A. Provide the services of an independent Testing Agency to perform the specified tests for the following systems:
1. Medium voltage cable (where furnished and installed by the CONTRACTOR).
2. Pad mounted transformer (where furnished and installed by the CONTRACTOR).
3. Switchboard overcurrent device coordination and selectivity with respect to upstream and downstream devices.
4. Harmonic analysis for variable frequency drives.
5. Standby power.
6. Ground resistance.
7. Fire alarm system.
8. Security alarm system.

B. The Testing Company shall perform all testing in accordance with National Electrical Testing Association (NETA) standards and procedures. All testing results shall be submitted on NETA forms and the testing data shall be certified by the respective Agency. Test results shall indicate recommended action for a sub-par test results. Results shall list recommended test values that should be obtained for new installation.

C. Provide necessary material, equipment, labor and technical supervision to perform and complete the Electrical Acceptance Tests as required.

D. Acceptance tests as herein specified are defined as those tests and inspections required to determine that the equipment involved is acceptable as delivered to the job site, that the equipment may be energized for final operational tests and is in accordance with the Specifications.

E. Final acceptance of the equipment and/or workmanship will depend upon performance characteristics as determined by the subject tests, in addition to complete operation tests, on all electrical equipment to show that it will perform the functions for which it was designed.

F. If the test and inspection data submitted should indicate deficiencies in the operation of the electrical apparatus or in the manufacturer thereof, the CONTRACTOR shall promptly implement the necessary adjustments, corrections, modifications and/or replacements necessary to be made to meet the specified requirements.

G. Upon completion of the remedial work, the Testing Agency shall repeat all of the tests on components previously found deficient on the first test or any additional test if they be required. It shall be the responsibility and obligation of the Electrical Subcontractor to have all remedial work accomplished as may be required by second and/or additional tests.

3.05 CLEANING

A. General. When all work is completed and has been tested and accepted by the Owner's Representative, the CONTRACTOR shall clean all light fixtures, equipment, and exposed surfaces that have been directly affected by this work. The CONTRACTOR, insofar as the work is concerned, shall at all times keep the premises in a neat and orderly condition and at the completion of the work shall properly clean up and remove from the site any excess materials.

END OF SECTION

SECTION 16110

RACEWAY

PART 1 – GENERAL

1.01 SCOPE

A. The Electrical Subcontractor shall provide the labor, tools, equipment, and materials necessary to install raceways in accordance with the plans and as specified herein.

B. All raceway systems shall be complete with fittings, boxes, and necessary connections as required.

C. Types of raceways in this section include the following:
1. Intermediate metal conduit (IMC).
2. Liquid tight flexible conduit.
3. Rigid galvanized steel conduit (RGS).
4. Rigid nonmetallic conduit (PVC).
5. Wireways.
6. Underground ducts.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

B. Related Sections. The following sections contain requirements that relate to this section:
1. Section 16050 Basic Electrical
2. Section 16120 Wires and Cables (for other wiring methods).
3. Section 16130 Cabinets, Boxes and Fittings (for boxes used with conduit and tubing systems).
4. Section 16190 Supporting Devices (for raceway supports).

1.03 QUALITY ASSURANCE

A. Reference Standards:
1. National Fire Protection Association (NFPA) 70 "Massachusetts Electrical Code" (MEC).
2. National Electrical Manufacturers Association (NEMA) Compliance.
3. Underwriter's Laboratories, Inc. (UL) Compliance and Labeling. Provide raceway products and components listed and labeled by UL, Electrical Testing Laboratories (ETL), or Canadian Standards Association (CSA).

1.04 SUBMITTALS

A. Furnish manufacturer's product data, test reports, and materials certifications as required.

B. Submit in accordance with Conditions of Contract and Division 1 specification sections:

PART 2 - PRODUCTS

2.01 MATERIALS

A. Metal Conduit and Tubing
1. Provide rigid steel conduit conforming to ANSI C80.1.
2. Provide intermediate steel conduit conforming to UL 1242.
3. Provide liquid tight flexible metal conduit and fittings conforming to UL 360.

