

BID DOCUMENTS AND SPECIFICATIONS FOR:

**Robbins Farm Field Renovations and Upgrades
Arlington, Massachusetts**

Bid # 17-27

April 2017

Prepared for:

Park & Recreation Commission
Town of Arlington, Massachusetts

Prepared by: Weston & Sampson

SEALED BIDS will be received:

Date: Wednesday May 17, 2017

Time: 10:00 AM

Place: Office of the Purchasing Agent

730 Massachusetts Avenue

Arlington, MA 02476

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**TOWN OF ARLINGTON
MASSACHUSETTS**

INVITATION TO BID

**BID No. 17-27 ROBBINS FARM FIELD RENOVATIONS AND
UPGRADES**

Sealed bids for Robbins Farm Field Renovations and Upgrades for the Town of Arlington, Massachusetts, will be received at the Purchasing Department, 730 Massachusetts Avenue, Arlington, MA 02476 until **10:00 AM prevailing time, on Wednesday May 17, 2017** at which time and place said bids will be publicly opened and read aloud.

All bids must be in a sealed envelope plainly marked: **BID No. 17-27 ROBBINS FARM FIELD RENOVATIONS AND UPGRADES.**

The scope of work of the Base Bid includes improvements to Robbins Farm Field in the town of Arlington, Massachusetts. The project includes a new baseball field with team benches and fencing and a new irrigation system. The project also includes new pathway construction. Utility improvements include adding new water service and new perimeter drain lines and area drains for the baseball field. Other utility work includes electrical service for the irrigation system.

Add Alternate #1 includes a walkway connecting the oval overlook to a new basketball court with goals and bench seating area.

Bid Security in the form of a bid bond, cash, certified check, treasurer's or cashier's check payable to the Owner, is required in the amount of five percent of the bid, in accordance with Section 00200, INSTRUCTIONS TO BIDDERS.

The contract duration for the Base Bid is 150 consecutive days.

Copies may be obtained at the Office of the Purchasing Agent, located at 730 Massachusetts Avenue, Arlington, Massachusetts 02476, from 9 a.m. to 12 noon and 1 to 4 p.m., upon payment of \$100.00 for each set made payable to "Town of Arlington". Any unsuccessful bidder or non-bidder, upon returning such set within the time specified in the Instructions to Bidders and in good condition, will be refunded his payment.

Contract Documents and plans will not be mailed.

Contract Documents and plans are available for down load and review on the Town Website:

www.arlingtonma.gov/purchasing

The selected contractor shall furnish a performance bond and a payment bond in amount at least equal to one hundred percent (100%) of the contract price as stipulated in Section 00700 GENERAL CONDITIONS of these specifications.

By-law of the Town of Arlington, Title 1, Article 16, Minority/Woman Workforce Participation in Construction Projects which exceed \$200,000.00 in part and parcel of the bid.

Minimum Wage Rates as determined by the Commissioner of the Division of Occupational Safety of the Executive Office of Labor and Workforce Development under the provisions of the Massachusetts General Laws Chapter 149, Section 26 to 27D, as amended, apply to this project. It is the responsibility of the Bidder, before bid opening, to request if necessary, any additional information on Minimum Wage Rates for those trades people who may be employed for the proposed work under this contract.

All bids for this project are subject to applicable bidding laws of Massachusetts, including General Laws Chapter 30, Section 39M as amended.

The Bidder agrees that this bid shall be good and may not be withdrawn for a period of 30 working days, Saturdays, Sundays and legal holidays excluded after the opening of bids.

The Owner reserves the right to waive any informalities or to reject any or all bids.

TOWN OF ARLINGTON

Adam W. Chapdelaine
Town Manager

INSTRUCTIONS TO BIDDERS

1. COMPLEMENTARY DOCUMENT
 - A. INVITATION TO BID, including herewith, is complementary to this document and shall be reviewed by bidder for specific instruction which are not repeated herein.

2. STATUTES REGULATING COMPETITIVE BIDDING
 - A. Bidding procedures and award of general contract and subcontracts shall be in accordance with the provisions of Chapter 30, Section 39M and Chapter 149, Section 44A through 44L inclusive, of the General Laws of the Commonwealth of Massachusetts, including all current amendments.
 - B. In the event of any discrepancy or inconsistency between the provisions of these Bid and Contract Documents and the above-mentioned statutes, the provisions of the above-mentioned statutes shall govern. In such event, the application of all remaining provisions not in conflict to any circumstance other than that in which the conflict occurs shall not be affected thereby.

3. BIDDER'S QUALIFICATIONS
 - A. DCPO Certification not required.
 - B. The Contractors' Update Statements are not public records and will not be open to public inspection.

4. INTERPRETATION OF DOCUMENTS: NOTIFICATION OF ERRORS
 - A. Interpretations of the provisions of the Bid and Contract Documents will be made by the designer upon written request of any general bidder or subbidder, provided that such request is received by the Designer at least seven (7) days prior to the date of the applicable bid opening, and that the Designer considers such interpretation to be of sufficient importance. Oral or telephone interpretations will not generally be made, and if made shall be strictly informal and not legally valid or binding.
 - B. Such written interpretations shall be in the form of Addenda to the Bid and Contract Documents.
 - C. Bidders are urged to communicate all errors and discrepancies found in the Bid and Contract Documents to the Designer. Telephone calls pointing out any such errors or discrepancies will be taken by the Designer, but only for the purpose of receiving the information in order that it may be properly processed, and not for interpretation or clarification.

5. EXAMINATION OF BIDDING AND CONTRACT DOCUMENTS

- A. Each Bidder shall carefully examine the Bid and Contract Documents to obtain a thorough understanding of the work of his bid in addition to the work of related trades. In addition, each General Bidder shall personally visit the site to thoroughly acquaint himself/herself with the conditions as they exist hereon.
- B. Failure of any Bidder to thoroughly examine the Bid and Contract Documents or to visit and examine the site shall in no way relieve him/her of any obligation with respect to his/her bid or of any responsibility assigned to him under the Contract.

6. PRE-BID CONFERENCE

- A. Pre-bid conference will be held at the location and time stipulated in the Invitation to Bid.

7. MODIFICATION AND WITHDRAWAL OF BIDS

- A. Modification of withdrawal of Bids will be permitted after the submission of such bids provided clearly written, readily understandable instructions for same are received by the Owner in writing prior to the time established for opening of such bids. No Bid may be withdrawn after that time, except as otherwise provided herein or by law.

8. ADDENDA

- A. Addenda may be required during the bidding period to modify, clarify or interpret the Bid and Contract Documents. It is intended, but not guaranteed, that such Addenda shall be mailed by the Owner to all persons or parties to whom Bid and Contract Documents have been issued (Bidders of Record). Failure to receive such Addenda shall in no way relieve any bidder from the execution of its provisions. All bidders are cautioned to verify the number of Addenda which have been issued and to secure any needed copies from the Designer before submitting a Bid.

9. FORM FOR BIDS

- A. The Owner will make available, to every person applying therefor, a Bid Form. Each bona fide Bidder will be furnished forms for his proposal upon request. Such forms will be made available at the Owner's office during the regular office hours throughout the bidding period. Bids must be submitted on the forms provided by Owner or of forms included in the bid documents of the Project Manual.

- B. All blank spaces provided on the bid forms shall be filled in with ink or typewriter. Where space is provided, sums shall be expressed in both words and figures. In case of a discrepancy between the two, the written words shall govern.
- C. No interlineations, additions, alterations or erasures shall be made on the forms.

10. ALTERNATES

- A. Each Bidder shall bid on alternatives listed. In the event that any alternate does not involve a change in the amount of the Bid, the Bidder shall so indicate by using the words "No Change" in the space provided for that alternate.
- B. General Bidders shall enter on the form for General Bid a single amount for each alternate, each amount to consist of the total of all the subbidders' amounts for the given alternate plus the amount of for work of the alternate to be performed by the General Contractor.
- C. If alternate(s) are accepted, they shall be accepted in the order listed. The low bidder will be determined on the basis of the sum of the Base Bid and the alternates accepted.

11. SUBMISSION OF BIDS

- A. The Bid Form shall be properly executed and enclosed with the required bid deposit in a sealed envelope plainly marked on the outside with the following information.

Bid For:

SUBMITTED
BY:

(Name of Bidder)

(Address of Bidder)

- B. If Bids are mailed; the above required envelope shall be enclosed in a second envelope identified with the above markings and mailed to the place of bid opening, as described in the Invitation to Bid. Mailed Bids must be received before the time scheduled for opening of Bids.

12. PERFORMANCE AND PAYMENT BONDS

- A. The Performance and Labor and Materials Payment Bonds required of the General Contractor shall each be in the amount of 100% of the contract sum from a surety company qualified to do business under the laws of the Commonwealth of Massachusetts and approved by the Owner.

13. FOREIGN CORPORATIONS

- A. The attention of bidders is called to General Laws, Chapter 30, Section 39L, as amended by Acts of 1967, Chapter 3, under which the Owner may not enter into a contract with a foreign corporation as a subcontractor unless the foreign corporation has filed with the Owner a certificate by the State Secretary stating that the foreign corporation has complied with General Laws Chapter 181, Sections 3 and 5 and stating the date of such compliance.

14. AWARD OF CONTRACT

- A. The Contract will be awarded to the lowest responsible and eligible bidder except in the event of a substitution as provided by under Chapter 149, Sections 44E and 44F of the above-reference General Laws.

15. COMMENCEMENT AND COMPLETION OF WORK

- A. The successful bidder, upon completion of the Contract Agreement, shall commence the work of the Contract within seven (7) calendar days from receipt of written Notice to Proceed issued by the Owner within fourteen (14) calendar days after said execution of the Contract Agreement, and shall therefore diligently and continuously carry on the work in such manner as to substantially complete the work on or before September 30, 2016 except as noted herein.

16. LIQUIDATED DAMAGES

- A. The attention of bidders is particularly called to the requirements as to the conditions of employment to be observed, the minimum wage rates to be paid under the Contract and affirmative action to ensure equal employment opportunity.
- B. Contractor shall make full good faith efforts to secure at least ten percent (10%) of the Labor and Materials incorporated in the Work from Minority Business Enterprises and five percent (5%) of the Labor and Materials incorporated in the Work from Women Business Enterprises certified by the Commonwealth of Massachusetts and consistent with the Federal Equal Employment Opportunity requirements attached hereto as Attachment A. Satisfactory documentation of such effort shall be furnished promptly upon request by Owner.

C. The Owner is an equal employment opportunity employer and has an active Affirmative Action Plan (AAP). For more information, direct correspondence to Patricia M. Libby, Affirmative Action Officer for the Town of Arlington.

BID FORM

For: Robbins Farm Field Renovations and Upgrades (Bid #17-27)

Proposal (BID) of _____
(hereinafter called "Bidder") a corporation, organized and existing under the laws of
the Commonwealth of Massachusetts.

_____ doing business as _____
(corporation, proprietorship, partnership)

to the TOWN OF ARLINGTON hereinafter called "Owner". Gentlemen:

- A. The Bidder, in compliance with your invitation for bids for the Robbins Farm Field Renovations and Upgrades, Arlington Massachusetts, having examined the plan and specifications with related documents and the site of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials and supplies, and to construct the project in accordance with the Contract Documents, within the time set forth therein, and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the Contract Documents, of which this proposal is a part.

Bidder hereby agrees to commence work under this Contract on or before a date to be specified in the written "Notice to Proceed" from the Owner, and to complete the work by November 1, 2017. The Bidder further agrees to pay as liquidated damages, the sum of \$100.00 for each consecutive calendar day thereafter that the works remains incomplete, as provided in the Instruction to Bidders, Modifications to General Conditions. Required completion dates are as follows:

- B. Bidder acknowledges receipt of the following addendum:

_____ Dated _____
_____ Dated _____
_____ Dated _____

- C. Bidder agrees to perform all work described in the specifications and shown on the drawings, for the following lump sum price of:

- 1. Total Proposed Base Bid Contract Price:

_____ Dollars (\$ _____)

- 2. Bid Deposit on total bid price, including alternates, in the sum of:

_____ Dollars (\$ _____) in

the form of _____ is submitted herewith in accordance with the INSTRUCTION FOR BIDDERS and is to become property of the Owner in

the event the Contract and bonds are not executed within the time above set forth, as liquidated damages for the delay and additional expense to the Owner caused thereby.

- 3. The Bid does not include premiums on Performance/Labor and Materials Bond. Cost of required Bond Premiums (for base bid and any and all alternates):

Bid Premiums Add \$ _____

- 4. Alternates
This bid includes Alternates as follows:

ADD Alternate No. 1: _____ dollars
and _____ cents \$ { _____ }.

- 5. The Supplemental Unit Prices set forth herein shall be used to determine any equitable adjustment of the Contract in connection with the changes or extra work performed under this Contract as directed by the **Town of Arlington**.

It is mutually understood and agreed that such Supplemental Unit Prices include all items of costs, equipment, taxes and insurance of every kind, overhead, and profit for the **Contractor** and they shall be used uniformly, without modification for addition and deductions. Prices listed under ADDITIONS and DEDUCTIONS are to be the complete total price billed to and paid by the **Town of Arlington** therefor. There can be no more than fifteen (15) percent difference in price between the additions and deductions.

SUPPLEMENTAL UNIT PRICES FORM

ITEM DESCRIPTION	UNIT	ADDITIONS	Owner Approval
1. Loam Borrow	CY		
2. Seeding (15#/1000SF)	3,000 SF		
3. Aggregate base installed, excluding excavation	CY		
4. Bituminous concrete pavement	SY		
5. CIP concrete pavement	CY		
6. Furnish and install new bench with back	EA		
7. Bituminous concrete removal, full depth	SY		
8. Demolish existing drainage structure	EA		
9. Install new drainage structure	EA		
10. Demolish existing drainage lines	LF		
11. Install new drainage lines	LF		

- D. If the Bid is accepted by the Owner, the undersigned agrees to complete the entire work provided to be done under the contract within the time stipulated by the Owner.

- E. The undersigned agrees that for extra work, if any, performed in accordance with the AGREEMENT, he will accept compensation as stipulated therein in full payment for such extra work.
- F. Bidder understands that the Owner reserves the right to reject any and all bids.
- G. The undersigned hereby agrees that he will not withdraw the Bid within sixty (60) consecutive calendar days after the actual date of the opening of Bids and that, if the Owner accepts this Bid, the undersigned will duly execute and acknowledge the required Contract Bonds within 10 days after notification that the AGREEMENT is ready for signature.
- H. Should the undersigned fail to fulfill any of his agreements as here in before set forth, the Owner shall have the right to retain as liquidated damages the amount of the Bid security, which shall become the Owner/s property. If a bid was furnished as bid security, it is agreed that the amount thereof shall be paid as liquidated damages to the Owner by the Surety.
- I. The Undersigned certifies under penalty of perjury that this Bid is in all respect bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the "person" shall men natural person, joint venture, partnership, corporation or other business or legal entity.
- J. The undersigned certifies that he is able to furnish labor that can work in harmony with all with all laws and regulations applicable to awards made subject forty-four A.
1. Have been in business under the present name for ____ years.
 2. Ever failed to complete any work awarded? _____(Yes), _____(No). If yes, explain: _____
 3. Bank Reference: _____

K. The Bidder is required to state below all work he/she and his/her subcontractors (if subcontractors are to perform substantial portions of the work) has compete within the past 5 years of a similar character and value to that of the work included in the proposed Contract and to give references that will enable the Owners to judge the Bidder's experience, skill and business standing. The Bidder is required to list a minimum of 3 completed projects that are comparable in scope, complexity and value. For each project, include the name, location, type, date complete, construction value and owner contact.

(add supplementary page if necessary)

L. The Bidder is required to state below all construction projects he/she currently has under contract. For each project, include the name, location, type, scheduled completion date, construction value and owner contact.

M. The undersigned bidder hereby certifies that the tools and equipment required to meet the specified requirements of the Contract document, with special attention called to Section 02300 Earthwork, will be utilized in the performance of the work.

N. The undersigned further certifies under the penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth of Massachusetts under the provisions of section 29F, or any other applicable debarment

provisions of any other chapter of the General Laws or any rule or regulation declared there under.

- O. The undersigned bidder hereby certifies he/she will comply with the minority workforce percentage ratio and specific affirmative action steps contained in the EEO/AA provisions of the Contract, including compliance with Minority/Women Business Enterprise as required under these contract provisions. The contractor receiving the award of the Contract shall be required to obtain from each of its subcontractors a copy of its bidder's certification and submit it to the contracting agency prior to the award of such subcontract, regardless of tier, that it will comply with the minority workforce ratio and specific affirmative action steps contained in these EEO/AA contract provisions.

Date: _____

Name of General Bidder

By:

Name and Title of Person Signing Bond

Business Address

FORM A

CERTIFICATE OF NON-COLLUSION

The undersigned certifies under 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 section the word 'person' shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.

Authorized Name

Authorized Signature

Date

Social Security Number or Federal Identification Number

Legal Name of Business Entity (Print or

Type) Address

City, State, Zip Code

Corporate Seal (If applicable)

FORM B

CERTIFICATE OF FOREIGN CORPORATION

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

Jurisdiction

The undersigned further certifies that it complies with the requirements of M.G.L, c. 30, sec. 39L and with the requirements of M.G.L, c. 181 relative to the registration and operation of foreign corporations within the Commonwealth of Massachusetts.

Name of Person Signing the Bid or Proposal

Date

Signature of Person Signing the Bid or Proposal

Date

Name of Business (Print or Type)

Corporate Seal (If applicable)

FORM C

COMMONWEALTH OF MASSACHUSETTS

SCHEDULE FOR PARTICIPATION BY WOMEN/MINORITY BUSINESS

ENTERPRISE BIDDER CERTIFICATION

A bidder agrees to expend at least the amount of the contract set forth below if awarded, for W/MNE. For the purposes of this commitment, the designation means a business that has been certified by SOMWBA as such. The Bidder must indicate the W/MBE it intends to utilize in this document as follows: (Attach another sheet of necessary.)

Company Name and Address	Nature of Participant	Dollar Value of Participation
<hr/>		
1.		\$ _____
2.		\$ _____
3.		\$ _____

The undersigned hereby certifies that he or she read the terms of this condition and is authorized to bind the Bidder to the commitment herein set forth.

Name of Person Signing the Bid or Proposal

Signature of Person Signing the Bid or Proposal

_____ Title

Name of Business (Print or Type)

Corporate Seal (If applicable)

FORM D

BIDDER CERTIFICATION REGARDING PAYMENT OF PREVAILING WAGES

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

Date

Name of Person Signing the Bid or Proposal

Signature of Person Signing the Bid or Proposal Title

Name of Business (Print or Type)

Corporate Seal (If applicable)

FORM E

CERTIFICATION OF PAYMENT OF STATE TAXES

Legislation enacted by the Commonwealth of Massachusetts, effective, 1983, requires that attestation below be signed:

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

APPROVAL OF A CONTRACT OR ANY OTHER AGREEMENT WILL NOT BE GRANTED UNLESS THIS CERTIFCATION CLAUSE IS SIGNED BY AN AUTHORIZED CORPROATE OFFICER.

THE TAX PAYER IDENTIFICATION NUMBER WILL BE FURNISHED TO THE MASSACHUSETIS DPEARTMENT OF REVENUE TO DETERMINE IF TAX FILINGS AND/OR TAX PAYMENT OBLIGATIONS HAVE BEEN MET. PROVIDERS WHO FAIL TO CORRECT THIER NON-FILING AND/OR DELIQUENCY STATUS SHALL NOT HAVE A CONTRACT OR ANY OTHER AGREEMENT ISSUED, RENEWED OR EXTENDED

(Signature of Individual) Title

Social Security Number or Federal Identification Number

Corporate Name

Name of Person Signing the Proposal (Print or Type) Date

Legal Name of Business Entity (Print or

Type) Business Address

Corporate Seal (If applicable)

FORM F

CERTIFICATION OF AUTHORITY MEETING OF BOARD OF DIRECTORS

(Note: if business entity is a partnership or individual, all owners shall sign this form.)

At a meeting of the Directors of the _____ duly called and held at

(Corporation
)

_____ on the _____ day of _____, 20 _____,
(Location)

at which a quorum was present and acting, it was voted that _____, the
(Name)

_____ of this Corporation, is hereby authorized and empowered to
make, (Title/Position)

into, sign, seal and deliver on behalf of the Corporation a Contract for _____

with the _____, and the performance and
payment bonds each in the amount as specified by the Owner.

I hereby certify that the above is a true and correct copy of the record, that said vote
has not been amended or repealed and is in full force, and effect as of this date and
that

_____ is duly elected _____ of the corporation
(Name) (Title/Position)

Clerk or secretary of the Corporation

Date

(Note: If the Bidder is a corporation, affix corporate seal and give below the names of its
president, treasurer, and general manager, if any; if a partnership, give full names and
residential addresses of all partners; and if an individual, give residential address if different
from business address.)

the required names and addresses of all person interested in this proposal, as
Principals, are as follows:

**CONTRACT FOR ROBBINS FARM FIELD RENOVATIONS AND
UPGRADES AGREEMENT**

THIS AGREEMENT, made as of this _____ day of _____, 20____, by and between the TOWN OF ARLINGTON, MASSACHUSETTS, acting through its TOWN

MANAGER, hereinafter called the 'Owner' and _____,,
of _____, country of _____ and
State of _____, hereinafter called the 'Contractor'.