B. Nonmetallic Conduit
1. Rigid Nonmetallic Conduit. PVC, Schedule 40 or 80, 90° C, conforming to NEMA TC-2, UL 651, and MEC Article 347.

C. Fittings and Couplings:
1. Threaded for rigid and IMC.
2. Compression for EMT.
3. Solvent weld for PVC, NEMA TC3.
4. Ferrous fittings shall be cadmium or zinc-coated, UL 614B.
5. Fittings for use in hazardous locations, UL 886.
6. Conduit Bodies

D. Wireways
1. General Purpose Wireways. NEMA 1 steel, front accessible, totally enclosed with bolted covers. Finish with rust-inhibiting coating and gray baked enamel finish.
2. Oiltight Wireways. NEMA 12, oiltight and dusttight steel with hinged gasketed cover, external latches, and flanged gasketed joints. Finished with gray enamel paint inside and outside.
3. Watertight Wireways. NEMA 4X, watertight, corrosion resistant stainless steel with hinged gasketed cover, screw clamps, and flanged gasketed joints.

2.02 ACCEPTABLE MANUFACTURERS

A. Conduit.
1. General Electric.
2. National.
3. Allied Tube and Conduit.
4. Carlon.
5. Electri-Flex Company.
6. Republic.
7. Perma-Cote Industries.
8. Robroy Industries, Inc.
9. Triangle PWC, Inc.
10. VAW of America, Inc.
11. Wheatland Tube Co.

B. Conduit Fittings and Accessories.
1. Pyle-National.
2. American Electric.
3. Appleton Electric Co.
4. Carlon.
5. Crouse-Hinds Division, Cooper Industries, Inc.
6. Thomas & Betts.
7. Killark Electric Mfg. Co.
8. Kraloy Products Co.
9. O-Z/Gedney.
10. Perma-Cote Industries
11. Raco
12. Robroy Industries.
13. Unistrut Corp.

C. Wireways
1. American Electric
2. B-Line Systems, Inc.
3. Circle AW Products.
4. GS Metals Corp.
5. Hoffman Engineering Co.
6. Square D Company.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Uses Permitted

1. Use liquidtight flexible metal conduit for the final 24 inches of connections to motors or control items subject to movement or vibration.
2. Use RGS or IMC for all exterior aboveground installations unless otherwise noted.
3. Use Schedule 40 PVC conduit for exterior direct buried installations.
4. Use Schedule 40 PVC conduit for exterior concrete encased installations. The transition from concrete encasement to riser shall be rigid steel conduit.
5. Use RGS or IMC for all other interior installations not exposed to severe moisture or corrosive conditions such as chemical feed area unless other wised noted.
6. Use Schedule 40 PVC conduit within chemical feed area only.
7. Use EMT for lighting circuits above hung ceilings in finished area only.
8. Use RGS for installation in the classified area.

B. Routing

1. Install exposed conduits, parallel or perpendicular to walls, ceilings, or structural members. Do not run through structural members. Avoid horizontal runs within partitions or side walls. Avoid ceiling inserts, lights, or ventilation ducts or outlets. Do not run conduits across pipe shafts or ventilation duct openings and keep conduits a minimum of 6 inches from parallel runs of flues, hot water pipes, or other sources of heat. Wherever possible, install horizontal raceway runs above water and steam piping.
2. Conduits installed in all new construction shall be concealed in walls or slabs. New conduits installed in existing areas shall be concealed where practical.
3. Conduits installed in other interior areas shall not be embedded in waterproofed or water bearing walls. Where possible, conduits to motors or equipment more than 3 feet from walls shall be run in or under the slab and stubbed up to the junction box. For all other interior applications, conduits shall be installed, exposed, or concealed as indicated on the plans.
4. For conduits installed in exterior areas:
   a) Do not run conduits exposed on the exterior surface of buildings.
5. Conduits penetrating exterior walls below grade, at grade floors, or below grade floors shall be sealed to prevent moisture migration. The exterior of the conduit shall be sealed with a mechanical pipe seal. The interior conduit seal shall be a gland type sealing bushing or RTV closed cell silicone foam. Ensure that conduits do not retain water against these seals.
6. Conduits shall penetrate roofs only where specifically shown on the plans. Provide all required flashing.
   Raceways penetrating fire rated walls, floors, and partitions shall be sealed with a fire rated sealant as described in Division 16 specification Section "Basic Electrical"
7. All conduits must be supported with materials specifically made for this purpose. Do not use wire hangers. Do not attach any parts of the raceway system to ventilation ducts. Conduit supports shall be attached to the building. Support conduits on each side of bends and on a spacing not to exceed the following: 6 feet for conduits smaller than 1 1/4 inches and 8 feet for conduits 1 1/4 inches and larger. Support riser conduits at each floor level with clamp hangers. All underground conduits shall be securely anchored to prevent movement during placement of concrete or backfill. Use precast separators and heavy gauge wire ties or other approved fasteners.
8. Install accessible pull boxes in runs over 100 feet or with more than three 90° bends or equivalent.
9. All empty conduits shall have #14 galvanized steel pull wire and terminate in accessible junction boxes or have accessible capped ends for future use.
10. Use E.Y.S. seal fittings for all conduits leaving hazardous areas and chemical rooms.

C. Conduit Embedded In Slab

1. Electrical conduit may be embedded in concrete according to the provisions of Article 6.3 of ACI 318 “Building Code Requirements for Reinforced Concrete”, provided the following conditions are met:
   a) Outside diameter of conduit shall not exceed 1/3 of concrete thickness. Maximum conduit outside diameter shall not exceed 3 inches when embedded in slab.
   b) Conduit shall not be placed closed than three diameters on center. Route conduit to minimize crossing of different conduit runs.
   c) Conduit shall not be embedded in structural concrete slabs less than four inches thick.
   d) A 1 1/2 inch minimum concrete cover shall be provided for conduits in structural concrete slabs.
   e) Conduit shall be located between the bottom and top of reinforcing steel. Conduit, crossing in the slab must be reviewed by the ENGINEER for proper cover.
   f) Conduit is generally not permitted in beams or girders.
   g) Only two conduits may cross at any point. The sum of the outside diameters of the crossing conduits shall not exceed 1/3 of the concrete thickness.

h) Provide additional reinforcement around all groups of conduits which stub up through the slabs.

i) Except where there are only isolated runs of conduit in slab, a plan showing conduit detail and the proposed routing of the conduits in slab shall be submitted, for the ENGINEERS approval prior to installation.

D. Underground Conduits

1. When installed in concrete or underground, apply two coats of approved asphalt paint to metallic conduits. Provide protection for conduit in areas subject to vehicle traffic.
2. Where conduits are installed in concrete slabs, on the ground, underground, or exposed to the weather, make all joints liquid tight and gas tight.
3. Bury all underground conduit, except under concrete slabs placed on fill, to a depth of at least two feet below finished grade unless otherwise indicated on the Drawings.
4. Slope ducts to drain away from buildings into manholes and/or handholes. Adjust final slopes to coordinate with existing site utilities.
5. Install on undisturbed soil where possible. Concrete encase conduits as shown on Drawings. Use pit run gravel and sand, placed 8 in. lifts and compacted for backfill.
6. After installation, clean and swab ducts.
7. Install galvanized steel pull wires in spare ducts. Cap spare ducts.

END OF SECTION

SECTION 16120

WIRE AND CABLES

PART 1 GENERAL

1.01 SCOPE

A. The Electrical Subcontractor shall provide the labor, tools, equipment, and materials necessary to install wires, cables, and connectors in accordance with the plans and as specified herein.

B. This section includes wires, cables, and connectors for power, lighting, signal, control, and related systems rated 600 volts and less.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

B. Related Sections:
1. Section 16050 Basic Electrical

1.03 QUALITY ASSURANCE

A. Reference Standards:
1. National Fire Protection Association (NFPA) 70 "National Electrical Code (NEC)."
2. Underwriter's Laboratories, Inc. (UL) Compliance.
   a) UL Standard 83 Thermoplastic Insulated Wires and Cables.
   b) UL Standard 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors.
   c) UL Standard 854 Service Entrance Cable.
3. National Electrical Manufacturers Association (NEMA) Compliance.
   a) WC-5 Thermoplastic Insulated Wire and Cable for the
   b) WC-7 Cross Linked Thermosetting Polyethylene Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
   c) WC-8 Ethylene Propylene Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
4. Institute of Electrical and Electronic Engineers (IEEE) Compliance.
   a) Standard 82 Test Procedure for Impulse Voltage Tests on Insulated Conductors.