WITNESSETH; That the Contractor and the Owner for the consideration hereinafter named agrees as follow:

1. SCOPE: The Contractor will furnish at his own proper cost and expense all materials, supplies, machinery, equipment, appliances, tools, superintendence, labor, insurance and other items and services necessary to complete the work as shown and described on the Contract Documents entitled "Robbins Farm Field Renovations and Upgrades", Arlington, Massachusetts, hereinafter called the 'Project', prepared by Weston & Sampson, Inc. hereinafter called the 'Designer', or 'Landscape Architect'.
2. CONTRACT SUM: The owner agrees to pay the contractor, and the contractor agrees to accept in full consideration for the performance of the contract, subject to additions and deductions provided for in the contract documents, in current funds, the sum of dollars (\$), hereinafter called the 'Contract Sum' and to make payments on account thereof, as described below and elsewhere in the Contract Documents.
3. COMMENCEMENT OF WORK AND TIME OF COMPLETION: The contractor agrees to commence work on the contract within seven (7) calendar days from the receipt of written Notice to Proceed issued by the Owner and/or within fourteen (14) calendar days after execution of the contract Agreement and to thereafter diligently and continuously carry on the work. He agrees to complete the work on or before Friday, September 30, 2016, except as herein noted.
4. LIQUIDATED DAMAGES: The Contractor agrees to pay the Owner liquidated damages for failure to complete the Project in conformance with the time allowances as set forth above at the rate of \$100.00 per calendar day.
5. ALTERNATES: The following Alternates have been accepted and the Contract Sum stated in Paragraph 2 of this Agreement includes and is adjusted to reflect the total cost of each accepted alternate:

Alternate No. Indicate Accepted or Rejected Original Bid Value of Alternate

ADD Alt. No. 1 _____ _____

6. PAYMENTS TO CONTRACTOR: Payments shall be made in accordance with Chapter 30, Section 39K of the General Laws of the Commonwealth of Massachusetts, including all current amendments, generally as follows:

A. Within fifteen days after receipt from the Contractor, at the place designated by the Owner if such a place is so designated, of a period estimate requesting payment of the amount due for the preceding month, the Owner will make a periodic payment to the Contractor for the work performed during the preceding month and for the - materials not incorporated in the work but delivered and suitably stored at the site (or at some location agreed upon in writing) to which the Contractor has title or to which pa subcontractor has title and has authorized to Contractor to transfer title to the Owner, less (1) a retention based on its estimate of the fair value of its claims against the Contractor and less (2) a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of Section 39F, and less (3) a retention not exceeding five percent of the approved amount of the periodic payment. After the receipt of a periodic estimate requesting final payment and within sixty-five days after (a) the Contractor fully completes the work or substantially completes the work so that the value of the work remaining to be done is, in the estimate of the Owner, less than one percent of the original contract price, or (b) the Contractor substantially completes the work and the Owner takes possession for occupancy, whichever occurs first, the Owner shall pay the Contractor the entire balance due on the Contract less (1) a retention based on its estimate of the fair value of its claim against the Contractor and of the cost of completing the incomplete and unsatisfactory items of work and less (2) a retention for direct payments to subcontractors based on the demands for same in accordance with the provisions of Section 39F, or based on the record of payments by the Contractor to the subcontractors under this contract if such record of payment indicates that the Contractor has not paid subcontractors as provided in Section 39F. If the Owner fails to make payment as herein provided, there shall be added to each such payment daily interest at the rate of five percent per annum commencing on the first day after said payment is due and continuing until the payment is delivered or mailed to the Contractor, provided, that no interest shall be due, in any event, on the amount due on a periodic estimate for Final Payment until fifteen days after receipt of such a periodic estimate from the Contractor, at the place designated by the Owner if such a place is so designated. The Contractor agrees to pay to each subcontractor a portion of any such interest paid in accordance with the amount due each subcontractor.

B. The Owner may make changes in any periodic estimate submitted by the Contractor and the payment due on said periodic estimate shall be computed in accordance with the changes so made, but such changes or any requirement for a corrected periodic estimate shall not affect the due date for the periodic

payment or the date for the commencement of interest charges on the amount of the periodic payment computed in accordance with the changes made, as provided herein; provided that the Owner may, within seven days after receipt, return to the Contractor for correction any periodic estimate which is not in the required form or which contains computations not arithmetically correct and, in that event, the date of receipt for such periodic estimate in proper form and with arithmetically correct computations. The date of receipt of a periodic estimate received on a Saturday shall be the first working day thereafter. The provisions of Section 39G shall not apply to any contract for the construction, reconstruction, remodeling, repair or demolition of any public building to which this section applies.

7. PAYMENTS TO SUBCONTRACTORS: Payments shall be made in accordance with Chapter 30, Section 39F of the General Laws of the Commonwealth of Massachusetts, including all current amendments, generally as follows:
- A. Forthwith after the General Contractor receives payment on account of a period estimate, the General Contractor shall pay to each Subcontractor the amount paid for the labor performed and the materials furnished 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 Owner as the estimated cost of completing the incomplete and unsatisfactory items of work, shall be due the Subcontractor, and the Owner shall pay that amount to the General Contractor. The General Contractor shall forthwith pay to the Subcontractor the full amount received from the Owner 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.
 - C. Each payment made by the Owner 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 that Subcontractor: and the Owner shall take reasonable steps to compel the General Contractor to make each payment to each such Subcontractor. If the Owner 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 for payment to the Subcontractor as provided in subparagraphs (A) and (B), the Owner shall act upon 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 Owner as the estimated cost of completing the incomplete and unsatisfactory items of work, the Subcontractor may demand direct payment of that balance from the Owner. The demand shall be by a sworn statement delivered to or sent by certified mail to the Owner, 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 completion of the Subcontract work. Any demand made after Substantial Completion of the Subcontract work shall be valid even if delivered or mailed prior to the seventieth day after the Subcontractor has substantially completed the Subcontract work. Within ten days after the Subcontractor has delivered or so mailed the demand to the Owner and delivered or so mailed a copy to the General Contractor, the General Contractor may reply to the demand. The reply shall be a sworn statement delivered to or sent by certified mail to the Owner 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 Owner, 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, less any amount (i) retained by the Owner as the estimated cost of completing the incomplete or unsatisfactory items of work, (ii) specified in any court proceedings barring such payment, or (iii) disputed by the General Contractor in the sworn reply; provided, that the Owner 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 in subparagraph (D); The Owner 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 Owner 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 Owner and agreed upon by the General Contractor and the Subcontractor and shall notify the General Contractor and the Subcontractor of the date of deposit and the bank receiving the deposit. The bank shall pay the amount on 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 later become payable to the General Contractor and in order of receipt of such demands from Subcontractors. All direct payments shall discharge the obligation of the Owner to the General Contractor to the extent of such payment.

- H. The Owner shall deduct from payments to a General Contractor amounts which, together with the 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.
- I. On all contracts for building construction subject to the provisions of Sections 44A to 44L, inclusive, of Chapter 149, periodic payments for work performed by a Subcontractor shall be made to the General Contractor for payment to the Subcontractor and shall be paid to the Subcontractor forthwith after receipt thereof by the General Contractor and without any ten day waiting period as provided above, less any amount claimed by the General Contractor in a letter containing a breakdown of the claim and sent to the Subcontractor with such payment, provided that a General Contractor, who has received a periodic estimate for a periodic payment in proper form from a Subcontractor three days, Saturdays, Sundays and holidays excluded, before the due date of the General Contractor's periodic estimate for the same periodic payment period less any amount claimed by the General Contractor in a letter containing a breakdown of the claim and sent to the Subcontractor with such payment, even though the General Contractor does not submit a periodic estimate to the Owner for that payment period; and provided, further, that the Owner shall take all reasonable steps to compel the General Contractor to make payment to the Subcontractors as provided in this paragraph, and upon the written request of a Subcontractor setting forth the amount payable but not paid, a copy of which shall be sent to the General Contractor, shall make direct payment to a Subcontractor, as provided for above, which shall discharge the obligation of the Owner to the General Contractor to extent of any such payment.
- J. The Owner shall not include in any direct payment to a Subcontractor pursuant to this section any amount claimed from that Subcontractor by the General Contractor in a letter containing a breakdown of the claim and sent to the Owner within ten days after the receipt by the General Contractor of the copy of the request of the Subcontractor to the Owner for direct payment.

8. CONDITIONS OF EMPLOYMENT

- A. The schedule of Minimum Wage Rates and Health and Pension Fund Contributions as determined by the Commissioner under the provisions

of the Massachusetts General Laws, Chapter 149, Sections 26 m 27D, inclusive, AS amended, is hereby made a part of this Agreement.

- B. The Contractor shall pay to any reserve police officer employed by him in any city or town the prevailing rate of wages paid to regular police officers in such city or town.
- C. No laborer, workman, mechanic, foreman or inspector working within the Commonwealth, in the employ of the Contractor, Subcontractor or any other person doing or contracting to do the whole or a part of the work contemplated by the Contract, shall be required or permitted to work more than eight hours in any one day or forty-eight hours in any one week, or more than six days in any one week, except in cases of emergency.
- D. Every employee of the Contractor or any Subcontractor shall lodge, board and trade where and with whom he elects; and no person or his agents or employees shall be directly or indirectly required, as a condition of employment that the employee to lodge, board or trade at a particular place or with a particular person.

9. SUBCONTRACTORS

- A. The Contractor will employ the following Subcontractors on the work and will pay for the execution of his as defined in the Contract Documents; and subject to the additions and deductions provided in the subject to the additions and deductions provided in the Contract Documents, the sum shown opposite his name.

<u>Class Of Work</u>	<u>Subcontractor</u>	<u>Subcontractor Sum</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

- B. The names of any additional Subcontractors whom the Contractor proposed to employ shall be submitted to the Designer for approval. No such Subcontractor shall be employed to whose standing or ability the Owner or the Designer has any reasonable objection.
10. **THE CONTRACT DOCUMENTS:** The General Conditions of the Contract, the Specifications and the Drawings, together with this Agreement, for the Contract, and they are as fully a part of the Contract as if hereto attached or herein repeated Drawings and Specifications titled: Robbins Farm Field Renovations and Upgrades
11. **INCORPORATION OF STATUTES BY REFERENCE:** If statutes of the Commonwealth of Massachusetts in any way relating to the construction, alterations, repair and installation of public works, particularly with reference to labor and labor rates, they shall be strictly complied with by the Contractor and it is understood that all such statutes are incorporated by reference in this Contract.

12. It is expressly agreed that this Agreement is to be executed for and in behalf of the Owner by the members of its Board of Selectmen and any of its appoints and that such persons are acting in a representative capacity for and in behalf of Owner, and that such persons shall not incur any personal liability hereunder.

IN WITNESS whereof, inhabitants of the Town of Arlington and

have caused these presents to be executed by their

hereunto duly authorized the day and year first written.

TOWN OF ARLINGTON

Adam W. Chapdelaine, Town Manager

Certification:
I hereby Certify that an
appropriation in the amount
of the Contract is available.

Town Accountant

Contractor

By: (Title)

Approved as to Matter of Form:

Town Counsel

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PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That we

(Name of Contractor)

a _____
(Corporation, Partnership or Individual)

hereinafter called "Principal" and

(Surety)
of _____, State of _____, hereinafter called the
"Surety", are held and firmly bound into

THE TOWN OF ARLINGTON, MASSACHUSETTS
(Owner)

acting through its TOWN MANAGER

ARLINGTON, MASSACHUSETTS
(City and State)

hereinafter called "Owner", in the penal sum of
_____ Dollars (\$ _____) in lawful
money of the United states, for the payment of which sum well and truly to be made,
we bind ourselves, our heirs, executors, administrators and successors, jointly and
severally, firmly
by these presents.

THE CONDITION OF THIS OBLIGATION is such that Whereas, the Principal
entered into a certain contract with the Owner, dated _____ day of
a copy of which is hereto attached and made a part hereof for the construction of

Arlington, Massachusetts

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its
duties, all the undertakings, covenants, terms, conditions, and agreements of said
contract during the original term thereof, and any extensions thereof which may be
granted by, the Owner, with or without notice to the Surety, and if he shall satisfy all
claims and demands incurred under such contract, and shall fully indemnify and save
harmless the Owner from all costs and damages which it may suffer by reason of
failure to do so, and shall reimburse and repay

the Owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the specifications accompanying the same

shall in any way affect its obligation of this, Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

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

IN WITNESS WHEREOF, the parties to these present have duly executed in this Bond on the day of _____

ATTEST:

Principal

By _____
Secretary

(Address - zip code)

Witness as to Principal

(Seal)

(Address - zip code)

ATTEST:

Surety

BY _____
(Surety)

Secretary

(Address-Zip Code)

Witness as to Surety

(Seal)

(Address-Zip Code)

NOTE: Date of Bond must not be prior to date of Contract. If Contractor is a Partnership, all partners should execute Bond.

END OF DOCUMENT

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LABOR AND MATERIALS PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That we

(Name of Contractor)

a _____
(Corporation, Partnership of Individual)
hereinafter called "Principal" and

(Surety)

of _____, State of _____, hereinafter called the
"Surety", are held and firmly bound into

TOWN OF ARLINGTON, MASSACHUSETTS
(Owner)
acting through its TOWN MANAGER

ARLINGTON, MASSACHUSETTS
(City and State)

herein called "Owner", in the penal sum of

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

THE CONDITION OF THIS OBLIGATION is such that 'Whereas, the Principal
entered into a certain contract with the Owner, dated the day of _____,
a copy of which is hereto attached and made a part hereof for the construction of:

ROBBINS FARM FIELD RENOVATIONS AND UPGRADES IN ARLINGTON
MASSACHUSETTS

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

used in connection with the construction of such work, and all insurance premiums on said work, and for all labor, performed in such work whether by subcontractor or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

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

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

IN WITNESS WHEREOF, the parties to these present have duly executed in this Bond on the day of _____,

ATTEST:

Principal

BY
Secretary

(Address - zip code)

Witness as to Principal

(Seal)

(Address - zip code)

ATTEST:

Surety

Secretary

(Address-Zip Code)

Witness as to Surety

(Seal)

(Address-Zip Code)

NOTE: Date of Bond must not be prior to date of Contract. If Contractor is a Partnership, all partners should execute Bond.

END OF DOCUMENT

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STANDARD
GENERAL CONDITIONS
OF THE
CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
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AMERICAN CONSULTING ENGINEERS COUNCIL

AMERICAN SOCIETY OF CIVIL ENGINEERS

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The Associated General

Contractors of America

Construction Specifications Institute

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GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Contract Documents and printed with initial or all capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof.

1. *Addenda*--Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the Contract Documents.

2. *Agreement*--The written instrument which is evidence of the agreement between OWNER and CONTRACTOR covering the Work.

3. *Application for Payment*--The form acceptable to ENGINEER which is to be used by CONTRACTOR during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*--Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*--The offer or proposal of a bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

7. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, Bid security form, if any, and the Bid form with any supplements.

8. *Bonds*--Performance and payment bonds and other instruments of security.

9. *Change Order*--A document recommended by ENGINEER which is signed by CONTRACTOR and OWNER and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the

Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*--A demand or assertion by OWNER or CONTRACTOR seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*--The entire and integrated written agreement between the OWNER and CONTRACTOR concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*--The Contract Documents establish the rights and obligations of the parties and include the Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders, and ENGINEER's written interpretations and clarifications issued on or after the Effective Date of the Agreement. Approved Shop Drawings and the reports and drawings of subsurface and physical conditions are not Contract Documents. Only printed or hard copies of the items listed in this paragraph are Contract Documents. Files in electronic media format of text, data, graphics, and the like that may be furnished by OWNER to CONTRACTOR are not Contract Documents.

13. *Contract Price*--The moneys payable by OWNER to CONTRACTOR for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*--The number of days or the dates stated in the Agreement to: (i) achieve Substantial Completion; and (ii) complete the Work so that it is ready for final payment as evidenced by ENGINEER's written recommendation of final payment.

15. *CONTRACTOR*--The individual or entity with whom OWNER has entered into the Agreement.

16. *Cost of the Work*--See paragraph 11.01.A for definition.

17. *Drawings*--That part of the Contract Documents prepared or approved by ENGINEER which graphically shows the scope, extent, and character of the Work to be performed by CONTRACTOR. Shop Drawings and other CONTRACTOR submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*--The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *ENGINEER*--The individual or entity named as such in the Agreement.

20. *ENGINEER's Consultant*--An individual or entity having a contract with ENGINEER to furnish services as ENGINEER's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.

21. *Field Order*--A written order issued by ENGINEER which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

22. *General Requirements*--Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

23. *Hazardous Environmental Condition*--The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

24. *Hazardous Waste*--The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

25. *Laws and Regulations; Laws or Regulations*--Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

26. *Liens*--Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

27. *Milestone*--A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

28. *Notice of Award*--The written notice by OWNER to the apparent successful bidder stating that upon timely compliance by the apparent successful bidder with the conditions precedent listed therein, OWNER will sign and deliver the Agreement.

29. *Notice to Proceed*--A written notice given by OWNER to CONTRACTOR fixing the date on which the Contract Times will commence to run and on which CONTRACTOR shall start to perform the Work under the Contract Documents.

30. *OWNER*--The individual, entity, public body, or authority with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be performed.

31. *Partial Utilization*--Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.

32. *PCBs*--Polychlorinated biphenyls.

33. *Petroleum*--Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

34. *Project*--The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part as may be indicated elsewhere in the Contract Documents.

35. *Project Manual*--The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

36. *Radioactive Material*--Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

37. *Resident Project Representative*--The authorized representative of ENGINEER who may be assigned to the Site or any part thereof.

38. *Samples*--Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

39. *Shop Drawings*--All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR to illustrate some portion of the Work.

40. *Site*--Lands or areas indicated in the Contract Documents as being furnished by OWNER upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by OWNER which are designated for the use of CONTRACTOR.

41. *Specifications*--That part of the Contract Documents consisting of written technical descriptions of materials, equipment, systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto.

42. *Subcontractor*--An individual or entity having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the Site.

43. *Substantial Completion*--The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of ENGINEER, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

44. *Supplementary Conditions*--That part of the Contract Documents which amends or supplements these General Conditions.

45. *Supplier*--A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with CONTRACTOR or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by CONTRACTOR or any Subcontractor.

46. *Underground Facilities*--All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

47. *Unit Price Work*--Work to be paid for on the basis of unit prices.

48. *Work*--The entire completed construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

49. *Work Change Directive*--A written statement to CONTRACTOR issued on or after the Effective Date of the Agreement and signed by OWNER and recommended by ENGINEER ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

50. *Written Amendment*--A written statement modifying the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the nonengineering or nontechnical rather than strictly construction-related aspects of the Contract Documents.

1.02 *Terminology*

A. *Intent of Certain Terms or Adjectives*

1. Whenever in the Contract Documents the terms “as allowed,” “as approved,” or terms of like effect or import are used, or the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of ENGINEER as to the Work, it is intended that such action or determination will be solely to evaluate, in general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to ENGINEER any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.10 or any other provision of the Contract Documents.

B. *Day*

1. The word “day” shall constitute a calendar day of 24 hours measured from midnight to the next midnight.

C. *Defective*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it does not conform to the Contract Documents or does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents, or has been damaged prior to ENGINEER’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by OWNER at Substantial Completion in accordance with paragraph 14.04 or 14.05).

D. *Furnish, Install, Perform, Provide*

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other

specified location) ready for use or installation and in usable or operable condition.

2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of CONTRACTOR, “provide” is implied.

E. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 - PRELIMINARY MATTERS

2.01 *Delivery of Bonds*

A. When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish.

2.02* *Copies of Documents*

A. OWNER shall furnish to CONTRACTOR up to ten copies of the Contract Documents. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times com-

mence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

A. CONTRACTOR shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

*See Supplementary Conditions

2.05* *Before Starting Construction*

A. *CONTRACTOR's Review of Contract Documents:* Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. CONTRACTOR shall promptly report in writing to ENGINEER any conflict, error, ambiguity, or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from ENGINEER before proceeding with any Work affected thereby; however, CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless CONTRACTOR knew or reasonably should have known thereof.

B. *Preliminary Schedules:* Within ten days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), CONTRACTOR shall submit to ENGINEER for its timely review:

1. a preliminary progress schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
2. a preliminary schedule of Shop Drawing and Sample submittals which will list each required submittal and the times for submitting, reviewing, and processing such submittal; and
3. a preliminary schedule of values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into

component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

* C. *Evidence of Insurance:* Before any Work at the Site is started, CONTRACTOR and OWNER shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which CONTRACTOR and OWNER respectively are required to purchase and maintain in accordance with Article 5.

2.06 *Preconstruction Conference*

A. Within 20 days after the Contract Times start to run, but before any Work at the Site is started, a conference attended by CONTRACTOR, ENGINEER, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in paragraph 2.05.B, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.07 *Initial Acceptance of Schedules*

A. Unless otherwise provided in the Contract Documents, at least ten days before submission of the first Application for Payment a conference attended by CONTRACTOR, ENGINEER, and others as appropriate will be held to review for acceptability to ENGINEER as provided below the schedules submitted in accordance with paragraph 2.05.B. CONTRACTOR shall have an additional ten days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to CONTRACTOR until acceptable schedules are submitted to ENGINEER.

1. The progress schedule will be acceptable to ENGINEER if it provides an orderly progression of the Work to completion within any specified Milestones and the Contract Times. Such acceptance will not impose on ENGINEER responsibility for the progress schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve CONTRACTOR from CONTRACTOR's full responsibility therefor.

2. CONTRACTOR's schedule of Shop Drawing and Sample submittals will be acceptable to ENGINEER if it provides a workable arrangement for reviewing and processing the required submittals.

3. CONTRACTOR's schedule of values will be acceptable to ENGINEER as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

*See Supplementary Conditions

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT,
AMENDING, REUSE

3.01* *Intent*

A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to OWNER.

C. Clarifications and interpretations of the Contract Documents shall be issued by ENGINEER as provided in Article 9.

3.02 *Reference Standards*

A. *Standards, Specifications, Codes, Laws, and Regulations*

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of OWNER, CONTRACTOR, or ENGINEER, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor shall any such provision or instruction be effective to assign to OWNER, ENGINEER, or any of ENGINEER's Consultants, agents, or employees any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. If, during the performance of the Work, CONTRACTOR discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, CONTRACTOR shall report it to ENGINEER in writing at once. CONTRACTOR shall not proceed with the Work affected thereby (except in an emergency as required by paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in paragraph 3.04; provided, however, that CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any such conflict, error, ambiguity, or discrepancy unless CONTRACTOR knew or reasonably should have known thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

a. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one or

*See Supplementary Conditions

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways: (i) a Field Order; (ii) ENGINEER's approval of a Shop Drawing or Sample; or (iii) ENGINEER's written interpretation or clarification.

3.05 *Reuse of Documents*

A. CONTRACTOR and any Subcontractor or Supplier or other individual or entity performing or furnishing any of the Work under a direct or indirect contract with OWNER: (i) shall not have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of ENGINEER or ENGINEER's Consultant, including electronic media editions; and (ii) shall not reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of OWNER and ENGINEER and specific written verification or adaption by ENGINEER. This prohibition will survive final payment, completion, and acceptance of the Work, or termination or completion of the Contract. Nothing herein shall preclude CONTRACTOR from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. OWNER shall furnish the Site. OWNER shall notify CONTRACTOR of any encumbrances or

restrictions not of general application but specifically related to use of the Site with which CONTRACTOR must comply in performing the Work. OWNER will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If CONTRACTOR and OWNER are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in OWNER's furnishing the Site, CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

B. Upon reasonable written request, OWNER shall furnish CONTRACTOR with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and OWNER's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02* *Subsurface and Physical Conditions*

A.* *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that ENGINEER has used in preparing the Contract Documents; and

2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that ENGINEER has used in preparing the Contract Documents.

B. *Limited Reliance by CONTRACTOR on Technical Data Authorized:* CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER, or any of ENGINEER's Consultants with respect to:

1. the completeness of such reports and drawings for CONTRACTOR's purposes, includ-

ing, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any CONTRACTOR interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

*See Supplementary Conditions

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If CONTRACTOR believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which CONTRACTOR is entitled to rely as provided in paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents; then CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by paragraph 6.16.A), notify OWNER and ENGINEER in writing about such condition. CONTRACTOR shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *ENGINEER's Review:* After receipt of written notice as required by paragraph 4.03.A, ENGINEER will promptly review the pertinent condition, determine the

necessity of OWNER's obtaining additional exploration or tests with respect thereto, and advise OWNER in writing (with a copy to CONTRACTOR) of ENGINEER's findings and conclusions.