1.04 SUBMITTALS

A. Furnish manufacturer's product data, test reports, and materials certifications as required.

B. Submit the following in accordance with Conditions of Contract and Division 1 specification sections:
1. Product data for electrical wires, cables, and connectors.
2. Product data for Megger insulation testing instrument.
3. Report sheets for Megger testing.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver wire and cable properly packaged in factory fabricated type containers or wound on NEMA specified type wire and cable reels.

B. Store wire and cable in clean dry space in original containers. Protect products from weather, damaging fumes, construction debris, and traffic.

PART 2 PRODUCTS

2.01 MATERIALS

A. General
1. Provide factory fabricated wires of sizes, ampacity ratings, and materials for applications and services indicated. Where not indicated, provide proper wire selection as determined by Installer to comply with project's installation requirements, NEC and NEMA standards. Select from the following UL types those wires with construction features which fulfill project requirements:
2. Provide color coding for phase identification in accordance with requirements in Division 16 section "Electrical Identification."
3. Provide factory applied nylon or polyvinyl chloride (PVC) external jackets on wires and cables for pulls in raceways over 100 feet in length, for pulls in raceways with more than three equivalent 90 degree bends, for pulls in conduits underground or under slabs on grade, and where indicated.

B. Service Wiring:
1. 98 percent conductivity copper.
2. 600 volt insulation, type RHW-RHH.
3. U.L. listed for underground use in wet locations at 75° C.

C. Building Wiring:
1. 98 percent conductivity copper.
2. 600 volt insulation, type THWN-THHN.
3. Solid conductor: #10 AWG and smaller.
4. Stranded conductor: #8 AWG and larger.
5. Minimum branch circuit: #12 AWG.
6. Minimum control wiring: #14 AWG, unless otherwise indicated.

D. Instrumentation
1. Instrumentation wiring for remote monitoring of equipment shall be #14 AWG, copper stranded.
2. Instrumentation wiring for transmitting 4-20mA DC signals shall be shielded, 2-conductor, minimum #18 AWG, equal to Belden No. 8179.

E. Splices:
1. No. 10 and smaller with 600 volt pressure type insulated connector of wire-nut type, or equal; soldered and crimped type not allowed. Ideal type “wire nut” Buchanan type “B-Cap” and Minnesota Mining (3M) type “Scotchiok”.
2. No. 8 and larger with solderless lugs or solderless connectors of Lock-tite or similar type properly taped with plastic insulating tape, Minnesota Mining Co. #33, or equal, then two half-lap servings of friction tape, Manson, or equal.’
3. Wire connector systems for use with underground conductors shall be UL listed specifically for such use.
4. Service entrance conductors shall be installed without splices. Electrical equipment feeders shall be spliced only where shown or specifically approved. Control and metering conductors shall be installed without splices.
5. All splices shall be made only by specific permission of the Engineer and then only in manholes or pull boxes and shall be sealed watertight with a heat shrunk insulation.
6. Tighten electrical connectors and terminals in accordance with manufacturer’s published torque tightening values. Where manufacture’s torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standards 486A and 486B.
7. Use UL listed splice for all underground wires, ducts buried, in conduit and in ducts. Connectors and splices shall be waterproof.

2.02 ACCEPTABLE MANUFACTURERS

A. Wire and Cable.
   . American Insulated Wire Corp.
   2. Brintec Corp.
   3. Carol Cable Co., Inc.
   4. Pirell.
   5. General Cable.
   6. Rome.
   7. Triangle.

B. Connectors and Terminals for Wires and Cable Conductors.
   1. AMP.
   2. Burndy Corporation.
   3. Ideal Industries, Inc.
   4. 3M Company
   5. O-Z/Gedney Co.
   6. Raychem.
   7. Thomas and Betts Corp.

PART 3 EXECUTION

3.01 WIRE AND CABLE INSTALLATION

A. All wire and cables shall be installed in conduit of size and type indicated on the drawing and specifications.

B. Install electrical cables, wires, and connectors in compliance with NEC.

C. Coordinate cable installation with other work.

D. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant, where necessary.

E. 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.

F. Conceal all cable in finished spaces.

G. Install exposed cable parallel and perpendicular to surfaces or exposed structural members, and follow surface contours, where possible.

H. Power conductors shall be No. 12 AWG minimum. Control conductors may be No. 14 AWG where circuit amperes and the NEC allow and when length does not pose a voltage drop problem.

I. Conductors shall be sized such that voltage drop does not exceed 3 percent for branch circuits or 5 percent for feeder/branch circuit combination.

J. 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.

K. All feeder and branch circuit wiring shall be color coded at all termination and splice locations. System neutrals shall be designated in addition to phase conductors. Equipment grounds shall be green.

L. The number of conductors shown on the Drawings is not necessarily the correct number required. As many conductors as are required in each case shall be installed. Grounding conductors are not scheduled.

3.02 FIELD QUALITY CONTROL

A. The Electrical Subcontractor shall test each electrical circuit after permanent cables are in place with terminators installed, but before cable or wire is connected to equipment or devices to demonstrate that each circuit is free from improper grounds and short circuits.

B. The Electrical Subcontractor shall test by Megger Test, the insulation resistance between phases and from each phase to ground for each of the following feeder and motor branch circuits:
1. Panelboards.
2. Motors.
3. Motor Control Centers.

C. The Megger Testing shall be witnessed by the Engineer/Architect. The Engineer/Architect shall be notified at least 48 hours in advance of testing.

D. Measure the insulation resistance at 500 volts dc with a hand cranked or motor driven "Megger" insulation testing instrument. Battery operated test instruments are not permitted. All test instruments are to be provided by the Electrical Subcontractor.

E. If any insulation resistance measures less than 50 megohms, the cable shall be considered faulty with the cable failing the insulation test. In moist environments, bag the ends of the cable to prevent a faulty Megger test.

F. Any cable which fails the insulation tests or which fails when tested under full load conditions shall be replaced with new cable for the full length and retested at no additional cost to Owner.

G. The below grade service or feeder splice shall be water immersion Megger tested in the presence of the Engineer. Each splice shall be immersed in a grounded water immersion bath for 24 continuous hours prior to and during the test. Criteria for failure shall be as described for cable above.

END OF SECTION

SECTION 16130

CABINETS, BOXES AND FITTINGS

PART 1 GENERAL

1.01 SCOPE

A. The Electrical Subcontractor shall provide the labor, tools, equipment, and materials necessary to furnish and install cabinets, boxes, and fittings in accordance with the plans and as specified herein.

B. 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. Boxes and fittings for hazardous locations.
4. Hinged door enclosures.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

B. Related Sections:
1. Section 16050 Basic Electrical
2. Section 16110 Raceways

1.03 QUALITY ASSURANCE

A. Reference Standards.
1. Underwriter's Laboratories, Inc. (UL) Listing and Labeling. Items provided under this section shall be listed and labeled by UL.
2. Massachusetts Electrical Code (MEC) Compliance.
3. National Electrical Manufacturers Association (NEMA) Compliance.

1.04 SUBMITTALS

A. Furnish manufacturer's product data, test reports, and material certifications as required.

B. 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 floor boxes and boxes, enclosures and cabinets that are to be shop fabricated (nonstock items).

PART 2 PRODUCTS

2.01 MATERIALS

A. Cabinets, Boxes, and Fittings, General
1. 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 and provide air sealing gaskets for units mounted in exterior walls.

B. Materials and Finishes
1. Provide fasteners for general use which are corrosion resistant screws and hardware including cadmium and zinc plated items.
2. Provide fasteners for damp or wet locations which are stainless steel screws and hardware.
3. Provide cast metal for boxes, enclosures, and covers which are copper-free aluminum except as otherwise specified.