C. *Possible Price and Times Adjustments*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in CONTRACTOR's cost of, or time required for, performance of the Work; subject, however, to the following:

a. such condition must meet any one or more of the categories described in paragraph 4.03.A; and

b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of paragraphs 9.08 and 11.03.

2. CONTRACTOR shall not be entitled to any adjustment in the Contract Price or Contract Times if:

a. CONTRACTOR knew of the existence of such conditions at the time CONTRACTOR made a final commitment to OWNER in respect of Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for CONTRACTOR prior to CONTRACTOR's making such final commitment; or

c. CONTRACTOR failed to give the written notice within the time and as required by paragraph 4.03.A.

3. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be

made therefor as provided in paragraph 10.05. However, OWNER, ENGINEER, and ENGINEER's Consultants shall not be liable to CONTRACTOR for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by CONTRACTOR on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to OWNER or ENGINEER by the owners of such Underground Facilities, including OWNER, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. OWNER and ENGINEER shall not be responsible for the accuracy or completeness of any such information or data; and

2. the cost of all of the following will be included in the Contract Price, and CONTRACTOR shall have full responsibility for:

a. reviewing and checking all such information and data,

b. locating all Underground Facilities shown or indicated in the Contract Documents,

c. coordination of the Work with the owners of such Underground Facilities, including OWNER, during construction, and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or

performing any Work in connection therewith (except in an emergency as required by paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to OWNER and ENGINEER. ENGINEER will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility.

2. If ENGINEER concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price of Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that CONTRACTOR did not know of and could not reasonably have been expected to be aware of or to have anticipated. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, OWNER or CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

4.05* *Reference Points*

A. OWNER shall provide engineering surveys to establish reference points for construction which in ENGINEER's judgment are necessary to enable CONTRACTOR to proceed with the Work. CONTRACTOR shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of OWNER.

CONTRACTOR shall report to ENGINEER whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings*: Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the ENGINEER in the preparation of the Contract Documents.

B. *Limited Reliance by CONTRACTOR on Technical Data Authorized*: CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER or any of ENGINEER's Consultants with respect to:

1. the completeness of such reports and drawings for CONTRACTOR's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by CONTRACTOR and safety precautions and programs incident thereto; or

*See Supplementary Conditions

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any CONTRACTOR interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. CONTRACTOR shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. CONTRACTOR shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by CONTRACTOR, Subcontractors, Suppliers, or anyone else for whom CONTRACTOR is responsible.

D. If CONTRACTOR encounters a Hazardous Environmental Condition or if CONTRACTOR or anyone for whom CONTRACTOR is responsible creates a Hazardous Environmental Condition, CONTRACTOR shall immediately: (i) secure or otherwise isolate such condition;

(ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by paragraph 6.16); and (iii) notify OWNER and ENGINEER (and promptly thereafter confirm such notice in writing). OWNER shall promptly consult with ENGINEER concerning the necessity for OWNER to retain a qualified expert to evaluate such condition or take corrective action, if any.

E. CONTRACTOR shall not be required to resume Work in connection with such condition or in any affected area until after OWNER has obtained any required permits related thereto and delivered to CONTRACTOR written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If OWNER and CONTRACTOR cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by CONTRACTOR, either party may make a Claim therefor as provided in paragraph 10.05.

F. If after receipt of such written notice CONTRACTOR does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then OWNER may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If OWNER and CONTRACTOR cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in paragraph 10.05.

OWNER may have such deleted portion of the Work performed by OWNER's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, OWNER shall indemnify and hold harmless CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or

Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by CONTRACTOR or by anyone for whom CONTRACTOR is responsible. Nothing in this paragraph 4.06.E shall obligate OWNER to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by CONTRACTOR or by anyone for whom CONTRACTOR is responsible. Nothing in this paragraph 4.06.F shall obligate CONTRACTOR to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of paragraphs 4.02, 4.03, and 4.04 are not intended to apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

*See Supplementary Conditions

ARTICLE 5 - BONDS AND INSURANCE

5.01* *Performance, Payment, and Other Bonds*

A. CONTRACTOR shall furnish performance and payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all CONTRACTOR's obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due, except as provided otherwise by Laws or Regulations or by the Contract Documents. CONTRACTOR shall also furnish such other Bonds as are required by the Contract Documents.

B.* All Bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Compa-

nies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

C. If the surety on any Bond furnished by CONTRACTOR is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of paragraph 5.01.B, CONTRACTOR shall within 20 days thereafter substitute another Bond and surety, both of which shall comply with the requirements of paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All Bonds and insurance required by the Contract Documents to be purchased and maintained by OWNER or CONTRACTOR shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue Bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. CONTRACTOR shall deliver to OWNER, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by OWNER or any other additional insured) which CONTRACTOR is required to purchase and maintain. OWNER shall deliver to CONTRACTOR, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by CONTRACTOR or any other additional insured) which OWNER is required to purchase and maintain.

5.04* *CONTRACTOR's Liability Insurance*

A. CONTRACTOR shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from CONTRACTOR's performance of the Work and CONTRACTOR's other obligations under the Contract Documents, whether it is to be performed by CONTRACTOR, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to

perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
2. claims for damages because of bodily injury, occupational sickness or disease, or death of CONTRACTOR's employees;
3. claims for damages because of bodily injury, sickness or disease, or death of any person other than CONTRACTOR's employees;
4. claims for damages insured by reasonably available personal injury liability coverage which are sustained: (i) by any person as a result of an offense directly or indirectly related to the employment of such person by CONTRACTOR, or (ii) by any other person for any other reason;
5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance so required by this paragraph 5.04 to be purchased and maintained shall:

*See Supplementary Conditions

1. with respect to insurance required by paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insureds (subject to any customary exclusion in respect of professional liability) OWNER, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include completed operations insurance;

4. include contractual liability insurance covering CONTRACTOR's indemnity obligations under paragraphs 6.07, 6.11, and 6.20;

5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least thirty days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the CONTRACTOR pursuant to paragraph 5.03 will so provide);

6. remain in effect at least until final payment and at all times thereafter when CONTRACTOR may be correcting, removing, or replacing defective Work in accordance with paragraph 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment (and CONTRACTOR shall furnish OWNER and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to OWNER and any such additional insured of continuation of such insurance at final payment and one year thereafter).

5.05 *OWNER's Liability Insurance*

A.* In addition to the insurance required to be provided by CONTRACTOR under paragraph 5.04, OWNER, at OWNER's option, may purchase and maintain at OWNER's expense OWNER's own liability insurance as will protect OWNER against claims which may arise from operations under the Contract Documents.

5.06* *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, OWNER shall purchase and maintain property

insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

*See Supplementary Conditions

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by OWNER prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by ENGINEER;

5. allow for partial utilization of the Work by OWNER;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by OWNER, CONTRACTOR, and ENGINEER with

30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

B.* OWNER shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

C.* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with paragraph 5.07.

D.* OWNER shall not be responsible for purchasing and maintaining any property insurance specified in this paragraph 5.06 to protect the interests of CONTRACTOR, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by CONTRACTOR, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

E.* If CONTRACTOR requests in writing that other special insurance be included in the property insurance policies provided under paragraph 5.06, OWNER shall, if possible, include such insurance, and the cost thereof will be charged to CONTRACTOR by appropriate Change Order or Written Amendment. Prior to commencement of the Work at the Site, OWNER shall in writing advise CONTRACTOR whether or not such other insurance has been procured by OWNER.

5.07 Waiver of Rights

A.* OWNER and CONTRACTOR intend that all policies purchased in accordance with paragraph 5.06 will protect OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and all other

individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. OWNER and CONTRACTOR waive all rights against each other and their respective officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) under such policies for losses and damages so caused.

None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by OWNER as trustee or otherwise payable under any policy so issued.

B. OWNER waives all rights against CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them for:

*See Supplementary Conditions

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to OWNER's property or the Work caused by, arising out of, or resulting from fire or other peril whether or not insured by OWNER; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by OWNER during partial utilization pursuant to

paragraph 14.05, after Substantial Completion pursuant to paragraph 14.04, or after final payment pursuant to paragraph 14.07.

C. Any insurance policy maintained by OWNER covering any loss, damage or consequential loss referred to in paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against CONTRACTOR, Subcontractors, ENGINEER, or ENGINEER's Consultants and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them.

5.08* *Receipt and Application of Insurance Proceeds*

A.* Any insured loss under the policies of insurance required by paragraph 5.06 will be adjusted with OWNER and made payable to OWNER as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of paragraph 5.08.B. OWNER shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order or Written Amendment.

B.* OWNER as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to OWNER's exercise of this power. If such objection be made, OWNER as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, OWNER as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, OWNER as fiduciary shall give bond for the proper performance of such duties.

5.09* *Acceptance of Bonds and Insurance; Option to Replace*

A.* If either OWNER or CONTRACTOR has any objection to the coverage afforded by or other provisions of the Bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the

certificates (or other evidence requested) required by paragraph 2.05.C. OWNER and CONTRACTOR shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the Bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent Bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If OWNER finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. CONTRACTOR shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with

*See Supplementary Conditions

the Contract Documents. CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction, but CONTRACTOR shall not be responsible for the negligence of OWNER or ENGINEER in the design or specification of a specific means, method, technique, sequence, or procedure of

construction which is shown or indicated in and expressly required by the Contract Documents. CONTRACTOR shall be responsible to see that the completed Work complies accurately with the Contract Documents.

B. At all times during the progress of the Work, CONTRACTOR shall assign a competent resident superintendent thereto who shall not be replaced without written notice to OWNER and ENGINEER except under extraordinary circumstances. The superintendent will be CONTRACTOR's representative at the Site and shall have authority to act on behalf of CONTRACTOR. All communications given to or received from the superintendent shall be binding on CONTRACTOR.

6.02 *Labor; Working Hours*

A. CONTRACTOR shall provide competent, suitably qualified personnel to survey, lay out, and construct the

Work as required by the Contract Documents. CONTRACTOR shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, and CONTRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday, or any legal holiday without OWNER's written consent (which will not be unreasonably withheld) given after prior written notice to ENGINEER.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the General Requirements, CONTRACTOR shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for by the Specifications shall expressly

run to the benefit of OWNER. If required by ENGINEER, CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. CONTRACTOR shall adhere to the progress schedule established in accordance with paragraph 2.07 as it may be adjusted from time to time as provided below.

1. CONTRACTOR shall submit to ENGINEER for acceptance (to the extent indicated in paragraph 2.07) proposed adjustments in the progress schedule that will not result in changing the Contract Times (or Milestones). Such adjustments will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the progress schedule that will change the Contract Times (or Milestones) shall be submitted in accordance with the requirements of Article 12. Such adjustments may only be made by a Change Order or Written Amendment in accordance with Article 12.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to ENGINEER for review under the circumstances described below.

1. *"Or-Equal" Items:* If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be

considered by ENGINEER as an "or-equal" item, in which case review and approval of the proposed item may, in ENGINEER's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment ENGINEER determines that: (i) it is at least equal in quality, durability, appearance, strength, and design characteristics; (ii) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole, and;

b. CONTRACTOR certifies that: (i) there is no increase in cost to the OWNER; and (ii) it will conform substantially, even with deviations, to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items*

a. If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR does not qualify as an "or-equal" item under paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. CONTRACTOR shall submit sufficient information as provided below to allow ENGINEER to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by ENGINEER from anyone other than CONTRACTOR.

c. The procedure for review by ENGINEER will be as set forth in paragraph 6.05.A.2.d, as supplemented in the General Requirements and as ENGINEER may decide is appropriate under the circumstances.

d. CONTRACTOR shall first make written application to ENGINEER for review of a proposed substitute item of material or equipment that CONTRACTOR seeks to furnish or use. The application shall certify

that the proposed substitute item will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified, and be suited to the same use as that specified. The application will state the extent, if any, to which the use of the proposed substitute item will prejudice CONTRACTOR's achievement of Substantial Completion on time, whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) to adapt the design to the proposed substitute item and whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute item from that specified will be identified in the application, and available engineering, sales, maintenance, repair, and replacement services will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change, all of which will be considered by ENGINEER in evaluating the proposed substitute item. ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute item.

B. Substitute Construction Methods or Procedures:

If a specific means, method, technique, sequence, or procedure of construction is shown or indicated in and expressly required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by ENGINEER. CONTRACTOR shall submit sufficient information to allow ENGINEER, in ENGINEER's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by ENGINEER will be similar to that provided in subparagraph 6.05.A.2.

C. Engineer's Evaluation: ENGINEER will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs 6.05.A and 6.05.B. ENGINEER will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized until ENGINEER's review is complete, which will be evidenced by either a Change Order for a

substitute or an approved Shop Drawing for an "or equal." ENGINEER will advise CONTRACTOR in writing of any negative determination.

D. Special Guarantee: OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any substitute.

E. ENGINEER's Cost Reimbursement: ENGINEER will record time required by ENGINEER and ENGINEER's Consultants in evaluating substitute proposed or submitted by CONTRACTOR pursuant to paragraphs 6.05.A.2 and 6.05.B and in making changes in the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) occasioned thereby. Whether or not ENGINEER approves a substitute item so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's Consultants for evaluating each such proposed substitute.

F. CONTRACTOR's Expense: CONTRACTOR shall provide all data in support of any proposed substitute or "or-equal" at CONTRACTOR's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. CONTRACTOR shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to OWNER as indicated in paragraph 6.06.B), whether initially or as a replacement, against whom OWNER may have reasonable objection. CONTRACTOR shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom CONTRACTOR has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to OWNER in advance for acceptance by OWNER by a specified date prior to the Effective Date of the Agreement, and if CONTRACTOR has submitted a list thereof in accordance with the Supplementary Conditions, OWNER's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. CONTRACTOR shall submit an acceptable replacement

for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by OWNER of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of OWNER or ENGINEER to reject defective Work.

C. CONTRACTOR shall be fully responsible to OWNER and ENGINEER for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between OWNER or ENGINEER and any such Subcontractor, Supplier or other individual or entity, nor shall it create any obligation on the part of OWNER or ENGINEER to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. CONTRACTOR shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR.

E. CONTRACTOR shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with ENGINEER through CONTRACTOR.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control CONTRACTOR in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for CONTRACTOR by a Subcontractor or Supplier will be pursuant to an appropriate agreement between CONTRACTOR and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of OWNER and ENGINEER. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in paragraph 5.06, the agreement between the CONTRAC-

TOR and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against OWNER, CONTRACTOR, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, CONTRACTOR will obtain the same.

6.07 *Patent Fees and Royalties*

A. CONTRACTOR shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of OWNER or ENGINEER its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by OWNER in the Contract Documents. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees or agents, and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, CONTRACTOR shall obtain and pay for all construction permits and licenses. OWNER shall assist CONTRACTOR, when necessary, in obtaining such permits and licenses. CONTRACTOR shall pay all governmental charges and inspection fees necessary for

the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. CONTRACTOR shall pay all charges of utility owners for connections to the Work, and OWNER shall pay all charges of such utility owners for capital costs related thereto, such as plant investment fees.

6.09 *Laws and Regulations*

A. CONTRACTOR shall give all notices and comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither OWNER nor ENGINEER shall be responsible for monitoring CONTRACTOR's compliance with any Laws or Regulations.

B. If CONTRACTOR performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, CONTRACTOR shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve CONTRACTOR of CONTRACTOR's obligations under paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work may be the subject of an adjustment in Contract Price or Contract Times. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in paragraph 10.05.

6.10* *Taxes*

A. CONTRACTOR shall pay all sales, consumer, use, and other similar taxes required to be paid by CONTRACTOR in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11* *Use of Site and Other Areas*

A.* *Limitation on Use of Site and Other Areas*

1. CONTRACTOR shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations,

*See Supplementary Conditions

and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultant, and the officers, directors, partners, employees, agents, and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against OWNER, ENGINEER, or any other party indemnified hereunder to the extent caused by or based upon CONTRACTOR's performance of the Work.

B. *Removal of Debris During Performance of the Work:* During the progress of the Work CONTRACTOR shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning*: Prior to Substantial Completion of the Work CONTRACTOR shall clean the Site and make it ready for utilization by OWNER. At the completion of the Work CONTRACTOR shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures*: CONTRACTOR shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall CONTRACTOR subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

A. CONTRACTOR shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to ENGINEER for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to ENGINEER for OWNER.

6.13 *Safety and Protection*

A. CONTRACTOR shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;
2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. CONTRACTOR shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property. All damage, injury, or loss to any property referred to in paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of OWNER or ENGINEER or ENGINEER's Consultant, or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of CONTRACTOR or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them). CONTRACTOR's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and ENGINEER has issued a notice to OWNER and CONTRACTOR in accordance with paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. CONTRACTOR shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

A. CONTRACTOR shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, CONTRACTOR is obligated to act to prevent threatened damage, injury, or loss. CONTRACTOR shall give ENGINEER prompt written notice if CONTRACTOR believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If ENGINEER determines that a change in the Contract Documents is required because of the action taken by CONTRACTOR in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17* *Shop Drawings and Samples*

A.* CONTRACTOR shall submit Shop Drawings to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals. All submittals will be identified as ENGINEER may require and in the number of copies specified in the General Requirements. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show ENGINEER the services, materials, and equipment CONTRACTOR proposes to provide and to enable ENGINEER to review the information for the limited purposes required by paragraph 6.17.E.

B.* CONTRACTOR shall also submit six (6) Samples to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals. Each Sample will be identified clearly as to material, Supplier, pertinent data such as catalog numbers, and the use for which intended and otherwise as ENGINEER may require to enable ENGINEER to review the submittal for the limited purposes required by paragraph 6.17.E. The numbers of each Sample to be submitted will be as specified in the Specifications.

C. Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submittals acceptable to ENGINEER as required by paragraph 2.07, any related Work performed prior to ENGINEER's review and approval of the pertinent submittal will be at the sole expense and responsibility of CONTRACTOR.

D. *Submittal Procedures*

1. Before submitting each Shop Drawing or Sample, CONTRACTOR shall have determined and verified:

a. all field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

b. all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

c. all information relative to means, methods, techniques, sequences, and procedures of construction and safety precautions and programs incident thereto; and

d. CONTRACTOR shall also have reviewed and coordinated each Shop Drawing or

*See Supplementary Conditions

Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

2. Each submittal shall bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR's obligations under the Contract Documents with respect to CONTRACTOR's review and approval of that submittal.

3. At the time of each submittal, CONTRACTOR shall give ENGINEER specific written notice of such variations, if any, that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, such notice to be in a written communication separate from the submittal; and, in addition, shall cause a specific notation to be made on each Shop Drawing and Sample submitted to ENGINEER for review and approval of each such variation.

E. *ENGINEER's Review*

1. ENGINEER will timely review and approve Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample submittals acceptable to ENGINEER. ENGINEER's review and approval will be only to determine if the items covered by the submittals

will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. ENGINEER's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. ENGINEER's review and approval of Shop Drawings or Samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless CONTRACTOR has in writing called ENGINEER's attention to each such variation at the time of each submittal as required by paragraph 6.17.D.3 and ENGINEER has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample approval; nor will any approval by ENGINEER relieve CONTRACTOR from responsibility for complying with the requirements of paragraph 6.17.D.1.

F. *Resubmittal Procedures*

1. CONTRACTOR shall make corrections required by ENGINEER and shall return the required number of corrected copies of Shop Drawings and submit as required new Samples for review and approval. CONTRACTOR shall direct specific attention in writing to revisions other than the corrections called for by ENGINEER on previous submittals.

6.18 *Continuing the Work*

A. CONTRACTOR shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with OWNER. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by paragraph 15.04 or as OWNER and CONTRACTOR may otherwise agree in writing.

6.19 *CONTRACTOR's General Warranty and Guarantee*

A. CONTRACTOR warrants and guarantees to OWNER, ENGINEER, and ENGINEER's Consultants that all Work will be in accordance with the Contract Documents and will not be defective. CONTRACTOR's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than CONTRACTOR, Subcontractors, Suppliers, or any other individual or entity for whom CONTRACTOR is responsible; or
2. normal wear and tear under normal usage.

B. CONTRACTOR's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of CONTRACTOR's obligation to perform the Work in accordance with the Contract Documents:

1. observations by ENGINEER;
2. recommendation by ENGINEER or payment by OWNER of any progress or final payment;
3. the issuance of a certificate of Substantial Completion by ENGINEER or any payment related thereto by OWNER;
4. use or occupancy of the Work or any part thereof by OWNER;
5. any acceptance by OWNER or any failure to do so;
6. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by ENGINEER;
7. any inspection, test, or approval by others; or
8. any correction of defective Work by OWNER.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage:

1. is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom; and

2. is caused in whole or in part by any negligent act or omission of CONTRACTOR, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not caused in part by any negligence or omission of an individual or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such individual or entity.

B. In any and all claims against OWNER or ENGINEER or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of CONTRACTOR, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for CONTRACTOR or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of CONTRACTOR under paragraph 6.20.A shall not extend to the liability of ENGINEER and ENGINEER's Consultants or to the officers, directors, partners, employees, agents, and

other consultants and subcontractors of each and any of them arising out of:

1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

ARTICLE 7 - OTHER WORK

7.01 *Related Work at Site*

A. OWNER may perform other work related to the Project at the Site by OWNER's employees, or let other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to CONTRACTOR prior to starting any such other work; and

2. if OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in paragraph 10.05.

B. CONTRACTOR shall afford each other contractor who is a party to such a direct contract and each utility owner (and OWNER, if OWNER is performing the other work with OWNER's employees) proper and safe access to the Site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, CONTRACTOR shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. CONTRACTOR shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of ENGINEER and the others whose work will be affected. The duties and responsibilities of CONTRACTOR under this paragraph are for the benefit of

such utility owners and other contractors to the extent that there are comparable provisions for the benefit of CONTRACTOR in said direct contracts between OWNER and such utility owners and other contractors.

C. If the proper execution or results of any part of CONTRACTOR's Work depends upon work performed by others under this Article 7, CONTRACTOR shall inspect such other work and promptly report to ENGINEER in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of CONTRACTOR's Work. CONTRACTOR's failure to so report will constitute an acceptance of such other work as fit and proper for integration with CONTRACTOR's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

A. If OWNER intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
2. the specific matters to be covered by such authority and responsibility will be itemized; and
3. the extent of such authority and responsibilities will be provided.

B. Unless otherwise provided in the Supplementary Conditions, OWNER shall have sole authority and responsibility for such coordination.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, OWNER shall issue all communications to CONTRACTOR through ENGINEER.

8.02 *Replacement of ENGINEER*

A. In case of termination of the employment of ENGINEER, OWNER shall appoint an engineer to whom CONTRACTOR makes no reasonable objection, whose status under the Contract Documents shall be that of the former ENGINEER.

8.03 *Furnish Data*

A. OWNER shall promptly furnish the data required of OWNER under the Contract Documents.

8.04 *Pay Promptly When Due*

A. OWNER shall make payments to CONTRACTOR promptly when they are due as provided in paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. OWNER's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.01 and 4.05. Paragraph 4.02 refers to OWNER's identifying and making available to CONTRACTOR copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by ENGINEER in preparing the Contract Documents.