4. Provide exterior finish which is gray baked enamel for items exposed in finished locations except as otherwise indicated.
5. Provide fittings for boxes, cabinets, and enclosures which conform to UL 514B. Malleable iron or zinc plated steel for conduit hubs, bushings, and box connectors.

C. Metal Outlet Boxes
1. Conform to UL 514A, "Metallic Outlet Boxes," and UL 514B, "Fittings for Conduit and Outlet Boxes." Boxes shall be of type, shape, size, and depth to suit each location and application.
2. Provide cast iron boxes of 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.

D. Pull and Junction Boxes
1. 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 cover shall be gasketed.
2. Provide hot-dipped galvanized steel boxes constructed of 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.

E. Nonmetallic Outlet, Device, and Wiring Boxes
1. Conform to NEMA OS 2, "Nonmetallic Outlet Boxes, Device Boxes, Covers, and box Supports," and UL 514C, "Nonmetallic Outlet Boxes, Flush Device Boxes and Covers." Boxes shall be molded polyvinyl chloride (PVC) units of type, shape, size, and depth to suit location and application.
2. Boxes shall be equipped with threaded screw holes for device and cover plate mounting. Each box shall have a molded cover of matching PVC material suitable for the application.

2.02 ACCEPTABLE MANUFACTURERS

A. American Electric
B. Appleton
C. Carlon
D. Crouse Hinds
E. Hoffman Engineering Co.
F. Killark Electric Mfg. Co.
G. O.Z. Gedney
H. Parker Electrical Mfg. Co.
I. Raco/Bell Division Harvey Hubbell
J. Spring City Electrical Mfg. Co.
K. Square D Co.
L. Steel City/Thomas & Betts

PART 3 EXECUTION

3.01 INSTALLATION

A. General
1. Install items where indicated and where required to suit code requirements and installation conditions.
2. Cap unused knockout holes where blanks have been removed and plug unused conduit hubs.
3. Support and fasten items securely in accordance with Division 16 section "Supporting Devices." Boxes shall be securely mounted to the building structure, independent of the raceway entering or leaving.
4. Sizes shall be adequate to meet MEC volume requirements, but in no case smaller than sizes indicated.
5. Remove sharp edges where they may come in contact with wiring or personnel.

B. Uses Permitted
1. Outlet Boxes.
a. Use nonmetallic boxes in corrosive areas such as chemical feed and storage or as designated on the plans.
b. Use explosionproof boxes in hazardous areas as designated on the plans.

c. Use cast metal boxes in all other locations. Each box with associated covers and fittings shall have a NEMA rating suitable for each location installed.

2. Pull and Junction Boxes.
   a. Use general purpose boxes (NEMA 1) in finished areas with framed construction.
   b. Use dusttight and oiltight boxes (NEMA 12) in other dry interior areas.
   c. Use explosionproof boxes (NEMA 7) in hazardous areas as designated on the plans.
   d. Use watertight boxes (NEMA 4) for exterior and wet locations on outdoor structure where moisture is present.

3. Cabinets
   a. Install enclosures and associated materials and NEMA types suitable for each location and in conformance with the drawings.

C. Installation of Outlet Boxes
1. Surface mount outlet boxes for exposed conduit runs.
   Adjust position of outlets in finished masonry walls to suit masonry course lines.
2. Coordinate cutting of masonry walls to achieve neat openings for boxes.
3. Use rotary cutting equipment to cut masonry work for installation of electrical fittings.
4. Locate boxes in masonry walls so that only a corner need be cut from masonry units.
5. Do not use sectional or handy boxes unless specifically requested.
6. Adjust outlet mounting height to agree with required location for equipment served.
7. Wall boxes in block construction shall be masonry boxes with inside ears and shall be concrete tight.
8. Outlet boxes shall be installed at all lighting fixtures.
9. 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. 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.
10. For concrete boxes use extra deep boxes to permit side conduit entrance without interfacing with reinforcing, but do not use such boxes with over 6 inch depth.
11. For existing outlet boxes where extension rings are required to be installed, drill new mounting holes in the rings to align with the mounting holes on the existing boxes where existing holes are not aligned.

D. Installation of Pull and Junction Boxes
1. 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 those required by MEC.
2. Install clamps, grips, 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.
3. Mount pull boxes in inaccessible ceilings with the covers flush with the finished ceiling.
4. 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.
5. Steel enclosed wireways and auxiliary gutter may be used at grouped equipment locations and at other locations where multiple circuits are run, when such use is accepted by the ENGINEER.

3.02 GROUNDING

A. Electrically ground metallic cabinets, boxes, and enclosures.

END OF SECTION

SECTION 16190

SUPPORTING DEVICES

PART 1 GENERAL

1.01 SCOPE

A. The Electrical Subcontractor shall provide the labor, tools, equipment, and materials necessary to furnish and install supporting devices in accordance with the plans and as specified herein.

B. This section includes secure support from the building structure for electrical items by means of hangers, supports, anchors, sleeves, inserts, seals, and associated fastenings.

A.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.

B. Related Sections:
1. Section 16050 Basic Electrical

1.03 QUALITY ASSURANCE

A. Reference Standards.
1. Massachusetts Electrical Code (MEC) Compliance.
2. Underwriter's Laboratories, Inc. (UL), Electrical Testing Laboratories, Inc. (ETL), or Canadian Standards Association (CSA).

1.04 SUBMITTALS

A. Furnish manufacturer's product data, test reports, and materials certifications as required.

B. Submit the following in accordance with Conditions of Contract and Division 1 specification sections:
1. Product data for each type of product specified.
2. 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.

PART 2 PRODUCTS

2.01 MATERIALS

A. Coatings:
1. 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 unless material is inherently corrosion resistant.

B. Conduit Supports:
1. Single run hangers: Galvanized steel conduit straps or clamps or cast metal beam clamps. Perforated straps and spring steel clips and clamps will not be permitted.
2. Group run hangers: Minimum 12-gauge galvanized performed U-channel rack with conduit fittings; 25 percent spare capacity.
3. Hanger rods: Threaded steel, 3/8-inch diameter.
4. Vertical run supports: Minimum 12-gauge galvanized performed U-channel struts with conduit fittings.

C. Equipment and lighting supports:
1. U-channel: 12-gauge galvanized performed U-channel struts with fixture and conduit fittings, as applicable.

2. Loose angles, channels, plates and tubing: As specified in Section 05500.

D. Anchors:
1. Hollow masonry: Stainless steel toggle bolts.
2. Solid masonry: Lead expansion anchors or preset inserts.
3. Metal surfaces: Machine screws, bolts, or steel clamps as required for application.
4. Wood surfaces: Wood screws.

E. Conduit Seals. Provide factory fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit, or tubing passing through concrete floors and walls. Provide a cast-in-place water stop wall sleeve with a mechanical pipe seal between the conduit and the sleeve. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.

B.

2.02 ACCEPTABLE MANUFACTURERS

A. Metal Angle and U-Channel Systems.
1. Allied Tube and Conduit Corp.
2. American Electric.
3. B-Line Systems, Inc.
4. GS Metals Corp.
5. Kin-Line, Inc.
6. Unistrut Diversified Products.

B. Conduit Sealing Bushings.
1. Cooper Industries, Inc.
2. GS Metals Corp.
3. Killark Electric Mfg. Co.
4. OZ/Gedney.
5. Product Electric Corp.
6. Raco, Inc.
7. Spring City Electrical Mfg. Co.
8. Thomas & Betts Corp.

PART 3 EXECUTION

3.01 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 installations.

C. Conform to manufacturer's recommendations for selection and installation of supports.

D. 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.

E. Support parallel runs of horizontal raceways together on trapeze type hangers.

F. 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.

G. 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.

H. 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.

I. Install sleeves 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 fire stopping sealant in gaps between sleeves and enclosed conduits and cables.

J. Install conduit 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. Provide seals for the interior of conduits which penetrate exterior or water bearing walls, consisting of gland type sealing bushings or RTV closed cell silicone foam. Provide explosionproof conduit seal fittings with appropriate potting material where conduits enter or leave a Class 1, Division 1 or 2 environment or a Class 2, Division 1 or 2 environment.

END OF SECTION