*See Supplementary Conditions

8.06* *Insurance*

A.* OWNER's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. OWNER is obligated to execute Change Orders as indicated in paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. OWNER's responsibility in respect to certain inspections, tests, and approvals is set forth in paragraph 13.03.B.

8.09 *Limitations on OWNER's Responsibilities*

A. The OWNER shall not supervise, direct, or have control or authority over, nor be responsible for, CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work. OWNER will not be responsible for CONTRACTOR's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. OWNER's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. If and to the extent OWNER has agreed to furnish CONTRACTOR reasonable evidence that financial arrangements have been made to satisfy OWNER's obligations under the Contract Documents, OWNER's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *OWNER'S Representative*

A. ENGINEER will be OWNER's representative during the construction period. The duties and responsibilities and the limitations of authority of ENGINEER as OWNER's representative during construction are set forth in the Contract Documents and will not be changed without written consent of OWNER and ENGINEER.

9.02 *Visits to Site*

A. ENGINEER will make visits to the Site at intervals appropriate to the various stages of construction as ENGINEER deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of CONTRACTOR's executed Work. Based on information obtained during such visits and

observations, ENGINEER, for the benefit of OWNER, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. ENGINEER will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. ENGINEER's efforts will be directed toward providing for OWNER a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, ENGINEER will keep OWNER informed of the progress of the Work and will endeavor to guard OWNER against defective Work.

B. ENGINEER's visits and observations are subject to all the limitations on ENGINEER's authority and responsibility set forth in paragraph 9.10, and particularly, but without limitation, during or as a result of ENGINEER's visits or observations of CONTRACTOR's Work ENGINEER will not supervise, direct, control, or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work.

9.03* *Project Representative*

A. If OWNER and ENGINEER agree, ENGINEER will furnish a Resident Project Representative to assist ENGINEER in providing more extensive observation of the Work. The responsibilities and authority and limitations thereon of any such Resident Project Representative and assistants will be as provided in paragraph 9.10 and in the Supplementary Conditions. If OWNER designates another representative or agent to represent OWNER at the Site who is not ENGINEER's Consultant, agent or employee,

*See Supplementary Conditions

the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Clarifications and Interpretations*

A. ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents as ENGINEER may determine necessary, which shall be consistent with the intent of and reasonably inferable from the Contract Docu-

ments. Such written clarifications and interpretations will be binding on OWNER and CONTRACTOR. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a written clarification or interpretation, a Claim may be made therefor as provided in paragraph 10.05.

9.05 *Authorized Variations in Work*

A. ENGINEER may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on OWNER and also on CONTRACTOR, who shall perform the Work involved promptly. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of a Field Order, a Claim may be made therefor as provided in paragraph 10.05.

9.06 *Rejecting Defective Work*

A. ENGINEER will have authority to disapprove or reject Work which ENGINEER believes to be defective, or that ENGINEER believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. ENGINEER will also have authority to require special inspection or testing of the Work as provided in paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.07 *Shop Drawings, Change Orders and Payments*

A. In connection with ENGINEER's authority as to Shop Drawings and Samples, see paragraph 6.17.

B. In connection with ENGINEER's authority as to Change Orders, see Articles 10, 11, and 12.

C. In connection with ENGINEER's authority as to Applications for Payment, see Article 14.

9.08 *Determinations for Unit Price Work*

A. ENGINEER will determine the actual quantities and classifications of Unit Price Work performed by CONTRACTOR. ENGINEER will review with CONTRACTOR the ENGINEER's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). ENGINEER's written decision thereon will be final and binding (except as modified by ENGINEER to reflect changed factual conditions or more accurate data) upon OWNER and CONTRACTOR, subject to the provisions of paragraph 10.05.

9.09 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes and other matters relating to the acceptability of the Work, the quantities and classifications of Unit Price Work, the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, and Claims seeking changes in the Contract Price or Contract Times will be referred initially to ENGINEER in writing, in accordance with the provisions of paragraph 10.05, with a request for a formal decision.

B. When functioning as interpreter and judge under this paragraph 9.09, ENGINEER will not show partiality to OWNER or CONTRACTOR and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by ENGINEER pursuant to this paragraph 9.09 with respect to any such Claim, dispute, or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.07) will be a condition precedent to any exercise by OWNER or CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such Claim, dispute, or other matter.

*See Supplementary Conditions

9.10 *Limitations on ENGINEER's Authority and Responsibilities*

A. Neither ENGINEER's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by ENGINEER in good faith either to exercise or not exercise such

authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by ENGINEER shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by ENGINEER to CONTRACTOR, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. ENGINEER will not supervise, direct, control, or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work. ENGINEER will not be responsible for CONTRACTOR's failure to perform the Work in accordance with the Contract Documents.

C. ENGINEER will not be responsible for the acts or omissions of CONTRACTOR or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. ENGINEER's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

E. The limitations upon authority and responsibility set forth in this paragraph 9.10 shall also apply to ENGINEER's Consultants, Resident Project Representative, and assistants. See Article 18.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Agreement and without notice to any surety, OWNER may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Written Amendment, a Change Order, or a Work Change Directive. Upon receipt of any such document, CONTRACTOR shall promptly proceed with the Work involved which will be performed under the

applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If OWNER and CONTRACTOR are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A. CONTRACTOR shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in paragraph 3.04, except in the case of an emergency as provided in paragraph 6.16 or in the case of uncovering Work as provided in paragraph 13.04.B.

10.03 *Execution of Change Orders*

A. OWNER and CONTRACTOR shall execute appropriate Change Orders recommended by ENGINEER (or Written Amendments) covering:

1. changes in the Work which are: (i) ordered by OWNER pursuant to paragraph 10.01.A, (ii) required because of acceptance of defective Work under paragraph 13.08.A or OWNER's correction of defective Work under paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by ENGINEER pursuant to paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, CONTRACTOR shall carry on the Work and adhere to the progress schedule as provided in paragraph 6.18.A.

10.04 *Notification to Surety*

A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be CONTRACTOR's responsibility. The amount of each applicable Bond will be adjusted to reflect the effect of any such change.

10.05 *Claims and Disputes*

A. *Notice:* Written notice stating the general nature of each Claim, dispute, or other matter shall be delivered by the claimant to ENGINEER and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. Notice of the amount or extent of the Claim, dispute, or other matter with supporting data shall be delivered to the ENGINEER and the other party to the Contract within 60 days after the start of such event (unless ENGINEER allows additional time for claimant to submit additional or more accurate data in support of such Claim, dispute, or other matter). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to ENGINEER and the claimant within 30 days after receipt of the claimant's last submittal (unless ENGINEER allows additional time).

B. *ENGINEER's Decision:* ENGINEER will render a formal decision in writing within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any. ENGINEER's written decision on such Claim, dispute, or other matter will be final and binding upon OWNER and CONTRACTOR unless:

1. an appeal from ENGINEER's decision is taken within the time limits and in accordance with the dispute resolution procedures set forth in Article 16; or

2. if no such dispute resolution procedures have been set forth in Article 16, a written notice of intention to appeal from ENGINEER's written decision is delivered by OWNER or CONTRACTOR to the other and to ENGINEER within 30 days

after the date of such decision, and a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction within 60 days after the date of such decision or within 60 days after Substantial Completion, whichever is later (unless otherwise agreed in writing by OWNER and CONTRACTOR), to exercise such rights or remedies as the appealing party may have with respect to such Claim, dispute, or other matter in accordance with applicable Laws and Regulations.

C. If ENGINEER does not render a formal decision in writing within the time stated in paragraph 10.05.B, a decision denying the Claim in its entirety shall be deemed to have been issued 31 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any.

D. No Claim for an adjustment in Contract Price or Contract Times (or Milestones) will be valid if not submitted in accordance with this paragraph 10.05.

ARTICLE 11 - COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to CONTRACTOR will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in paragraph 11.01.B.

1. Payroll costs for employees in the direct employ of CONTRACTOR in the performance of the Work under schedules of job classifications agreed upon by OWNER and CONTRACTOR. Such employees shall include without limitation superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work

shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by OWNER.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to CONTRACTOR unless OWNER deposits funds with CONTRACTOR with which to make payments, in which case the cash discounts shall accrue to OWNER. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to OWNER, and CONTRACTOR shall make provisions so that they may be obtained.

3. Payments made by CONTRACTOR to Subcontractors for Work performed by Subcontractors. If required by OWNER, CONTRACTOR shall obtain competitive bids from subcontractors acceptable to OWNER and CONTRACTOR and shall deliver such bids to OWNER, who will then determine, with the advice of ENGINEER, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as CONTRACTOR's Cost of the Work and fee as provided in this paragraph 11.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

a. The proportion of necessary transportation, travel, and subsistence expenses of

CONTRACTOR's employees incurred in discharge of duties connected with the Work.

b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of CONTRACTOR.

c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from CONTRACTOR or others in accordance with rental agreements approved by OWNER with the advice of ENGINEER, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which CONTRACTOR is liable, imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by CONTRACTOR in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of OWNER. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining CONTRACTOR's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expressage, and similar petty cash items in connection with the Work.

i. When the Cost of the Work is used to determine the value of a Change Order or of a Claim, the cost of premiums for additional Bonds and insurance required because of the changes in the Work or caused by the event giving rise to the Claim.

j. When all the Work is performed on the basis of cost-plus, the costs of premiums for all Bonds and insurance CONTRACTOR is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnerships and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by CONTRACTOR, whether at the Site or in CONTRACTOR's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 11.01.A.1 or specifically covered by paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the CONTRACTOR's fee.

2. Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR's office at the Site.

3. Any part of CONTRACTOR's capital expenses, including interest on CONTRACTOR's capital employed for the Work and charges against CONTRACTOR for delinquent payments.

4. Costs due to the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not

limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraphs 11.01.A and 11.01.B.

C. *CONTRACTOR's Fee:* When all the Work is performed on the basis of cost-plus, CONTRACTOR's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, CONTRACTOR's fee shall be determined as set forth in paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to paragraphs 11.01.A and 11.01.B, CONTRACTOR will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to ENGINEER an itemized cost breakdown together with supporting data.

11.02 *Cash Allowances*

A. It is understood that CONTRACTOR has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums as may be acceptable to OWNER and ENGINEER. CONTRACTOR agrees that:

1. the allowances include the cost to CONTRACTOR (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

2. CONTRACTOR's costs for unloading and handling on the Site, labor, installation costs, overhead, profit, and other expenses contemplated for the allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

B. Prior to final payment, an appropriate Change Order will be issued as recommended by ENGINEER to reflect actual amounts due CONTRACTOR on account of

Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by CONTRACTOR will be made by ENGINEER subject to the provisions of paragraph 9.08.

B. Each unit price will be deemed to include an amount considered by CONTRACTOR to be adequate to cover CONTRACTOR's overhead and profit for each separately identified item.

C. OWNER or CONTRACTOR may make a Claim for an adjustment in the Contract Price in accordance with paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by CONTRACTOR differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
2. there is no corresponding adjustment with respect any other item of Work; and
3. if CONTRACTOR believes that CONTRACTOR is entitled to an increase in Contract Price as a result of having incurred additional expense or OWNER believes that OWNER is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 - CHANGE OF CONTRACT PRICE;
CHANGE OF CONTRACT TIMES

12.01* *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the ENGINEER and the other party to the Contract in accordance with the provisions of paragraph 10.05.

B.* The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of paragraph 11.03); or
2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 12.01.C.2); or
3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in paragraph 11.01) plus a CONTRACTOR's fee for overhead and profit (determined as provided in paragraph 12.01.C).

C. *CONTRACTOR's Fee*: The CONTRACTOR's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or
2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under paragraphs 11.01.A.1 and 11.01.A.2, the CONTRACTOR's fee shall be 15 percent;

b. for costs incurred under paragraph 11.01.A.3, the CONTRACTOR's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and CONTRACTOR will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

*See Supplementary Conditions

d. no fee shall be payable on the basis of costs itemized under paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by CONTRACTOR to OWNER for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in CONTRACTOR's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in CONTRACTOR's fee shall be computed on the basis of the net change in accordance with paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times (or Milestones) may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Times (or Milestones) shall be based on written notice submitted by the party making the claim to the ENGINEER and the other party to the Contract in accordance with the provisions of paragraph 10.05.

B. Any adjustment of the Contract Times (or Milestones) covered by a Change Order or of any Claim for an adjustment in the Contract Times (or Milestones)

will be determined in accordance with the provisions of this Article 12.

12.03 *Delays Beyond CONTRACTOR's Control*

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of CONTRACTOR, the Contract Times (or Milestones) will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in paragraph 12.02.A. Delays beyond the control of CONTRACTOR shall include, but not be limited to, acts or neglect by OWNER, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

12.04 *Delays Within CONTRACTOR's Control*

A. The Contract Times (or Milestones) will not be extended due to delays within the control of CONTRACTOR. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of CONTRACTOR.

12.05 *Delays Beyond OWNER's and CONTRACTOR's Control*

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both OWNER and CONTRACTOR, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay shall be CONTRACTOR's sole and exclusive remedy for such delay.

12.06 *Delay Damages*

A. In no event shall OWNER or ENGINEER be liable to CONTRACTOR, any Subcontractor, any Supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from:

1. delays caused by or within the control of CONTRACTOR; or

2. delays beyond the control of both OWNER and CONTRACTOR including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God, or acts or neglect by utility

owners or other contractors performing other work as contemplated by Article 7.

B. Nothing in this paragraph 12.06 bars a change in Contract Price pursuant to this Article 12 to compensate CONTRACTOR due to delay, interference, or disruption directly attributable to actions or inactions of OWNER or anyone for whom OWNER is responsible.

ARTICLE 13 - TESTS AND INSPECTIONS;
CORRECTION, REMOVAL OR ACCEPTANCE OF
DEFECTIVE WORK

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which OWNER or ENGINEER has actual knowledge will be given to CONTRACTOR. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02* *Access to Work*

A. OWNER, ENGINEER, ENGINEER's Consultants, other representatives and personnel of OWNER, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. CONTRACTOR shall provide them proper and safe conditions for such access and advise them of CONTRACTOR's Site safety procedures and programs so that they may comply therewith as applicable.

13.03* *Tests and Inspections*

A. CONTRACTOR shall give ENGINEER timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B.* OWNER shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to paragraph 13.04.B shall be paid as provided in said paragraph 13.04.B; and

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, CONTRACTOR shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish ENGINEER the required certificates of inspection or approval.

D. CONTRACTOR shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for OWNER's and ENGINEER's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to CONTRACTOR's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to OWNER and ENGINEER.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by CONTRACTOR without written concurrence of ENGINEER, it must, if requested by ENGINEER, be uncovered for observation.

F. Uncovering Work as provided in paragraph 13.03.E shall be at CONTRACTOR's expense unless CONTRACTOR has given ENGINEER timely notice of CONTRACTOR's intention to cover the same and ENGINEER has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of ENGINEER, it must, if requested by ENGINEER, be uncovered for ENGINEER's observation and replaced at CONTRACTOR's expense.

B. If ENGINEER considers it necessary or advisable that covered Work be observed by ENGINEER or inspected or tested by others, CONTRACTOR, at ENGINEER's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as ENGINEER may require, that portion of the Work in

question, furnishing all necessary labor, material, and equipment. If it is found that such Work is defective, CONTRACTOR shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and OWNER shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, OWNER may make a Claim therefor as provided in paragraph 10.05. If, however, such Work is not found to be defective, CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Times (or Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

*See Supplementary Conditions

13.05 *OWNER May Stop the Work*

A. If the Work is defective, or CONTRACTOR fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, OWNER may order CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of OWNER to stop the Work shall not give rise to any duty on the part of OWNER to exercise this right for the benefit of CONTRACTOR, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

A. CONTRACTOR shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by ENGINEER, remove it from the Project and replace it with Work that is not defective. CONTRACTOR shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for CONTRACTOR's use by OWNER or permitted by Laws and Regulations as contemplated in paragraph 6.11.A is found to be defective, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions: (i) repair such defective land or areas, or (ii) correct such defective Work or, if the defective Work has been rejected by OWNER, remove it from the Project and replace it with Work that is not defective, and (iii) satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom. If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the defective Work corrected or repaired or may have the rejected Work removed and replaced, and all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by CONTRACTOR.

B. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications or by Written Amendment.

C. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

D. CONTRACTOR's obligations under this paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, OWNER (and, prior to ENGINEER's recommendation of final payment, ENGINEER) prefers to accept it, OWNER may do so. CONTRACTOR shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to OWNER's evaluation of and determination to accept such defective Work (such costs to be approved by ENGINEER as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by CONTRACTOR pursuant to this sentence. If any such acceptance occurs prior to ENGINEER's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and OWNER shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, OWNER may make a Claim therefor as provided in paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by CONTRACTOR to OWNER.

13.09 *OWNER May Correct Defective Work*

A. If CONTRACTOR fails within a reasonable time after written notice from ENGINEER to correct defective Work or to remove and replace rejected Work as required by ENGINEER in accordance with paragraph 13.06.A, or if CONTRACTOR fails to perform the Work in accordance with the Contract Documents, or if CONTRACTOR fails to comply with any other provision of the Contract Documents, OWNER may, after seven days written notice

to CONTRACTOR, correct and remedy any such deficiency.

B. In exercising the rights and remedies under this paragraph, OWNER shall proceed expeditiously. In connection with such corrective and remedial action, OWNER may exclude CONTRACTOR from all or part of the Site, take possession of all or part of the Work and suspend CONTRACTOR's services related thereto, take possession of CONTRACTOR's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which OWNER has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR shall allow OWNER, OWNER's representatives, agents and employees, OWNER's other contractors, and ENGINEER and ENGINEER's Consultants access to the Site to enable OWNER to exercise the rights and remedies under this paragraph.

C. All Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by OWNER in exercising the rights and remedies under this paragraph 13.09 will be charged against CONTRACTOR, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, OWNER may make a Claim therefor as provided in paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of CONTRACTOR's defective Work.

D. CONTRACTOR shall not be allowed an extension of the Contract Times (or Milestones) because of any delay in the performance of the Work attributable to the exercise by OWNER of OWNER's rights and remedies under this paragraph 13.09.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The schedule of values established as provided in paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to ENGINEER. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A.* *Applications for Payments*

1. At least 20 days before the date established for each progress payment (but not more often than once a month), CONTRACTOR shall submit to ENGINEER for review an Application for Payment filled out and signed by CONTRACTOR covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that OWNER has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect OWNER's interest therein, all of which must be satisfactory to OWNER.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of CONTRACTOR stating that all previous progress payments received on account of the Work have been applied on account to discharge CONTRACTOR's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to pro-gress payments will be as stipulated in the Agreement.

*See Supplementary Conditions

B. *Review of Applications*

1. ENGINEER will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to OWNER or return the Application to CONTRACTOR indicating in writing ENGINEER's reasons for refusing to recommend payment. In the latter case, CONTRACTOR may make the necessary corrections and resubmit the Application.

2. ENGINEER's recommendation of any payment requested in an Application for Payment will constitute a representation by ENGINEER to OWNER, based on ENGINEER's observations on the Site of the executed Work as an experienced and qualified design professional and on ENGINEER's review of the Application for Payment and the accompanying data and schedules, that to the best of ENGINEER's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under paragraph 9.08, and to any other qualifications stated in the recommendation); and

c. the conditions precedent to CONTRACTOR's being entitled to such payment appear to have been fulfilled in so far as it is ENGINEER's responsibility to observe the Work.

3. By recommending any such payment ENGINEER will not thereby be deemed to have represented that: (i) inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to ENGINEER in the Contract Documents; or (ii) that there may not be other matters or issues between the parties

that might entitle CONTRACTOR to be paid additionally by OWNER or entitle OWNER to withhold payment to CONTRACTOR.

4. Neither ENGINEER's review of CONTRACTOR's Work for the purposes of recommending payments nor ENGINEER's recommendation of any payment, including final payment, will impose responsibility on ENGINEER to supervise, direct, or control the Work or for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for CONTRACTOR's failure to comply with Laws and Regulations applicable to CONTRACTOR's performance of the Work. Additionally, said review or recommendation will not impose responsibility on ENGINEER to make any examination to ascertain how or for what purposes CONTRACTOR has used the moneys paid on account of the Contract Price, or to determine that title to any of the Work, materials, or equipment has passed to OWNER free and clear of any Liens.

5. ENGINEER may refuse to recommend the whole or any part of any payment if, in ENGINEER's opinion, it would be incorrect to make the representations to OWNER referred to in paragraph 14.02.B.2. ENGINEER may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in ENGINEER's opinion to protect OWNER from loss because:

- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
- b. the Contract Price has been reduced by Written Amendment or Change Orders;
- c. OWNER has been required to correct defective Work or complete Work in accordance with paragraph 13.09; or
- d. ENGINEER has actual knowledge of the occurrence of any of the events enumerated in paragraph 15.02.A.

C. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to OWNER with ENGINEER's recommendation, the amount recommended will (subject to the provisions of paragraph 14.02.D) become due, and when due will be paid by OWNER to CONTRACTOR.

D. *Reduction in Payment*

1. OWNER may refuse to make payment of the full amount recommended by ENGINEER because:

a. claims have been made against OWNER on account of CONTRACTOR's performance or furnishing of the Work;

b. Liens have been filed in connection with the Work, except where CONTRACTOR has delivered a specific Bond satisfactory to OWNER to secure the satisfaction and discharge of such Liens;

c. there are other items entitling OWNER to a set-off against the amount recommended; or

d. OWNER has actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.02.B.5.a through 14.02.B.5.c or paragraph 15.02.A.

2. If OWNER refuses to make payment of the full amount recommended by ENGINEER, OWNER must give CONTRACTOR immediate written notice (with a copy to ENGINEER) stating the reasons for such action and promptly pay CONTRACTOR any amount remaining after deduction of the amount so withheld. OWNER shall promptly pay CONTRACTOR the amount so withheld, or any adjustment thereto agreed to by OWNER and CONTRACTOR, when CONTRACTOR corrects to OWNER's satisfaction the reasons for such action.

3. If it is subsequently determined that OWNER's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by paragraph 14.02.C.1.

14.03 *CONTRACTOR's Warranty of Title*

A. CONTRACTOR warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to OWNER no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

A. When CONTRACTOR considers the entire Work ready for its intended use CONTRACTOR shall notify OWNER and ENGINEER in writing that the entire Work is substantially complete (except for items specifically listed by CONTRACTOR as incomplete) and request that ENGINEER issue a certificate of Substantial Completion. Promptly thereafter, OWNER, CONTRACTOR, and ENGINEER shall make an inspection of the Work to determine the status of completion. If ENGINEER does not consider the Work substantially complete, ENGINEER will notify CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers the Work substantially complete, ENGINEER will prepare and deliver to OWNER a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. OWNER shall have seven days after receipt of the tentative certificate during which to make written objection to ENGINEER as to any provisions of the certificate or attached list. If, after considering such objections, ENGINEER concludes that the Work is not substantially complete, ENGINEER will within 14 days after submission of the tentative certificate to OWNER notify CONTRACTOR in writing, stating the reasons therefor. If, after consideration of OWNER's objections, ENGINEER considers the Work substantially complete, ENGINEER will within said 14 days execute and deliver to OWNER and CONTRACTOR a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as ENGINEER believes justified after consideration of any objections from OWNER. At the time of delivery of the tentative certificate of Substantial Completion ENGINEER will deliver to OWNER and CONTRACTOR a written recommendation as to division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless OWNER and CONTRACTOR agree otherwise in writing and so inform ENGINEER in writing prior to ENGINEER's issuing the definitive certificate of Substantial Completion,

ENGINEER's aforesaid recommendation will be binding on OWNER and CONTRACTOR until final payment.

B. OWNER shall have the right to exclude CONTRACTOR from the Site after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Use by OWNER at OWNER's option of any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which OWNER, ENGINEER, and CONTRACTOR agree constitutes a separately functioning and usable part of the Work that can be used by OWNER for its intended purpose without significant interference with CONTRACTOR's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work subject to the following conditions.

1. OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees that such part of the Work is substantially complete, CONTRACTOR will certify to OWNER and ENGINEER that such part of the Work is substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. CONTRACTOR at any time may notify OWNER and ENGINEER in writing that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, OWNER, CONTRACTOR, and ENGINEER shall make an inspection of that part of the Work to determine its status of completion. If ENGINEER does not consider that part of the Work to be substantially complete, ENGINEER will notify OWNER and CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers that part of the Work to be substantially complete, the provisions of paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

2. No occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

A. Upon written notice from CONTRACTOR that the entire Work or an agreed portion thereof is complete, ENGINEER will promptly make a final inspection with OWNER and CONTRACTOR and will notify CONTRACTOR in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. CONTRACTOR shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment*

1. After CONTRACTOR has, in the opinion of ENGINEER, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, Bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in paragraph 6.12), and other documents, CONTRACTOR may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by: (i) all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by subparagraph 5.04.B.7; (ii) consent of the surety, if any, to final payment; and (iii) complete and legally effective releases or waivers (satisfactory to OWNER) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in paragraph 14.07.A.2 and as approved by OWNER, CONTRACTOR may furnish receipts or releases in full and an affidavit of CONTRACTOR that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other

indebtedness connected with the Work for which OWNER or OWNER's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, CONTRACTOR may furnish a Bond or other collateral satisfactory to OWNER to indemnify OWNER against any Lien.

B. *Review of Application and Acceptance*

1. If, on the basis of ENGINEER's observation of the Work during construction and final inspection, and ENGINEER's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, ENGINEER is satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled, ENGINEER will, within ten days after receipt of the final Application for Payment, indicate in writing ENGINEER's recommendation of payment and present the Application for Payment to OWNER for payment. At the same time ENGINEER will also give written notice to OWNER and CONTRACTOR that the Work is acceptable subject to the provisions of paragraph 14.09. Otherwise, ENGINEER will return the Application for Payment to CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case CONTRACTOR shall make the necessary corrections and resubmit the Application for Payment.

C. *Payment Becomes Due*

1. Thirty days after the presentation to OWNER of the Application for Payment and accompanying documentation, the amount recommended by ENGINEER will become due and, when due, will be paid by OWNER to CONTRACTOR.

14.08 *Final Completion Delayed*

A. If, through no fault of CONTRACTOR, final completion of the Work is significantly delayed, and if ENGINEER so confirms, OWNER shall, upon receipt of CONTRACTOR's final Application for Payment and recommendation of ENGINEER, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by OWNER for Work not

fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by CONTRACTOR to ENGINEER with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by OWNER against CONTRACTOR, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from CONTRACTOR's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by CONTRACTOR against OWNER other than those previously made in writing which are still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.01 *OWNER May Suspend Work*

A. At any time and without cause, OWNER may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to CONTRACTOR and ENGINEER which will fix the date on which Work will be resumed. CONTRACTOR shall resume the Work on the date so fixed. CONTRACTOR shall be allowed an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if CONTRACTOR makes a Claim therefor as provided in paragraph 10.05.

15.02 *OWNER May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. CONTRACTOR's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under paragraph 2.07 as adjusted from time to time pursuant to paragraph 6.04);

2. CONTRACTOR's disregard of Laws or Regulations of any public body having jurisdiction;

3. CONTRACTOR's disregard of the authority of ENGINEER; or

4. CONTRACTOR's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in paragraph 15.02.A occur, OWNER may, after giving CONTRACTOR (and the surety, if any) seven days written notice, terminate the services of CONTRACTOR, exclude CONTRACTOR from the Site, and take possession of the Work and of all CONTRACTOR's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by CONTRACTOR (without liability to CONTRACTOR for trespass or conversion), incorporate in the Work all materials and equipment stored at the Site or for which OWNER has paid CONTRACTOR but which are stored elsewhere, and finish the Work as OWNER may deem expedient. In such case, CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by OWNER arising out of or relating to completing the Work, such excess will be paid to CONTRACTOR. If such claims, costs, losses, and damages exceed such unpaid balance, CONTRACTOR shall pay the difference to OWNER. Such claims, costs, losses, and damages incurred by OWNER will be reviewed by ENGINEER as to their reasonableness and, when so approved by ENGINEER, incorporated in a Change Order. When exercising any rights or remedies under this paragraph OWNER shall not be required to obtain the lowest price for the Work performed.

C. Where CONTRACTOR's services have been so terminated by OWNER, the termination will not affect any rights or remedies of OWNER against CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of moneys due CONTRACTOR by OWNER will not release CONTRACTOR from liability.

15.03 *OWNER May Terminate For Convenience*

A. Upon seven days written notice to CONTRACTOR and ENGINEER, OWNER may, without cause and without prejudice to any other right or remedy of OWNER, elect to terminate the Contract. In such case, CONTRACTOR shall be paid (without duplication of any items):

1. for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. for expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. for all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. for reasonable expenses directly attributable to termination.

B. CONTRACTOR shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *CONTRACTOR May Stop Work or Terminate*

A. If, through no act or fault of CONTRACTOR, the Work is suspended for more than 90 consecutive days by OWNER or under an order of court or other public authority, or ENGINEER fails to act on any Application for Payment within 30 days after it is submitted, or OWNER fails for 30 days to pay CONTRACTOR any sum finally determined to be due, then CONTRACTOR may, upon

seven days written notice to OWNER and ENGINEER, and provided OWNER or ENGINEER do not remedy such suspension or failure within that time, terminate the Contract and recover from OWNER payment on the same terms as provided in paragraph 15.03. In lieu of terminating the Contract and without prejudice to any other right or remedy, if ENGINEER has failed to act on an Application for Payment within 30 days after it is submitted, or OWNER has failed for 30 days to pay CONTRACTOR any sum finally determined to be due, CONTRACTOR may, seven days after written notice to OWNER and ENGINEER, stop the Work until payment is made of all such amounts due CONTRACTOR, including interest thereon. The provisions of this paragraph 15.04 are not intended to preclude CONTRACTOR from making a Claim under paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to CONTRACTOR's stopping the Work as permitted by this paragraph.

ARTICLE 16 - DISPUTE RESOLUTION*

16.01 *Methods and Procedures*

A. Dispute resolution methods and procedures, if any, shall be as set forth in the Supplementary Conditions. If no method and procedure has been set forth, and subject to the provisions of paragraphs 9.09 and 10.05, OWNER and CONTRACTOR may exercise such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any dispute.

ARTICLE 17 - MISCELLANEOUS*

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to

exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents, and the provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Agreement.

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

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SUPPLEMENTARY CONDITIONS

TABLE OF CONTENTS

Article Number	Title
1	DEFINITIONS AND TERMINOLOGY
2	PRELIMINARY MATTERS
3	CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE
4	AVAILABILITY OF LANDS; SUBSUREACE AND PHYSICAL CONDITIONS; REFERENCE POINTS
5	BONDS AND INSURANCE
6	CONTRACTOR'S RESPONSIBILITIES
7	OWNER'S RESPONSIBILITIES
8	ENGINEER'S STATUS DURING CONSTRUCTION
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12	PAYMENTS TO CONTRACTOR AND COMPLETION
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14	MISCELLANEOUS

SUPPLEMENTARY CONDITIONS

AMENDMENTS TO GENERAL CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (No. 1910-8, 1996 edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

ARTICLE I. DEFINITIONS AND TERMINOLOGY

Add the following language at the beginning of definition I.QI A.12 entitled "Contract Documents" in the General-Conditions:

"The Advertisement for Bids, Instructions to Bidders, State Regulations, ..."

Delete the words "The individual or entity named as such in the Agreement" in 1.01.A.19 and insert the following in their place:

"The individual or entity duly appointed by the Owner to undertake the duties and powers herein assigned to the Engineer, acting either directly or through duly appointed representatives."

Delete the words "and who is identified as such in the Supplementary Conditions" at the end of definition 1.01 A.20, entitled "ENGINEER'S Consultant."

Delete definition 1.01 A.41 entitled "Specifications" in the General Conditions in its entirety and insert the following in its place:

"Sections included under Division 1 through Division 16 of the Contract Documents:"

ARTICLE 2. PRELIMINARY MATTERS

SC-2.05

Delete paragraph 2.0SC of the General Conditions in its entirety and insert the following in its place:

"C. Evidence of Insurance: CONTRACTOR shall deliver to OWNER, with a copy to the ENGINEER, Certificates of Insurance within 10 days after receipt of the notice of the acceptance of bid (and other evidence requested by OWNER) which CONTRACTOR is required to purchase and maintain in accordance with the requirements of Article 5."

ARTICLE 3. CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE
SC-3.0

Add the following sentence at the end of Paragraph 3.01A of the General Conditions:

"...by all. Each and every provision of law and clause required by law to be inserted in these Contract Documents shall be deemed to be inserted herein, and they shall be read and enforced as though it were included herein, and if through mistake or otherwise, any such provision is not inserted, or if not correctly inserted, then upon the application of either party, the Contract Documents shall forthwith be physically amended to make such insertion."

ARTICLE 4. AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS;
REFERENCE POINTS

SC-4.02

Delete the term "Supplementary Conditions" of paragraph 4.02 A of the General Conditions and replace it with "Contract Documents".

SC-4.04

Change "of" to "or" on line 6 of paragraph 4.04 B.2 of the General Conditions. Delete the following words from lines 8 and 9 of paragraph 4.04 B.2 of the General Conditions:

"...Or not shown or indicated with reasonable accuracy..."

SC-4.05

Add a new paragraph immediately after paragraph 4.05A of the General Conditions which is to read as follows:

B. ENGINEER may check the lines elevations and reference marks set by CONTRACTOR, and CONTRACTOR shall correct any errors disclosed by such check. Such a check shall not be considered as approval of CONTRACTOR'S work and shall not relieve CONTRACTOR of the responsibility for construction of the entire Work in accordance with the Contract Documents. CONTRACTOR shall furnish personnel to assist ENGINEER in checking lines and grades."

SC-4.06

Delete the term Supplementary Conditions in paragraph 4.06A of the General Conditions and replace it with "Contract Documents".

ARTICLE 5. BOND AND INSURANCE

NOTICE TO CONTRACTOR:

1. Proof of Insurance coverage shall be furnished to the OWNER in accordance with the schedule for submittal of Bonds and Agreements.
2. Additionally refer to Article 2. PRELIMINARY MATTERS, Paragraph SC-2.05.C

SC-5.01

Insert these sentences following SC-5.01.A: The Surety Company providing the bonds shall have a rating of A or better within the Best Key Rating Guide and be licensed by the Massachusetts Division of Insurance. The contractor shall pay the premiums for such Bonds.

SC-5.03

Delete the second sentence following SC-5.03.A: of the General Conditions, which beings "OWNER shall deliver to..."

SC-5.04

The limits of liability for the insurance required by paragraph 5.04A of the General Conditions shall provide coverage for not less than the following amounts or greater where required by law:

5.4 A.1 and 5.04 A.2 Worker's Compensation

(1) Worker's Compensation	Statutory Requirements
(2) Coverage B - Employer's Liability	\$100,000/\$500,000/\$100,000

5.04 A.3, 5.04 A.4, and 5.04 A.5 Commercial General Liability Limits shall include Coverage for... independent Contractors, Personal Injury, Owners and Contractors Protective Liability, Explosion, Underground and Collapse, Broad Form Property Damage, Blanket Contractual Liability per locations/project endorsement.

Commercial General Liability	\$1,000,000/\$2,000,000
Products/completed Operations	\$2,000,000 Aggregate

5.4 A.6 Automobile Liability for owned, hired and non-owned vehicles:

(1) Bodily injury:	\$1,000,000/\$1,000,000	Each person
	\$1,000,000/\$1,000,000	Each accident
(2) Property damage	\$1,000,000	Each occurrence

The following indemnity agreement: shall be made part of this contract:

1.To the fullest extent permitted by law, Contractor(s) hereby acknowledges and agrees that it shall indemnify, hold harmless and defend the Engineer, the Owner, the Engineer and any of their officers, directors, employees, agents, affiliates, subsidiaries and partners from and against all-claims, damages, losses and expenses, including but not limited to, attorney's fees, arising out of or resulting from the performance of the contractor's work under this contract, provided that any such claim, damage, loss or expense (1) is attributable to bodily injury to or destruction of tangible property (other than to the work itself) including loss of use resulting therefrom, and (2) is (CAUSED) in whole or in part by any

negligent acts omissions of the contractor, its employees, agents or contractors or anyone directly or indirectly employed by any of them, or anyone whose acts any of them may be liable.

2. The Contractor hereby acknowledges its obligation under the foregoing paragraph to indemnify the Engineer and Owner against judgments suffered because of the contractor's work and to assume the cost of defending the Engineer and Owner against claims as described in the foregoing paragraph.

A. Engineer and Owner shall be named as Additional Insured on contractors General Liability and Umbrella Liability Contractors.

The Contractual Liability required by paragraph s.04n.4 of the General Conditions shall provide coverage for not less than the following amounts:

- | | |
|--|---|
| (1) Bodily injury: | \$1,000,000 Each occurrence
\$1,000,000 Annual aggregate |
| (2).Property damage, including explosion, collapse and underground coverage: | \$1,000,000 Each occurrence
\$1,000,000 Annual aggregate |

SC-5.04

Add two new paragraphs immediately after paragraph-5.04B of the General Conditions, which are to read as follows:

"C. The CONTRACTOR shall also provide:

1. CONTRACTOR shall, as a minimum, purchase and maintain excess liability insurance in the umbrella form with a combined single limit of not less than \$5,000,000 per claim and in the aggregate. Evidence of such excess liability shall be delivered to OWNER in accordance with paragraph 2.0SC in the form of a certificate indicating the policy numbers and limits of liability of all underlying insurance.

A. General Liability, Workers' Compensation, Automobile Liability and Umbrella Liability Policies will contain waivers of subrogation in favor of the Engineer and Owner.

2. If the aggregate limits of liability indicated in CONTRACTOR' insurance provided in accordance with paragraphs 5.03 and 5.04 are not sufficient to cover all claims for damages arising from his operations under this Contract and from any other work performed by him or if policies of insurance do not provide that the aggregate limits of liability for bodily injury and property damage apply to each contract or project separately, CONTRACTOR shall have such policies amended so that the aggregate limits of liability required by this Contract will be available to cover all claims for damages due to operations under this Contract."

SC-5.05

Delete paragraph 5 .05 of the General Conditions in its entirety.

SC-5.06

Delete Paragraph 5.06 A of the General Conditions in its entirety and insert the following in its place:

"A. CONTRACTOR shall purchase and maintain, until final payment, property insurance upon the Work at the site in an amount equal to the total bid price for the completed construction. This insurance shall include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER and ENGINEERS consultants in the Work, shall insure against the perils of fire and extended coverage, shall include "all risk" insurance for physical loss and damage including theft, vandalism and malicious mischief, collapse and water damage, and shall include damages, losses and expenses rising out of or resulting from any insured loss or incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers, architects, attorneys and other professionals). This insurance shall be provided on the completed value form.' If not covered under the "all risk" insurance or otherwise provided in these Supplementary Conditions, CONTRACTOR shall purchase and maintain similar property insurance on portions of the Work stored on and off the site or in transit when such portions of the Work are to be included in an Application for Payment." A \$20,000 deductible shall be acceptable. Any other deductible amount shall be approved in advance by the OWNER and any deductible amount shall be borne by the CONTRACTOR.

Delete paragraph 5.068 of the General Conditions in its entirety.

Delete Paragraph 5.06C of the General Conditions in its entirety and insert the following in its place:

"C. All the policies of insurance (or the certificates or other evidence thereof) required to be purchased and maintained by CONTRACTOR in accordance with paragraphs 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least thirty days' prior written notice has been given to OWNER by certified mail and will contain waiver provisions in accordance with paragraph 5.078. The words "**Endeavor** to" shall be struck from the Certificate Of Insurance in the Cancellation Statement"

Delete paragraph 5.06D of the General Conditions in its entirety.

Delete paragraph 5.06E of the General Conditions in its entirety.

SC-5.07

Amend the last sentence of paragraph 5.07A of the General Conditions by striking out the words "held by OWNER as trustee or." As so amended, paragraph 5.07A remains in effect.

SC-5.08

Delete paragraph 5.08A of the General Conditions in its entirety.

Delete paragraph 5.0813 of the General Conditions in its entirety.

SC-5.09

Delete paragraph 5.09A of the General Conditions in its entirety and insert the following in its place:

"A. If OWNER has any objection to the coverage afforded by or other provisions of the insurance required to be purchased and maintained by CONTRACTOR in accordance with this Article 5 on the basis of its not complying with the Contract Documents, OWNER will notify CONTRACTOR in writing thereof within thirty days of the date of delivery of such certificates to OWNER in accordance with paragraph 2.0SC. CONTRACTOR will provide such additional information in respect of insurance provided by him as OWNER may reasonably request."

ARTICLE 6. CONTRACTOR'S RESPONSIBILITIES

SC-6.01

Delete paragraph 6.01B of the General Conditions in its entirety and replace with the following:

"B. At the site of the Work the CONTRACTOR shall employ a full-time construction superintendent or foreman who shall have full authority to act for the CONTRACTOR. It is understood that such representative shall be acceptable to the ENGINEER and shall be one who will be continued in the capacity for the particular job involved unless the representative ceases to be on the CONTRACTOR'S payroll. If at any time during the Work the representative is deemed by the ENGINEER to be no longer acceptable, the representative shall be promptly replaced by the CONTRACTOR. All communications to the superintendent shall be as binding as if given to the CONTRACTOR."

SC-6.04

Add the following paragraph after paragraph 6.04 A.2 of the General Conditions: -

"B. The CONTRACTOR's resident superintendent shall attend monthly progress meetings at the site of the work with the ENGINEER and others as appropriate to review schedule status and such other pertinent subjects as may be listed on the agenda by the ENGINEER."

SC-6.17

In paragraph 6.17 E.1 of the General Conditions, delete the word "timely" from the first line.

SC-6.20

Delete paragraph 6.20A of the General Conditions in its entirety and replace with the following:

"A. To the fullest extent permitted by law, the CONTRACTOR shall indemnify and hold harmless the OWNER, the ENGINEER, ENGINEER'S consultants, and their agents and employees from and against all claims, damages, losses and expenses, including but not limited to attorneys fees, arising out of or resulting from the performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness,

disease or death, or to injury to or destruction of tangible property (other than the Work itself) including loss of use resulting therefrom, but only to the extent caused in whole or in part by acts or omissions of the CONTRACTOR, a subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall apply to any such claims, damages, losses and expenses which arise and/or are incurred by any person or entity either during the performance of the Work and/or alter completion of construction. Nothing in this paragraph shall be construed to negate, abridge, or reduce other rights or obligations of indemnity or contribution which would otherwise exist as to a party or person indemnified hereunder. CONTRACTOR hereby assumes the responsibility and liability for injury to or death of any and all persons, including the. CONTRACTOR's employees, and for any and all damage to property caused by, resulting from, or arising out of any act, omission or neglect on the part of the CONTRACTOR, or of any Subcontractor or of anyone directly or indirectly employed by any of them or of anyone for whose acts, any of them may be liable."

Delete paragraph 6.20C of the General Conditions in its entirety.

ARTICLE 8. OWNER'S RESPONSIBILITIES

SC-8.06

Delete paragraph 8.06A of the General Conditions in its entirety.

ARTICLE 9. ENGINEER'S STATUS DURING CONSTRUCTION

SC-9.01

Add a new paragraph 9.0113 after paragraph 9.01A of the General Conditions, which is to read as follows:

"B. Nothing contained in the Contract Documents shall be construed to create a contractual relationship of any kind (1) between the ENGINEER and CONTRACTOR, (2) between the OWNER and a Subcontractor or Subcontractors, or (3) between any person or entities other than the OWNER and CONTRACTOR. The ENGINEER shall, however, be entitled to performance and enforcement of obligations under the CONTRACT DOCUMENTS intended to facilitate performance of the ENGINEERS duties."

ARTICLE 11. COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK

Delete Article 11 of the General Conditions in its entirety and replace with the following:

"A. The unit price of an item of Unit Price work shall be subject to reevaluation and adjustment under the following conditions:

(1) If the total extended bid price [Estimated Quantity times the Bid Unit Price] of a particular item of Unit Price Work amounts to 5 percent or more of the Original Contract Price and the variation in the quantity of the particular item of Unit Price Work performed by CONTRACTOR differs by more than 15 percent from the estimated quantity of such item indicated in the Agreement;
and

(2) If there is no corresponding adjustment with respect to any other item of work; and

(3) If CONTRACTOR believes that CONTRACTOR has incurred additional expense as a result thereof, CONTRACTOR may make a claim for an adjustment in the Contract Price in accordance with Article 11- if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed. If OWNER believes that the quantity variation entitles OWNER to an adjustment in the unit price, OWNER shall be entitled to an adjustment in the unit price in an amount determined by the ENGINEER. ENGINEER shall not be liable in connection with any determination relating to adjustments which is rendered in good faith."

ARTICLE 12. CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

SC-12.06

Add the following new paragraphs after paragraph 12.06 of the General Conditions:

"12.07 Liquidated Damages:

A. If the CONTRACTOR shall neglect, fail or refuse to complete the work within the time herein specified, or any proper extension thereof granted by the OWNER, then the CONTRACTOR does hereby agree, as a part consideration for the awarding of this Contract, to pay to the OWNER the amount specified in the Contract, not as a penalty but as liquidated damages for such breach of contract as hereinafter set forth, for each and every calendar day that the Contract shall be in default after the time stipulated in the Contract for completing the work. Such damages may be retained from time to time by the OWNER from progress payments or any amounts owing to the CONTRACTOR, or otherwise collected.

B. The said amount is fixed and agreed upon by and between the CONTRACTOR and the OWNER because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the OWNER would in such event sustain, and said amount is agreed to be the amount of damages which the OWNER would sustain and said amount shall be retained from time to time by the OWNER from current periodical estimates.

C. It is further agreed that time is of the essence of each and every portion of this Contract and of the specifications wherein as definite and certain length of times is fixed for the performance of any act whatsoever; and where under the Contract an additional time is allowed for the completion of any work, the new time limit fixed by such extension shall be of the essence of this Contract. Provided that the CONTRACTOR shall not be charged with liquidated damages of any excess cost when the OWNER determines that the CONTRACTOR is without fault and the CONTRACTOR'S reasons for the time extension are acceptable to the OWNER; Provided, further, that the CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in completion of the work is due:

1) to any preference, priority or allocation order duly issued by the Government;

2) to unforeseeable cause beyond the control and without the fault or negligence of the CONTRACTOR, including, but not restricted to, acts of God, or of the public enemy, acts of the OWNER, acts of another CONTRACTOR in the performance of a contract with the OWNER, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and severe weather; and

3) to any delays of subcontractors or suppliers occasioned by any of the causes specified in subsections C(1) and C(2) above;

D. Provided, further, that the CONTRACTOR shall, within ten (10) days from the beginning of such delay, unless the OWNER shall grant a further period of time prior to the date of final settlement of the Contract, notify the OWNER, in writing, of the causes of the delay, who shall ascertain the facts and extent of the delay and notify the CONTRACTOR within a reasonable time of its decision in the matter."

ARTICLE 13. TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

SC-13.07

Delete paragraph 3.07A of the General Conditions and insert the following in its place:

"A. If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any work is found to be defective, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions: (i) correct such defective work, or, if it has been rejected by OWNER, remove it from the site and replace it with work that is not defective, and (ii) satisfactorily correct or remove and replace any damage to other work or the work of others therefrom. If CONTRACTOR does not begin the repairs ten (10) days of receipt of written notification and promptly comply with the terms of OWNER's written instructions, or in an emergency when delay would cause serious risk, loss or damage, OWNER may have the defective work corrected or the rejected work removed and replaced, and all claims, costs, losses and damages caused by or resulting from such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by CONTRACTOR."

SC-13.09

Revise paragraph 13.09A of the General Conditions

A. Delete the word "seven" and replace it with the word "ten" so that it reads "after ten days written notice to CONTRACTOR."

ARTICLE 14. PAYMENTS TO CONTRACTOR AND COMPLETION

SC-14.02

Delete paragraph 14.02A.3 and insert the following in its place:

"3. Retainage with respect to progress payments will be five percent or, if stipulated, the maximum allowed by law."

Add Paragraph 4. to read as follows:

"4. The CONTRACTOR shall submit Weekly Payroll Records Report and Statement of

Compliance verifying compliance with the Minimum Prevailing Wage Law, MGL ch. 149, Sections 26-27H. "These Statements of Compliance shall be submitted as a condition of payment for work performed during the period the reports apply."

SC-14.03

Delete paragraph 14.03A in its entirety and insert the following in its place:

"A CONTRACTOR warrants and guarantees that title to all work, material and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to OWNER no later than at the time of Application for Payment free and clear of all liens. CONTRACTOR shall provide written transfer of title and a certified paid invoice provided by the supplier."

ARTICLE 15. SUSPENSION OF WORK AND TERMINATION

SC-15.02

Add a new paragraph immediately after paragraph 15.02 AA of the General Conditions which is to read as follows:

"5. If the Work to be done under this Contract shall be abandoned, or if this Contract or any part thereof shall be sublet, without the previous written consent of OWNER, or if the contract or any claim thereunder shall be assigned by CONTRACTOR otherwise than as herein specified;"

ARTICLE 17. MISCELLANEOUS

SC-17.06, 17.07, 17.08, 17.09

Add the following new paragraphs after paragraph 17.05 of the General Conditions:

"17.06 Assignment:

A. The CONTRACTOR shall not assign the whole or any part of this Contract or any moneys due or to become due hereunder until thirty (30) days prior notice in writing has been given to the OWNER of the intention to assign, which notice shall state the identity and address of the prospective assignee. No assignment shall be made without the OWNER's prior written consent. Such consent shall not be unreasonably withheld. In case the CONTRACTOR assigns all or any part of the moneys due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any moneys due or to become due to the CONTRACTOR shall be subject to prior claims of all persons, firms and corporations of services rendered or materials supplied for the performance of the work called for in this Contract."

17.7 Liability

It is understood and agreed that members of the OWNER or the ENGINEER' or any agent or employees of the OWNER signing this Agreement shall not be personally liable hereunder for any action incurred in connection with this Agreement.

17.8 State Statutes and Regulations

See Superseding Changes To General & Supplementary Conditions 12/29/04 for further modifications of the General Conditions due to state statutes and regulations.

17.9 Severability

If any provision of this Agreement shall be invalid or unenforceable to any extent or in any application, then the remainder of this Agreement and of such terms and conditions, except to such extent or in such application, shall not be affected thereby, and each and every term and condition of this Agreement shall be valid and enforced to the fullest extent and in the broadest application permitted by law."

END OF SECTION

**STATE STATUTES AND REGULATIONS
COMMONWEALTH OF MASSACHUSETTS**

A. REVISIONS TO GENERAL CONDITIONS

1. Definitions
2. Subsurface Conditions Found Different
3. Subcontracting
4. Permits
5. Contractor Records
6. Massachusetts Sales and Use Tax I
7. Clarifications and Interpretations
8. Change of Contract Price
9. Payments
10. Suspension of Work and Termination
11. Labor Classification and Minimum Wage Rates

B. OTHER REGULATORY REQUIREMENTS

1. Working Hours
2. DEP Community Sound Level Criteria

ATTACHMENT A – Wage Rates

ATTACHMENT B

Excerpts from Chapter 149 and Chapter 30 of the Massachusetts General Law

ATTACHMENT C - (not used on this project)

Special Provisions for Minority/Women Business Enterprises and the Commonwealth of Massachusetts Supplemental Equal Employment Opportunity Anti-Discrimination and Affirmative Action Program.

ATTACHMENT D--

Change Orders

A. REVISIONS TO GENERAL CONDITIONS:

1. Definitions

The term "AWARDING AUTHORITY," as used herein, shall be considered to be synonymous with the term "OWNER," described in definition 1.01 A.30.

Delete definition 1.01 A.43 entitled "Substantial Completion" in the General Conditions in its entirety and insert the following in its place:

"Substantial Completion shall be interpreted in accordance with Massachusetts General Law Chapter 30, Section 39G or -39K as appropriate."

2. Subsurface Conditions Found Different

Add the following sentence to the end of paragraph 4.03A of the General Conditions:

"...to do so. Adjustments resulting from subsurface or latent physical conditions will be in accordance with Massachusetts General Law Chapter 30, Section 39N."

3. Subcontracting

Add the following language at the end of paragraph 6.06F of the General Conditions:

"Except as required otherwise by Massachusetts General Law Chapter 149, Section 44F, for Work governed by Chapter 149, sections 44A through 44H."

4. Permits

Delete paragraph 6.08A of the General Conditions in its entirety and insert the following in its place:

"A. The AWARDING AUTHORITY shall be responsible for identifying and obtaining all federal, state, and local permits required by the nature and location of construction, including but not limited to railroad permits, building construction permits, and permits for street and highway cuts and openings. CONTRACTOR shall be responsible for obtaining all permits required of his equipment, work force, or particular operations (such as blasting) in the performance of the Work and not otherwise specified to be obtained by the AWARDING AUTHORITY. These permit fees shall be paid by CONTRACTOR. CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of opening of bids, or, if there are no Bids, on the Effective Date of the Agreement."

5. Contractor Records

Add a new paragraph immediately after paragraph 6.09C of the General Conditions, which is to read as follows:

"D. The CONTRACTOR shall comply with all applicable provisions Chapter 30, Section 39R of the Massachusetts General Laws Regarding, CONTRACTOR'S records."

6. Massachusetts Sales and Use Tax

Add the following paragraph after paragraph 6.10A of the General Conditions:

"B. The material and supplies to be used by the CONTRACTOR in the Work of this Contract are exempt from the Sales and Use Tax of the Commonwealth of Massachusetts. The AWARDING AUTHORITY tax exemption certificate number will be furnished to the CONTRACTOR."

7. Clarifications and Interpretations

Add the following language at the end of paragraph 9.04A of the General Conditions:

"The ENGINEER'S interpretation will be made in accordance with the requirements of Massachusetts General Law Chapter 30, Section 39P."

8. Change of Contract Price

Delete paragraphs 11.01, 11.02, and 12.01 of the General Conditions, having to do with Change of Contract Price. Changes in contract price will be governed by the section called "Change Orders" in Attachment D, Section XXX and Article 11 in the Supplementary Conditions.

9. Payments

Delete paragraph 12.028.1 of the General Conditions, in its entirety and insert the following in its place:

"1. Progress Payments will be made in accordance with the Massachusetts General Law Chapter 30, Section 39G or 39K, as applicable."

Add the following new paragraph following paragraph 14.02C.1 of the General Conditions:

"2. The CONTRACTOR shall make payments to Subcontractors in accordance with the requirements of Massachusetts General Law Chapter 30, Section 39F."

Delete paragraph 14.07B of the General Conditions in its entirety and insert the following in its place:

"1. If, on the basis of the ENGINEER's observation of the Work during construction and final inspection and, upon the ENGINEER's review of the final Application for Payment and accompanying documentation, the ENGINEER is satisfied that the Work has been completed and that the CONTRACTOR's other obligations under the Contract Documents have been fulfilled, the ENGINEER will indicate in writing his recommendation of payment and present the Application to the AWARDING AUTHORITY for payment. Thereupon the ENGINEER will give written notice to the AWARDING AUTHORITY and the CONTRACTOR that the Work is acceptable subject to the provisions of paragraph 14.15. Otherwise, the ENGINEER will return the Application to CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment. In such case the CONTRACTOR shall make the

necessary corrections and resubmit the Application. If the Application and accompanying documentation are appropriate as to form and substance, the AWARDING AUTHORITY shall in accordance with the applicable Massachusetts General Law, pay the CONTRACTOR the amount recommended by the ENGINEER."

10. Suspension of Work and Termination

Delete paragraph 15.01A of the General Conditions in its entirety and insert the following in its place:

"A. The AWARDING AUTHORITY may order, at any time and without cause, the CONTRACTOR to suspend or delay the Work in accordance with Massachusetts General Law Chapter 30, Section 39-0."

11. Labor Classifications and Minimum Wage Rates

Add the following paragraphs under the heading "Wage Rates" after paragraph 17.10 of the Supplementary Conditions:

"17.11 Wage Rates

- A. Minimum wage rates as determined by the Commissioner of the Department of Labor and Industries under the provisions of Massachusetts General Laws Chapter 149, Sections 26-270 apply to this project. A copy of the wage schedule is included in the front end of the specifications under Federal Minimum Wage Rates. If, after the Notice of Award, it becomes necessary to employ any person in a trade or occupation not classified in the wage determinations, such person shall be paid at not less than such rates as shall be determined by the Commissioner. Such approved minimum rate shall be retro- active to the time of the initial employment of such person in such trade or occupation. The CONTRACTOR shall notify the AWARDING AUTHORITY of its intention to employ persons in trades or occupations not classified in the wage determinations as soon as possible in order to allow sufficient time for the AWARDING AUTHORITY to obtain approved rates for such trades or occupations.
- B. The schedule of wages referred to above are minimum rates only, and the AWARDING AUTHORITY will not consider any claims for additional compensation made by CONTRACTOR because of payment by the CONTRACTOR of any wage rate in excess of the applicable rate contained in the Contract.
- C. The said schedule of wages shall continue to be the minimum rates to be paid during the life of this Agreement and a legible copy of said schedule shall be kept posted in a conspicuous place at the site of the Work.
- D. CONTRACTOR and subcontractors shall submit a copy of weekly payroll records to the AWARDING AUTHORITY and the AWARDING AUTHORITY shall retain the records of a minimum of three years."

B. OTHER REGULATORY REQUIREMENTS:

1. Working Hours

No laborer, workman, mechanic, foreman, or inspector, working within the Commonwealth, in the employ of the CONTRACTOR, subcontractor, or other person doing or contracting to do the whole or a part of the work contemplated by this contract, shall be required or permitted to work more than eight hours in any one day or more than forty-eight hours in any one week, or more than six days in any one week, except in cases of emergency.

2. DEP Community sound Level Criteria

The Community Sound Level Criteria as established by the Commonwealth of Massachusetts Department of Environmental Protection (DEP) must be conformed to prior to the AWARDING AUTHORITY's acceptance of the structure. The following sound level criteria must be met at the construction site:

- A. The increase in the broad band noise level shall not be in excess of ten (10) dB(A) above ambient at the station boundary. The ambient level is defined as the A-weighted noise level that is exceeded ninety (90) percent of the time measured during the period in question.
- B. The primary noise source(s) shall not produce a puretone condition. Puretone is any given octave band center frequency that exceeds the two adjacent center frequencies by three (3) or more decibels.

END OF SECTION

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**SUPERSEDING CHANGES TO
GENERAL AND SUPPLEMENTARY CONDITIONS**

1. GENERAL CONDITIONS

2.06A - insert at end: Said conference shall be scheduled and arranged by the Contractor. I

4.01B - delete

4.06G - delete

5.07B - delete

6.17E - restore the word "timely" in the first line. Delete the word "only" from the 5" line. Where "only" has been deleted, insert "to determine their general conformance with the contract documents, in accordance with good and accepted engineering practices, and".

8.02A - delete "to whom contractor makes no reasonable objection".

9.02A - Insert, after "Work" in the 6" line, "While construction is active at the project, said visits and inspections will take place at least once per week."

12.06 - delete subparts A and B, and replace with the following: "The Contractor hereby agrees that the Contractor shall have no claim for damages of any kind against the Owner or the Engineer on account of any delay in the commencement of the Work and/or any delay in, or suspension of any portion of the Work, whether such delay is caused by the Owner, the Engineer, or otherwise. The Contractor acknowledges that the Contractor's sole remedy for any such delay and/or suspension will be an extension of time as provided in these general conditions.

No claims shall be allowed on account of the failure of the Engineer to furnish Drawings, specifications or instructions or to return Shop Drawings or Samples until the expiration of the applicable time period referenced in Mass. Gen. L. c. 30, §39P, and not then unless such claim be reasonable.

No extension of time shall be granted because of seasonable or abnormal variations in temperature, humidity or precipitation, which conditions shall be wholly at the risk of the Contract, whether occurring within the time originally scheduled for completion, or within any period of extension granted. There shall be no increase in the Contract Sum on account of any additional costs or operations or conditions resulting therefrom.

14.02C - change "Ten" to "Twenty-One"

14.07A(3) - delete the first three lines through the word "Owner,". In the third line, after Contractor, substitute "shall" for "may". In the fourth line, after the word "full" insert "on behalf of both Contractor and all of its Subcontractors,".

14.09A(1) - delete -

15.03B - add after "termination" ", with respect to this project or any other project of the Contractor."

Add "15.03C. If this Contract is terminated by Owner with or without cause, and regardless of whether said termination is rightful or wrongful, in no event shall the Contractor be paid a sum which, together with prior payments to Contractor, exceeds the sum payable to Contractor under the Agreement (Section 00520), as adjusted by any agreed change orders.

II. SUPPLEMENTARY CONDITIONS

Article V - Bonds and Insurance

Employer's liability coverage must be \$2 million per accident, \$2 million disease limits, and \$2 million per employee disease limits.

General liability insurance limits must be \$5 million aggregate, \$2 million dollars' products/completed operations aggregate; \$2 million personal injury and advertising; and \$2 million per occurrence.

The contractual liability insurance coverage must have limits corresponding to the foregoing. At 5.04A.6, the following changes should be made to paragraph I of the indemnity clause: four lines from the bottom, the parenthesis should be removed from the word "CAUSED" and the word "CAUSED" should be changed to lower-case (caused). Also, in the last line of said clause, insert the word "for" after the word "anyone."

At SC-5.04C 1 - insert the following sentence at the end: "The Contractor's excess liability insurance coverage must follow from with its underlying liability coverages."

SC-6.20A - insert the word "defend" after the word "shall" in the first line.

SC-14.02A.3 - insert the following sentence at the end: "Retainage for the entire project will be withheld until substantial completion of the entire project, at which time retainage shall be accounted for, subject to all of the other terms and conditions of payment at the time of substantial completion.

Add the following Article SC-18.

SC-I 8 Arbitration - J

18.1 Controversies and Claims Subject to Arbitration. Any Claim arising out of or related to the Contract, or the breach thereof, except claims relating to aesthetic effect, shall be settled by arbitration, subject to the provisions of Subparagraph 18.7. Arbitration will be conducted in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association and judgment upon the award rendered by the Arbitrator or Arbitrators may be entered in any Court having jurisdiction thereof. In any such arbitration in which the amount stated in the demand is \$100,000 or less, a single arbitrator shall be appointed in accordance with the procedures set forth in the American Arbitration Association Construction Industry Arbitration Rules. In any such arbitration in which the amount stated in the demand is in excess of \$100,000, a panel of three arbitrators shall be appointed in accordance with the procedures set forth in the American Arbitration

Association Construction Industry Arbitration Rules. The parties may agree to use any arbitration service. In the absence of such agreement, the American Arbitration Association shall be utilized.

18.2 Rules For Arbitration. If the neutral arbitrator is appointed by the American Arbitration Association, the said Association shall administer the arbitration and its Construction Industry Arbitration Rules shall govern all aspects of the proceeding including the enforcement of any award. If the neutral arbitrator is not appointed by the American Arbitration Association, then the panel of arbitrators shall act as the administrator of the arbitration but the Construction Industry Arbitration Rules of the Association shall nonetheless govern all aspects of the proceeding, including the enforcement of any award. The arbitration panel shall have all the powers and duties conferred on the Association pursuant to said rules.

In addition, the following rules shall govern the selection of arbitrators and the proceedings:

18.2.1 Neither party may appoint as arbitrator an employee or an owner of that party, nor the parent, spouse or child of an employee or owner of that party.

18.2.2 After the neutral arbitrator has been appointed, neither party may engage in ex parte communication with the arbitrator appointed by that party.

18.2.3 Contract Performance During Arbitration. During arbitration proceedings, the Owner and Contractor shall otherwise continue their performances hereunder.

18.3 When a written decision of the Engineer states that the decision is final, any demand for arbitration of the matter covered by such decision must be made within two months after substantial completion of the project, as determined by the Engineer in accordance with the provisions hereof. The failure to demand arbitration within said two month period will result in the Engineer's decision becoming final and binding upon the Owner and the Contractor.

18.4 A Demand for arbitration shall be made with the time limits specified in Subparagraph 18.3, and in no event shall be made after the date when the institution of legal or equitable proceedings based on such Claim would be barred by the applicable statute of limitations.

18.5 Claims and Timely Assertion of Claims. A party who files a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded. When a party fails to include a claim through oversight, inadvertence or excusable neglect, or when a Claim has matured or been acquired subsequently, the arbitrator or arbitrators may permit amendment.

18.6 Judgment on Final Award. The award rendered by the arbitrator or arbitrators shall be final, and the judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

18.7 Notwithstanding any provision contained in this Paragraph 18 or elsewhere in the Contract Documents, the Owner reserves the following right in connection with claims and disputes between the Owner and Contractor:

1. the right to institute the legal action against the Contractor in any court of competent jurisdiction in-lieu of demanding arbitration pursuant to this paragraph 18, in which case the dispute or disputes which are the subject of such action shall be decided by such court, and not by arbitration.

2. the right to obtain from any court of competent jurisdiction a stay of any arbitration instituted by the Contractor, provided that the application for such stay is made before the appointment of the neutral arbitrator in such arbitration, in which case the dispute or disputes which are the subject of such arbitration shall be decided by such court, and not by arbitration;

3. the right to require the Contractor to join as a party in any arbitration between the Owner and Architect relating to the Project in which case the Contractor agrees to be bound by that decision of the arbitrator arbitrators in such arbitration.

In case the Owner elects to proceed in accordance with 18.7.1 or 18.7.2 above, the word "litigation", shall be deemed to replace the word "arbitration" wherever the latter word appears in the Contract Documents.

SC-19 MBE and WBE participation

The Contractor shall comply with the provision of G.L.c. 7 40N, and any associated regulations effective during the time of the project, relative to the participation of minority and women-owned businesses in connection with the project. At present, the current participation goals are 7.4% MBE and 4% WBE.

END OF SECTION

EQUAL OPPORTUNITY REQUIREMENTS

1. EQUAL EMPLOYMENT OPPORTUNITY

A. Equal Employment Plan: The Contractor and each Subcontractor shall implement an effective affirmative action plan to assure equal employment opportunity throughout the performance of work on this project. Do not discriminate against any employee or applicant for employment because of race, color, sex, religion, age, or national origin. Affirmative action plan shall include, but not be limited to, the following:

1. Employment, upgrading, demotion, or transfer.
2. Recruitment or recruitment advertising.
3. Layoff or termination.
4. Rates of pay or other forms of compensation.
5. Selection for training, including apprenticeship.

B. Rules and Regulations: The Contractor and each Subcontractor shall comply with all applicable local, state and federal laws and regulations regarding equal employment opportunity and with the provisions of the following:

1.. Governors "Executive Order No. 74", dated July 20, 1970, entitled the "Governor's Code of Fair Practices", as amended by the Governor's Executive Order No. 116, dated May 1, 1975.

2. The Fair Employment Practices Law of the Commonwealth, Chapter 1518 of the General Laws of Massachusetts, as amended.

3. The rules and regulations of the Massachusetts Commission Against Discrimination as in force at the date of the Contract.

4. The rules, regulations and relevant orders of the United States Secretary of Labor, the Commonwealth of Massachusetts Department of Labor and Industries, and other authorities having jurisdiction as in force at the date of the Contract.

5. Governor's 'Executive Order No. 237'.

C. Employment Advertisements: State in all solicitations or advertisements for employees that all qualified applicants will receive consideration for employment without regard to race, color, sex, religion, age, or national origin.

D. Referral Notices: Direct special effort toward the recruitment of minority workers through the unions and through referral agencies representing the minority community.

E. Advising Labor Unions: Send to each labor union or representative of workers with which the Contractor has a collective bargaining agreement or other contract or understanding, a notice advising the labor union or workers' representative of the Contractor's equal employment opportunity commitment and post copies of these notices in conspicuous places available to employees and applicants for employment.

F. Posting: Post copies of equal opportunity employment notices in conspicuous places available to employees and applicants for employment and post notices setting forth the provisions of this non-discrimination equal employment opportunity clause.

G. Manning Table: Assume and be responsible for the affirmative duty of achieving the range of minority employment and women work force participation set forth in a manning table for the entire project. Submit a manning table at the request of the Owner and obtain Owners approval prior to the Award of Contract.

H. Percentage Participation: Both Contractor and Sub-contractor shall comply with requirements of Minority and Women Business percentage of Contract percentage participation requirements specified in the Minority and Women Business Enterprise Set Aside Requirements Section.

END OF SECTION

**MINORITY AND WOMEN BUSINESS
ENTERPRISE SET ASIDE REQUIREMENTS**

1. GENERAL

A. All provisions of the Contract Documents shall be subject to all applicable provisions of law, including, without limitation, Federal, State, and Local statutes and ordinances regarding setting aside a portion of the Contract for qualified Minority and Women Business Enterprises. The Contractor shall recognize that other duties and obligations are required by laws, statutes, and ordinances which may not be provided herein, but must be considered and made a part of this Contract. In case of a conflict between the Contract Documents and applicable laws, statutes, and ordinances, the provisions of law, statutes, and ordinances shall *govern*.

2. MINORITY AND WOMEN OWNED BUSINESS ENTERPRISE SET ASIDE REQUIREMENTS

A. Requirements For minority and women business enterprise set aside requirements, provided to the Architect by the Awarding Authority Follow. The Architect does not warrant or guarantee the completeness or accuracy of this information, and every bidder and contractor shall be responsible for ascertaining the MWBE set aside requirements in the area where the work will be performed.

1. Bidders shall agree to contract with minority and women owned businesses as certified by the State Office of Minority and Women Business Assistance [SOMWBA]. "the amount of participation which shall be reserved for such enterprises shall not be less than fifteen percent [15%] of the total contract amount including accepted alternates, of which at least ten percent [10%] shall be reserved for minority business enterprises and five percent [5%] shall be reserved for womenowned business enterprises.

2. The Contractor and each Subcontractor shall furnish to the Awarding Authority, within fifteen days after completion of its portion of the work, a certified 'Statement of Compliance' certifying compliance with minority and women business enterprise set aside requirements. Submit the 'Statement of Compliance' in a form acceptable to the Awarding Authority.

3. See Massachusetts Executive Order 237 as amended.

END OF SECTION

MINORITY AND WOMEN BUSINESS ENTERPRISE SET ASIDE REQUIREMENTS

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

CHARLES D. BAKER
Governor
KARYN E. POLITO
Lt. Governor

RONALD L. WALKER, II
Secretary
WILLIAM D. MCCUNNEY
Director

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

Awarding Authority: Town of Arlington
Contract Number: 17-27
Description of Work: Renovation of Robbins Farm Park site improvements to include but not limited to improvement of baseball diamond and multipurpose field, basketball court, pathway improvements and ADA upgrades.

Job Location: Eastern Ave.
City/Town: ARLINGTON

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 19 ZONE A	12/01/2016	\$33.25	\$10.91	\$10.89	\$0.00	\$55.05
(3 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 19 ZONE A	12/01/2016	\$33.32	\$10.91	\$10.89	\$0.00	\$55.12
(4 & 5 AXLE) DRIVER - EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 19 ZONE A	12/01/2016	\$33.44	\$10.91	\$10.89	\$0.00	\$55.24
ADS/SUBMERSIBLE PILOT PILEDRIER LOCAL 56 (ZONE 1) For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2015	\$88.29	\$9.80	\$19.23	\$0.00	\$117.32
AIR TRACK OPERATOR LABORERS - ZONE 1 For apprentice rates see "Apprentice- LABORER"	12/01/2016	\$37.10	\$7.60	\$14.15	\$0.00	\$58.85
	06/01/2017	\$38.10	\$7.60	\$14.15	\$0.00	\$59.85
	12/01/2017	\$38.95	\$7.60	\$14.15	\$0.00	\$60.70
	06/01/2018	\$39.90	\$7.60	\$14.15	\$0.00	\$61.65
	12/01/2018	\$40.85	\$7.60	\$14.15	\$0.00	\$62.60
	06/01/2019	\$41.85	\$7.60	\$14.15	\$0.00	\$63.60
	12/01/2019	\$42.85	\$7.60	\$14.15	\$0.00	\$64.60
ASBESTOS REMOVER - PIPE /MECH. EQUIPT. HEAT & FROST INSULATORS LOCAL 6 (BOSTON) For apprentice rates see "Apprentice- LABORER"	12/01/2016	\$33.90	\$11.50	\$7.10	\$0.00	\$52.50
	06/01/2017	\$34.90	\$11.50	\$7.10	\$0.00	\$53.50
	12/01/2017	\$35.90	\$11.50	\$7.10	\$0.00	\$54.50
	06/01/2018	\$36.90	\$11.50	\$7.10	\$0.00	\$55.50
	12/01/2018	\$37.90	\$11.50	\$7.10	\$0.00	\$56.50
	06/01/2019	\$38.90	\$11.50	\$7.10	\$0.00	\$57.50
	12/01/2019	\$39.90	\$11.50	\$7.10	\$0.00	\$58.50
	06/01/2020	\$40.90	\$11.50	\$7.10	\$0.00	\$59.50
	12/01/2020	\$41.90	\$11.50	\$7.10	\$0.00	\$60.50
ASPHALT RAKER LABORERS - ZONE 1 For apprentice rates see "Apprentice- LABORER"	12/01/2016	\$36.60	\$7.60	\$14.15	\$0.00	\$58.35
	06/01/2017	\$37.60	\$7.60	\$14.15	\$0.00	\$59.35
	12/01/2017	\$38.45	\$7.60	\$14.15	\$0.00	\$60.20
	06/01/2018	\$39.40	\$7.60	\$14.15	\$0.00	\$61.15
	12/01/2018	\$40.35	\$7.60	\$14.15	\$0.00	\$62.10
	06/01/2019	\$41.35	\$7.60	\$14.15	\$0.00	\$63.10
	12/01/2019	\$42.35	\$7.60	\$14.15	\$0.00	\$64.10
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE OPERATING ENGINEERS LOCAL 4 For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2016	\$45.38	\$10.00	\$15.25	\$0.00	\$70.63
	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63
BACKHOE/FRONT-END LOADER OPERATING ENGINEERS LOCAL 4 For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2016	\$45.38	\$10.00	\$15.25	\$0.00	\$70.63
	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate	
BARCO-TYPE JUMPING TAMPER LABORERS - ZONE 1	12/01/2016	\$36.60	\$7.60	\$14.15	\$0.00	\$58.35	
	06/01/2017	\$37.60	\$7.60	\$14.15	\$0.00	\$59.35	
	12/01/2017	\$38.45	\$7.60	\$14.15	\$0.00	\$60.20	
	06/01/2018	\$39.40	\$7.60	\$14.15	\$0.00	\$61.15	
	12/01/2018	\$40.35	\$7.60	\$14.15	\$0.00	\$62.10	
	06/01/2019	\$41.35	\$7.60	\$14.15	\$0.00	\$63.10	
	12/01/2019	\$42.35	\$7.60	\$14.15	\$0.00	\$64.10	
	12/01/2016	\$37.10	\$7.60	\$14.15	\$0.00	\$58.85	
	06/01/2017	\$38.10	\$7.60	\$14.15	\$0.00	\$59.85	
	12/01/2017	\$38.95	\$7.60	\$14.15	\$0.00	\$60.70	
BLOCK PAVER, RAMMER / CURB SETTER LABORERS - ZONE 1 For apprentice rates see "Apprentice-LABORER"	06/01/2018	\$39.90	\$7.60	\$14.15	\$0.00	\$61.65	
	12/01/2018	\$40.85	\$7.60	\$14.15	\$0.00	\$62.60	
	06/01/2019	\$41.85	\$7.60	\$14.15	\$0.00	\$63.60	
	12/01/2019	\$42.85	\$7.60	\$14.15	\$0.00	\$64.60	
	01/01/2017	\$42.92	\$6.97	\$16.21	\$0.00	\$66.10	
	BOILER MAKER BOILERMAKERS LOCAL 29 For apprentice rates see "Apprentice-LABORER"	01/01/2017	\$42.92	\$6.97	\$16.21	\$0.00	\$66.10

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate	
Apprentice - BRICK/PLASTER/CEMENT MASON - Local 3 Boston Effective Date - 03/01/2017	1 50	\$25.38	\$10.75	\$19.22	\$0.00	\$55.35	
	2 60	\$30.46	\$10.75	\$19.22	\$0.00	\$60.43	
	3 70	\$35.53	\$10.75	\$19.22	\$0.00	\$65.50	
	4 80	\$40.61	\$10.75	\$19.22	\$0.00	\$70.58	
	5 90	\$45.68	\$10.75	\$19.22	\$0.00	\$75.65	
	Notes:						
	Apprentice to Journeyworker Ratio:1:5						
	BULLDOZER/GRADER/SCRAPER OPERATING ENGINEERS LOCAL 4	12/01/2016	\$44.94	\$10.00	\$15.25	\$0.00	\$70.19
		06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
		12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17
CAISSON & UNDERPINNING BOTTOM MAN LABORERS - FOUNDATION AND MARINE For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2016	\$37.45	\$7.60	\$14.35	\$0.00	\$59.40	
	12/01/2016	\$36.30	\$7.60	\$14.35	\$0.00	\$58.25	
	12/01/2016	\$36.30	\$7.60	\$14.35	\$0.00	\$58.25	
CAISSON & UNDERPINNING TOP MAN LABORERS - FOUNDATION AND MARINE For apprentice rates see "Apprentice-LABORER"	12/01/2016	\$36.30	\$7.60	\$14.35	\$0.00	\$58.25	
	12/01/2016	\$36.30	\$7.60	\$14.35	\$0.00	\$58.25	
	12/01/2016	\$36.30	\$7.60	\$14.35	\$0.00	\$58.25	
CARBIDE CORE DRILL OPERATOR LABORERS - ZONE 1 For apprentice rates see "Apprentice-LABORER"	12/01/2016	\$36.60	\$7.60	\$14.15	\$0.00	\$58.35	
	06/01/2017	\$37.60	\$7.60	\$14.15	\$0.00	\$59.35	
	12/01/2017	\$38.45	\$7.60	\$14.15	\$0.00	\$60.20	
	06/01/2018	\$39.40	\$7.60	\$14.15	\$0.00	\$61.15	
	12/01/2018	\$40.35	\$7.60	\$14.15	\$0.00	\$62.10	
	06/01/2019	\$41.35	\$7.60	\$14.15	\$0.00	\$63.10	
	12/01/2019	\$42.35	\$7.60	\$14.15	\$0.00	\$64.10	
	03/01/2017	\$38.77	\$9.90	\$17.00	\$0.00	\$65.67	
	09/01/2017	\$39.78	\$9.90	\$17.00	\$0.00	\$66.68	
	03/01/2018	\$40.78	\$9.90	\$17.00	\$0.00	\$67.68	
CARPENTER CARPENTERS - ZONE 2 (Eastern Massachusetts) For apprentice rates see "Apprentice-LABORER"	09/01/2018	\$41.82	\$9.90	\$17.00	\$0.00	\$68.72	
	03/01/2019	\$42.85	\$9.90	\$17.00	\$0.00	\$69.75	

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate	
Apprentice - BOILERMAKER - Local 29 Effective Date - 01/01/2017	1 65	\$27.90	\$6.97	\$10.54	\$0.00	\$45.41	
	2 65	\$27.90	\$6.97	\$10.54	\$0.00	\$45.41	
	3 70	\$30.04	\$6.97	\$11.35	\$0.00	\$48.36	
	4 75	\$32.19	\$6.97	\$12.16	\$0.00	\$51.32	
	5 80	\$34.34	\$6.97	\$12.97	\$0.00	\$54.28	
	6 85	\$36.48	\$6.97	\$13.78	\$0.00	\$57.23	
	7 90	\$38.63	\$6.97	\$14.59	\$0.00	\$60.19	
	8 95	\$40.77	\$6.97	\$15.40	\$0.00	\$63.14	
	Notes:						
	Apprentice to Journeyworker Ratio:1:5						
BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) BRICKLAYERS LOCAL 3 (BOSTON)	03/01/2017	\$50.76	\$10.75	\$19.22	\$0.00	\$80.73	

Apprentice - CEMENT MASONRY/PLASTERING - Eastern Mass (Boston)
Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.84	\$12.20	\$12.41	\$0.00	\$47.45
2	60	\$27.40	\$12.20	\$14.41	\$1.30	\$55.31
3	65	\$29.69	\$12.20	\$15.41	\$1.30	\$58.60
4	70	\$31.97	\$12.20	\$16.41	\$1.30	\$61.88
5	75	\$34.25	\$12.20	\$17.41	\$1.30	\$65.16
6	80	\$36.54	\$12.20	\$18.41	\$1.30	\$68.45
7	90	\$41.10	\$12.20	\$19.41	\$1.30	\$74.01

Effective Date - 07/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.15	\$12.20	\$12.41	\$0.00	\$47.76
2	60	\$27.78	\$12.20	\$14.41	\$1.30	\$55.69
3	65	\$30.10	\$12.20	\$15.41	\$1.30	\$59.01
4	70	\$32.41	\$12.20	\$16.41	\$1.30	\$62.32
5	75	\$34.73	\$12.20	\$17.41	\$1.30	\$65.64
6	80	\$37.04	\$12.20	\$18.41	\$1.30	\$68.95
7	90	\$41.67	\$12.20	\$19.41	\$1.30	\$74.58

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

Apprentice to Journeyworker Ratio:1:3

CHAIN SAW OPERATOR
LABORERS - ZONE 1

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
12/01/2016	\$36.60	\$7.60	\$7.60	\$14.15	\$65.95
06/01/2017	\$37.60	\$7.60	\$7.60	\$14.15	\$67.00
12/01/2017	\$38.45	\$7.60	\$7.60	\$14.15	\$67.80
06/01/2018	\$39.40	\$7.60	\$7.60	\$14.15	\$68.75
12/01/2018	\$40.35	\$7.60	\$7.60	\$14.15	\$69.70
06/01/2019	\$41.35	\$7.60	\$7.60	\$14.15	\$70.70
12/01/2019	\$42.35	\$7.60	\$7.60	\$14.15	\$71.70

For apprentice rates see "Apprentice- LABORER"

CLAM SHELLS/LURRY BUCKETS/HEADING MACHINES
OPERATING ENGINEERS LOCAL 4

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
12/01/2016	\$46.38	\$10.00	\$10.00	\$15.25	\$81.63
06/01/2017	\$47.38	\$10.00	\$10.00	\$15.25	\$82.63
12/01/2017	\$48.38	\$10.00	\$10.00	\$15.25	\$83.63

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

COMPRESSOR OPERATOR
OPERATING ENGINEERS LOCAL 4

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
12/01/2016	\$31.17	\$10.00	\$10.00	\$15.25	\$66.42
06/01/2017	\$31.86	\$10.00	\$10.00	\$15.25	\$67.11
12/01/2017	\$32.55	\$10.00	\$10.00	\$15.25	\$67.80

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

DELEADER (BRIDGE)
PRINTERS LOCAL 35 - ZONE 2

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
01/01/2017	\$51.41	\$7.85	\$7.85	\$16.10	\$83.11

Apprentice - CARPENTER - Zone 2 Eastern MA
Effective Date - 03/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.39	\$9.90	\$1.63	\$0.00	\$30.92
2	60	\$23.26	\$9.90	\$1.63	\$0.00	\$34.79
3	70	\$27.14	\$9.90	\$1.21	\$0.00	\$38.25
4	75	\$29.08	\$9.90	\$1.21	\$0.00	\$40.19
5	80	\$31.02	\$9.90	\$1.37	\$0.00	\$42.29
6	80	\$31.02	\$9.90	\$1.37	\$0.00	\$42.29
7	90	\$34.89	\$9.90	\$1.37	\$0.00	\$46.16
8	90	\$34.89	\$9.90	\$1.37	\$0.00	\$46.16

Effective Date - 09/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.89	\$9.90	\$1.63	\$0.00	\$31.42
2	60	\$23.87	\$9.90	\$1.63	\$0.00	\$35.40
3	70	\$27.85	\$9.90	\$1.21	\$0.00	\$38.96
4	75	\$29.84	\$9.90	\$1.21	\$0.00	\$40.96
5	80	\$31.82	\$9.90	\$1.37	\$0.00	\$43.11
6	80	\$31.82	\$9.90	\$1.37	\$0.00	\$43.11
7	90	\$35.80	\$9.90	\$1.37	\$0.00	\$47.07
8	90	\$35.80	\$9.90	\$1.37	\$0.00	\$47.07

Notes:

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING
BRICKLAYERS LOCAL 3 (BOSTON)

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
01/01/2017	\$45.67	\$12.20	\$19.41	\$1.30	\$78.58
07/01/2017	\$46.30	\$12.20	\$19.41	\$1.30	\$79.21
01/01/2018	\$46.54	\$12.20	\$19.41	\$1.30	\$79.45
07/01/2018	\$46.79	\$12.20	\$19.41	\$1.30	\$79.70
01/01/2019	\$47.03	\$12.20	\$19.41	\$1.30	\$79.94
07/01/2019	\$47.27	\$12.20	\$19.41	\$1.30	\$80.18
01/01/2020	\$47.52	\$12.20	\$19.41	\$1.30	\$80.43

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: CONCRETE CUTTERS/SAWYER LABORERS - ZONE 1	12/01/2016	\$37.50	\$7.60	\$14.15	\$0.00	\$59.25
	06/01/2017	\$38.50	\$7.60	\$14.15	\$0.00	\$60.25
	12/01/2017	\$39.35	\$7.60	\$14.15	\$0.00	\$61.10
	06/01/2018	\$40.30	\$7.60	\$14.15	\$0.00	\$62.05
	12/01/2018	\$41.25	\$7.60	\$14.15	\$0.00	\$63.00
	06/01/2019	\$42.25	\$7.60	\$14.15	\$0.00	\$64.00
	12/01/2019	\$43.25	\$7.60	\$14.15	\$0.00	\$65.00
	12/01/2016	\$37.25	\$7.60	\$14.15	\$0.00	\$59.00
	06/01/2017	\$38.25	\$7.60	\$14.15	\$0.00	\$60.00
12/01/2017	\$39.10	\$7.60	\$14.15	\$0.00	\$60.85	
06/01/2018	\$40.05	\$7.60	\$14.15	\$0.00	\$61.80	
12/01/2018	\$41.00	\$7.60	\$14.15	\$0.00	\$62.75	
06/01/2019	\$42.00	\$7.60	\$14.15	\$0.00	\$63.75	
12/01/2019	\$43.00	\$7.60	\$14.15	\$0.00	\$64.75	
For apprentice rates see "Apprentice-LABORER"						
DEMO: JACKHAMMER OPERATOR LABORERS - ZONE 1	12/01/2016	\$36.50	\$7.60	\$14.15	\$0.00	\$58.25
	06/01/2017	\$37.50	\$7.60	\$14.15	\$0.00	\$59.25
	12/01/2017	\$38.35	\$7.60	\$14.15	\$0.00	\$60.10
	06/01/2018	\$39.30	\$7.60	\$14.15	\$0.00	\$61.05
	12/01/2018	\$40.25	\$7.60	\$14.15	\$0.00	\$62.00
	06/01/2019	\$41.25	\$7.60	\$14.15	\$0.00	\$63.00
	12/01/2019	\$42.25	\$7.60	\$14.15	\$0.00	\$64.00
	12/01/2016	\$44.94	\$10.00	\$15.25	\$0.00	\$70.19
	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17	
For apprentice rates see "Apprentice-OPERATING ENGINEERS"						
DIVER PILEDRIVER LOCAL 56 (ZONE 1)	08/01/2015	\$58.86	\$9.80	\$19.23	\$0.00	\$87.89
	08/01/2015	\$42.04	\$9.80	\$19.23	\$0.00	\$71.07
	08/01/2015	\$63.06	\$9.80	\$19.23	\$0.00	\$92.09
For apprentice rates see "Apprentice-PILE DRIVER"						
DIVER TENDER PILEDRIVER LOCAL 56 (ZONE 1)	08/01/2015	\$42.04	\$9.80	\$19.23	\$0.00	\$71.07
	08/01/2015	\$63.06	\$9.80	\$19.23	\$0.00	\$92.09
	08/01/2015	\$88.23	\$9.80	\$19.23	\$0.00	\$117.26
For apprentice rates see "Apprentice-PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) ELECTRICIANS LOCAL 103	03/01/2017	\$48.33	\$13.00	\$17.45	\$0.00	\$78.78
	09/01/2017	\$49.28	\$13.00	\$17.48	\$0.00	\$79.76
	03/01/2018	\$50.48	\$13.00	\$17.51	\$0.00	\$80.99
09/01/2018	\$51.67	\$13.00	\$17.55	\$0.00	\$82.22	
03/01/2019	\$52.87	\$13.00	\$17.59	\$0.00	\$83.46	
For apprentice rates see "Apprentice-ELECTRICIAN"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Apprentice - PAINTER Local 35 - BRIDGES/TANKS Effective Date - 01/01/2017	1	\$25.71	\$7.85	\$0.00	\$0.00	\$33.56
	2	\$28.28	\$7.85	\$3.66	\$0.00	\$39.79
	3	\$30.85	\$7.85	\$3.99	\$0.00	\$42.69
	4	\$33.42	\$7.85	\$4.32	\$0.00	\$45.59
	5	\$35.99	\$7.85	\$4.65	\$0.00	\$47.49
	6	\$38.56	\$7.85	\$4.98	\$0.00	\$49.39
	7	\$41.13	\$7.85	\$5.31	\$0.00	\$51.29
	8	\$43.70	\$7.85	\$5.64	\$0.00	\$53.19
	9	\$46.27	\$7.85	\$5.97	\$0.00	\$55.09
Notes: Steps are 750 hrs.						
Apprentice to Journeyworker Ratio:1:1 DEMO: ADZEMAN LABORERS - ZONE 1	12/01/2016	\$36.50	\$7.60	\$14.15	\$0.00	\$58.25
	06/01/2017	\$37.50	\$7.60	\$14.15	\$0.00	\$59.25
	12/01/2017	\$38.35	\$7.60	\$14.15	\$0.00	\$60.10
	06/01/2018	\$39.30	\$7.60	\$14.15	\$0.00	\$61.05
	12/01/2018	\$40.25	\$7.60	\$14.15	\$0.00	\$62.00
	06/01/2019	\$41.25	\$7.60	\$14.15	\$0.00	\$63.00
	12/01/2019	\$42.25	\$7.60	\$14.15	\$0.00	\$64.00
	12/01/2016	\$37.50	\$7.60	\$14.15	\$0.00	\$59.25
	06/01/2017	\$38.50	\$7.60	\$14.15	\$0.00	\$60.25
12/01/2017	\$39.35	\$7.60	\$14.15	\$0.00	\$61.10	
06/01/2018	\$40.30	\$7.60	\$14.15	\$0.00	\$62.05	
12/01/2018	\$41.25	\$7.60	\$14.15	\$0.00	\$63.00	
06/01/2019	\$42.25	\$7.60	\$14.15	\$0.00	\$64.00	
12/01/2019	\$43.25	\$7.60	\$14.15	\$0.00	\$65.00	
For apprentice rates see "Apprentice-LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR LABORERS - ZONE 1	12/01/2016	\$36.50	\$7.60	\$14.15	\$0.00	\$58.25
	06/01/2017	\$37.50	\$7.60	\$14.15	\$0.00	\$59.25
	12/01/2017	\$38.35	\$7.60	\$14.15	\$0.00	\$60.10
	06/01/2018	\$39.30	\$7.60	\$14.15	\$0.00	\$61.05
	12/01/2018	\$40.25	\$7.60	\$14.15	\$0.00	\$62.00
	06/01/2019	\$41.25	\$7.60	\$14.15	\$0.00	\$63.00
	12/01/2019	\$42.25	\$7.60	\$14.15	\$0.00	\$64.00
	12/01/2016	\$37.25	\$7.60	\$14.15	\$0.00	\$59.00
	06/01/2017	\$38.25	\$7.60	\$14.15	\$0.00	\$60.00
12/01/2017	\$39.10	\$7.60	\$14.15	\$0.00	\$60.85	
06/01/2018	\$40.05	\$7.60	\$14.15	\$0.00	\$61.80	
12/01/2018	\$41.00	\$7.60	\$14.15	\$0.00	\$62.75	
06/01/2019	\$42.00	\$7.60	\$14.15	\$0.00	\$63.75	
12/01/2019	\$43.00	\$7.60	\$14.15	\$0.00	\$64.75	
For apprentice rates see "Apprentice-LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ELECTRICIAN ELECTRICIANS LOCAL 103	03/01/2017	\$48.33	\$13.00	\$17.45	\$0.00	\$78.78
	09/01/2017	\$49.28	\$13.00	\$17.48	\$0.00	\$79.76
	03/01/2018	\$50.48	\$13.00	\$17.51	\$0.00	\$80.99
	09/01/2018	\$51.67	\$13.00	\$17.55	\$0.00	\$82.22
	03/01/2019	\$52.87	\$13.00	\$17.59	\$0.00	\$83.46
Apprentice - ELECTRICIAN - Local 103						
Effective Date -	03/01/2017					
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$19.33	\$13.00	\$0.58	\$0.00	\$32.91
2	40	\$19.33	\$13.00	\$0.58	\$0.00	\$32.91
3	45	\$21.75	\$13.00	\$1.37	\$0.00	\$48.12
4	45	\$21.75	\$13.00	\$1.37	\$0.00	\$48.12
5	50	\$24.17	\$13.00	\$1.37	\$0.00	\$50.92
6	55	\$26.58	\$13.00	\$1.41	\$0.00	\$53.69
7	60	\$29.00	\$13.00	\$1.48	\$0.00	\$56.48
8	65	\$31.41	\$13.00	\$1.48	\$0.00	\$59.26
9	70	\$33.83	\$13.00	\$1.52	\$0.00	\$62.05
10	75	\$36.25	\$13.00	\$1.60	\$0.00	\$64.85
Apprentice to Journeyworker Ratio:2:3***						
Effective Date -	09/01/2017					
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$19.71	\$13.00	\$0.59	\$0.00	\$33.30
2	40	\$19.71	\$13.00	\$0.59	\$0.00	\$33.30
3	45	\$22.18	\$13.00	\$1.39	\$0.00	\$48.57
4	45	\$22.18	\$13.00	\$1.39	\$0.00	\$48.57
5	50	\$24.64	\$13.00	\$1.37	\$0.00	\$51.40
6	55	\$27.10	\$13.00	\$1.42	\$0.00	\$54.22
7	60	\$29.57	\$13.00	\$1.50	\$0.00	\$57.07
8	65	\$32.03	\$13.00	\$1.48	\$0.00	\$59.90
9	70	\$34.50	\$13.00	\$1.52	\$0.00	\$62.75
10	75	\$36.96	\$13.00	\$1.62	\$0.00	\$65.58
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	01/01/2017	\$55.86	\$15.28	\$15.71	\$0.00	\$86.85

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Apprentice - ELEVATOR CONSTRUCTOR - Local 4	01/01/2017	\$27.93	\$15.28	\$0.00	\$0.00	\$43.21
		\$30.72	\$15.28	\$15.71	\$0.00	\$61.71
		\$36.31	\$15.28	\$15.71	\$0.00	\$67.30
		\$39.10	\$15.28	\$15.71	\$0.00	\$70.09
		\$44.69	\$15.28	\$15.71	\$0.00	\$75.68
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	01/01/2017	\$39.10	\$15.28	\$15.71	\$0.00	\$70.09
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"						
FENCE & GUARD RAIL ERECTOR LABORERS - ZONE 1	12/01/2016	\$36.60	\$7.60	\$14.15	\$0.00	\$58.35
	06/01/2017	\$37.60	\$7.60	\$14.15	\$0.00	\$59.35
	12/01/2017	\$38.45	\$7.60	\$14.15	\$0.00	\$60.20
	06/01/2018	\$39.40	\$7.60	\$14.15	\$0.00	\$61.15
	12/01/2018	\$40.35	\$7.60	\$14.15	\$0.00	\$62.10
	06/01/2019	\$41.35	\$7.60	\$14.15	\$0.00	\$63.10
	12/01/2019	\$42.35	\$7.60	\$14.15	\$0.00	\$64.10
For apprentice rates see "Apprentice-LABORER"						
FIELD ENG INST PERSON-BLDG,SITE,HVY/HWY OPERATING ENGINEERS LOCAL 4	11/01/2016	\$41.37	\$10.00	\$15.15	\$0.00	\$66.52
	05/01/2017	\$42.15	\$10.00	\$15.25	\$0.00	\$67.40
	11/01/2017	\$42.88	\$10.00	\$15.25	\$0.00	\$68.13
	05/01/2018	\$43.59	\$10.00	\$15.25	\$0.00	\$68.84
For apprentice rates see "Apprentice-OPERATING ENGINEERS"						
FIELD ENG PARTY CHIEF-BLDG,SITE,HVY/HWY OPERATING ENGINEERS LOCAL 4	11/01/2016	\$42.82	\$10.00	\$15.15	\$0.00	\$67.97
	05/01/2017	\$43.61	\$10.00	\$15.25	\$0.00	\$68.86
	11/01/2017	\$44.34	\$10.00	\$15.25	\$0.00	\$69.59
	05/01/2018	\$45.06	\$10.00	\$15.25	\$0.00	\$70.31
For apprentice rates see "Apprentice-OPERATING ENGINEERS"						
FIELD ENG ROD PERSON-BLDG,SITE,HVY/HWY OPERATING ENGINEERS LOCAL 4	11/01/2016	\$21.98	\$10.00	\$15.15	\$0.00	\$47.13
	05/01/2017	\$22.41	\$10.00	\$15.25	\$0.00	\$47.66
	11/01/2017	\$22.83	\$10.00	\$15.25	\$0.00	\$48.08
	05/01/2018	\$23.26	\$10.00	\$15.25	\$0.00	\$48.51
For apprentice rates see "Apprentice-OPERATING ENGINEERS"						
FIRE ALARM INSTALLER ELECTRICIANS LOCAL 103	03/01/2017	\$48.33	\$13.00	\$17.45	\$0.00	\$78.78
	09/01/2017	\$49.28	\$13.00	\$17.48	\$0.00	\$79.76
	03/01/2018	\$50.48	\$13.00	\$17.51	\$0.00	\$80.99
	09/01/2018	\$51.67	\$13.00	\$17.55	\$0.00	\$82.22
	03/01/2019	\$52.87	\$13.00	\$17.59	\$0.00	\$83.46
For apprentice rates see "Apprentice-ELECTRICIAN"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIRE ALARM REPAIR / MAINTENANCE LOCAL 103 / COMMISSIONING ELECTRICIANS	03/01/2017	\$36.25	\$13.00	\$15.60	\$0.00	\$64.85
	09/01/2017	\$36.96	\$13.00	\$15.62	\$0.00	\$66.58
	03/01/2018	\$37.86	\$13.00	\$15.65	\$0.00	\$66.51
	09/01/2018	\$38.75	\$13.00	\$15.67	\$0.00	\$67.42
	03/01/2019	\$39.65	\$13.00	\$15.70	\$0.00	\$68.35
For apprentice rates see "Apprentice-TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) OPERATING ENGINEERS LOCAL 4	12/01/2016	\$37.65	\$10.00	\$15.25	\$0.00	\$62.90
	06/01/2017	\$38.49	\$10.00	\$15.25	\$0.00	\$63.74
	12/01/2017	\$39.32	\$10.00	\$15.25	\$0.00	\$64.57
FLAGGER & SIGNALER LABORERS- ZONE 1	12/01/2016	\$20.50	\$7.60	\$14.15	\$0.00	\$42.25
	03/01/2016	\$42.13	\$9.80	\$17.62	\$0.00	\$69.55
For apprentice rates see "Apprentice-LABORER"						
FLOORCOVERER FLOORCOVERERS LOCAL 2168 ZONE 1	03/01/2016	\$42.13	\$9.80	\$17.62	\$0.00	\$69.55

Apprentice - FLOORCOVERER - Local 2168 Zone 1

Effective Date - Step percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1 50	\$21.07	\$9.80	\$1.79	\$0.00	\$32.66
2 55	\$23.17	\$9.80	\$1.79	\$0.00	\$34.76
3 60	\$25.28	\$9.80	\$1.25	\$0.00	\$47.33
4 65	\$27.38	\$9.80	\$1.25	\$0.00	\$49.43
5 70	\$29.49	\$9.80	\$1.40	\$0.00	\$53.33
6 75	\$31.60	\$9.80	\$1.40	\$0.00	\$55.44
7 80	\$33.70	\$9.80	\$1.83	\$0.00	\$59.33
8 85	\$35.81	\$9.80	\$1.83	\$0.00	\$61.44

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FORK LIFT/CHERRY PICKER OPERATING ENGINEERS LOCAL 4	12/01/2016	\$45.38	\$10.00	\$15.25	\$0.00	\$70.63
	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63
For apprentice rates see "Apprentice-OPERATING ENGINEERS"						
GENERATOR/LIGHTING PLANT/HEATERS OPERATING ENGINEERS LOCAL 4	12/01/2016	\$31.17	\$10.00	\$15.25	\$0.00	\$56.42
	06/01/2017	\$31.86	\$10.00	\$15.25	\$0.00	\$57.11
	12/01/2017	\$32.55	\$10.00	\$15.25	\$0.00	\$57.80
For apprentice rates see "Apprentice-OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) GLAZIERS LOCAL 35 (ZONE 2)	01/01/2017	\$40.91	\$7.85	\$16.10	\$0.00	\$64.86

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Apprentice - GLAZIER - Local 35 Zone 2 Effective Date - 01/01/2017	Step percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
	1 50	\$20.46	\$7.85	\$0.00	\$0.00	\$28.31
	2 55	\$22.50	\$7.85	\$3.66	\$0.00	\$34.01
	3 60	\$24.55	\$7.85	\$3.99	\$0.00	\$36.39
	4 65	\$26.59	\$7.85	\$4.32	\$0.00	\$38.76
	5 70	\$28.64	\$7.85	\$14.11	\$0.00	\$50.60
	6 75	\$30.68	\$7.85	\$14.44	\$0.00	\$52.97
	7 80	\$32.73	\$7.85	\$14.77	\$0.00	\$55.35
8 90	\$36.82	\$7.85	\$15.44	\$0.00	\$60.11	

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HOISTING ENGINEER/CRANES/GRADALLS OPERATING ENGINEERS LOCAL 4	12/01/2016	\$45.38	\$10.00	\$15.25	\$0.00	\$70.63
	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Apprentice - OPERATING ENGINEERS - Local 4						
Effective Date - 12/01/2016						
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$24.96	\$10.00	\$0.00	\$0.00	\$34.96
2	60	\$27.23	\$10.00	\$15.25	\$0.00	\$52.48
3	65	\$29.50	\$10.00	\$15.25	\$0.00	\$54.75
4	70	\$31.77	\$10.00	\$15.25	\$0.00	\$57.02
5	75	\$34.04	\$10.00	\$15.25	\$0.00	\$59.29
6	80	\$36.30	\$10.00	\$15.25	\$0.00	\$61.55
7	85	\$38.57	\$10.00	\$15.25	\$0.00	\$63.82
8	90	\$40.84	\$10.00	\$15.25	\$0.00	\$66.09
Apprentice - 06/01/2017						
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$25.51	\$10.00	\$0.00	\$0.00	\$35.51
2	60	\$27.83	\$10.00	\$15.25	\$0.00	\$53.08
3	65	\$30.15	\$10.00	\$15.25	\$0.00	\$55.40
4	70	\$32.47	\$10.00	\$15.25	\$0.00	\$57.72
5	75	\$34.79	\$10.00	\$15.25	\$0.00	\$60.04
6	80	\$37.10	\$10.00	\$15.25	\$0.00	\$62.35
7	85	\$39.42	\$10.00	\$15.25	\$0.00	\$64.67
8	90	\$41.74	\$10.00	\$15.25	\$0.00	\$66.99
Notes:						
Apprentice to Journeyworker Ratio:1:6						
HVAC (DUCTWORK)	02/01/2017	\$43.72	\$11.45	\$23.07	\$2.35	\$80.59
SHEETMETALWORKERSLOCAL17-A	08/01/2017	\$44.82	\$11.45	\$23.07	\$2.35	\$81.69
	02/01/2018	\$45.97	\$11.45	\$23.07	\$2.35	\$82.84
For apprentice rates see "Apprentice-SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS)	03/01/2017	\$48.33	\$13.00	\$17.45	\$0.00	\$78.78
ELECTRICIANSLOCAL105	09/01/2017	\$49.28	\$13.00	\$17.48	\$0.00	\$79.76
	03/01/2018	\$50.48	\$13.00	\$17.51	\$0.00	\$80.99
	09/01/2018	\$51.67	\$13.00	\$17.55	\$0.00	\$82.22
	03/01/2019	\$52.87	\$13.00	\$17.59	\$0.00	\$83.46
For apprentice rates see "Apprentice-ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR)	02/01/2017	\$43.72	\$11.45	\$23.07	\$2.35	\$80.59
SHEETMETALWORKERSLOCAL17-A	08/01/2017	\$44.82	\$11.45	\$23.07	\$2.35	\$81.69
	02/01/2018	\$45.97	\$11.45	\$23.07	\$2.35	\$82.84
For apprentice rates see "Apprentice-SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING - WATER)	03/01/2017	\$51.19	\$9.70	\$18.14	\$0.00	\$79.03
PIPEFITTERSLOCAL337						
For apprentice rates see "Apprentice-PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC	03/01/2017	\$51.19	\$9.70	\$18.14	\$0.00	\$79.03
PIPEFITTERSLOCAL337						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HYDRAULIC DRILLS						
LABORERS - ZONE 1						
For apprentice rates see "Apprentice-PIPEFITTER" or "PLUMBER/PIPEFITTER"						
	12/01/2016	\$37.10	\$7.60	\$14.15	\$0.00	\$58.85
	06/01/2017	\$38.10	\$7.60	\$14.15	\$0.00	\$59.85
	12/01/2017	\$38.95	\$7.60	\$14.15	\$0.00	\$60.70
	06/01/2018	\$39.90	\$7.60	\$14.15	\$0.00	\$61.65
	12/01/2018	\$40.85	\$7.60	\$14.15	\$0.00	\$62.60
	06/01/2019	\$41.85	\$7.60	\$14.15	\$0.00	\$63.60
	12/01/2019	\$42.85	\$7.60	\$14.15	\$0.00	\$64.60
For apprentice rates see "Apprentice-LABORER"						
INSULATOR (PIPES & TANKS)						
HEAT & FROST INSULATORS LOCAL 6 (BOSTON)						
	09/01/2016	\$45.09	\$11.75	\$14.20	\$0.00	\$71.04
	09/01/2017	\$47.09	\$11.75	\$14.20	\$0.00	\$73.04
	09/01/2018	\$49.34	\$11.75	\$14.20	\$0.00	\$75.29
	09/01/2019	\$51.84	\$11.75	\$14.20	\$0.00	\$77.79
Apprentice - ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Boston						
Effective Date - 09/01/2016						
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.55	\$11.75	\$10.45	\$0.00	\$44.75
2	60	\$27.05	\$11.75	\$11.20	\$0.00	\$50.00
3	70	\$31.56	\$11.75	\$11.95	\$0.00	\$55.26
4	80	\$36.07	\$11.75	\$12.70	\$0.00	\$60.52
Effective Date - 09/01/2017						
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.55	\$11.75	\$10.45	\$0.00	\$45.75
2	60	\$28.25	\$11.75	\$11.20	\$0.00	\$51.20
3	70	\$32.96	\$11.75	\$11.95	\$0.00	\$56.66
4	80	\$37.67	\$11.75	\$12.70	\$0.00	\$62.12
Notes:						
Steps are 1 year						
Apprentice to Journeyworker Ratio:1:4						
IRONWORKER/WELDER	03/16/2017	\$44.65	\$7.80	\$20.85	\$0.00	\$73.30
IRONWORKERS LOCAL 7 (BOSTON AREA)						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate	Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate		
														Step	percent
Apprentice - IRONWORKER - Local 7 Boston															
Effective Date - 03/16/2017															
	1	60	\$26.79	\$7.80	\$20.85	\$0.00		1	60	\$21.81	\$7.60	\$14.15	\$0.00	\$43.56	
	2	70	\$31.26	\$7.80	\$20.85	\$0.00		2	70	\$25.45	\$7.60	\$14.15	\$0.00	\$47.20	
	3	75	\$33.49	\$7.80	\$20.85	\$0.00		3	80	\$29.08	\$7.60	\$14.15	\$0.00	\$50.83	
	4	80	\$35.72	\$7.80	\$20.85	\$0.00		4	90	\$32.72	\$7.60	\$14.15	\$0.00	\$54.47	
	5	85	\$37.95	\$7.80	\$20.85	\$0.00		Effective Date - 06/01/2017							
	6	90	\$40.19	\$7.80	\$20.85	\$0.00		1	60	\$22.41	\$7.60	\$14.15	\$0.00	\$44.16	
	Notes:														
	** Structural 1.6, Ornamental 1.4														
	Apprentice to Journeyworker Ratio:**														
JACKHAMMER & PAVING BREAKER OPERATOR															
LABORERS - ZONE I															
			12/01/2016	\$36.60	\$7.60	\$14.15	\$0.00		2	70	\$26.15	\$7.60	\$14.15	\$0.00	\$47.90
			06/01/2017	\$37.60	\$7.60	\$14.15	\$0.00		3	80	\$29.88	\$7.60	\$14.15	\$0.00	\$51.63
			12/01/2017	\$38.45	\$7.60	\$14.15	\$0.00		4	90	\$33.62	\$7.60	\$14.15	\$0.00	\$55.37
			06/01/2018	\$39.40	\$7.60	\$14.15	\$0.00	Apprentice to Journeyworker Ratio:1:5							
			12/01/2018	\$40.35	\$7.60	\$14.15	\$0.00	LABORER - CARPENTER TENDER							
			06/01/2019	\$41.35	\$7.60	\$14.15	\$0.00	LABORERS - ZONE I							
			12/01/2019	\$42.35	\$7.60	\$14.15	\$0.00	For apprentice rates see "Apprentice-LABORER"							
			12/01/2016	\$36.35	\$7.60	\$14.15	\$0.00	12/01/2016	\$36.35	\$7.60	\$14.15	\$0.00	\$58.10		
			06/01/2017	\$37.35	\$7.60	\$14.15	\$0.00	06/01/2017	\$37.35	\$7.60	\$14.15	\$0.00	\$59.10		
			12/01/2017	\$38.20	\$7.60	\$14.15	\$0.00	12/01/2017	\$38.20	\$7.60	\$14.15	\$0.00	\$59.95		
			06/01/2018	\$39.15	\$7.60	\$14.15	\$0.00	06/01/2018	\$39.15	\$7.60	\$14.15	\$0.00	\$60.90		
			12/01/2018	\$40.10	\$7.60	\$14.15	\$0.00	12/01/2018	\$40.10	\$7.60	\$14.15	\$0.00	\$61.85		
			06/01/2019	\$41.10	\$7.60	\$14.15	\$0.00	06/01/2019	\$41.10	\$7.60	\$14.15	\$0.00	\$62.85		
			12/01/2019	\$42.10	\$7.60	\$14.15	\$0.00	12/01/2019	\$42.10	\$7.60	\$14.15	\$0.00	\$63.85		
			12/01/2016	\$36.35	\$7.60	\$14.15	\$0.00	LABORER - CEMENT FINISHER TENDER							
			06/01/2017	\$37.35	\$7.60	\$14.15	\$0.00	LABORERS - ZONE I							
			12/01/2017	\$38.20	\$7.60	\$14.15	\$0.00	For apprentice rates see "Apprentice-LABORER"							
			06/01/2018	\$39.15	\$7.60	\$14.15	\$0.00	12/01/2016	\$36.50	\$7.60	\$14.15	\$0.00	\$58.25		
			12/01/2018	\$40.10	\$7.60	\$14.15	\$0.00	06/01/2017	\$37.50	\$7.60	\$14.15	\$0.00	\$59.25		
			06/01/2019	\$41.10	\$7.60	\$14.15	\$0.00	12/01/2017	\$38.35	\$7.60	\$14.15	\$0.00	\$60.10		
			12/01/2019	\$42.10	\$7.60	\$14.15	\$0.00	06/01/2018	\$39.30	\$7.60	\$14.15	\$0.00	\$61.05		
								12/01/2018	\$40.25	\$7.60	\$14.15	\$0.00	\$62.00		
								06/01/2019	\$41.25	\$7.60	\$14.15	\$0.00	\$63.00		
								12/01/2019	\$42.28	\$7.60	\$14.15	\$0.00	\$64.03		

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate	Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate	
														Step
Apprentice - LABORER - Zone 1														
Effective Date - 12/01/2016														
	1	60	\$21.81	\$7.60	\$14.15	\$0.00		1	60	\$21.81	\$7.60	\$14.15	\$0.00	\$43.56
	2	70	\$25.45	\$7.60	\$14.15	\$0.00		2	70	\$25.45	\$7.60	\$14.15	\$0.00	\$47.20
	3	80	\$29.08	\$7.60	\$14.15	\$0.00		3	80	\$29.08	\$7.60	\$14.15	\$0.00	\$50.83
	4	90	\$32.72	\$7.60	\$14.15	\$0.00		4	90	\$32.72	\$7.60	\$14.15	\$0.00	\$54.47
	Effective Date - 06/01/2017													
	1	60	\$22.41	\$7.60	\$14.15	\$0.00		1	60	\$22.41	\$7.60	\$14.15	\$0.00	\$44.16
	2	70	\$26.15	\$7.60	\$14.15	\$0.00		2	70	\$26.15	\$7.60	\$14.15	\$0.00	\$47.90
	3	80	\$29.88	\$7.60	\$14.15	\$0.00		3	80	\$29.88	\$7.60	\$14.15	\$0.00	\$51.63
	4	90	\$33.62	\$7.60	\$14.15	\$0.00		4	90	\$33.62	\$7.60	\$14.15	\$0.00	\$55.37
	Notes:													
	Apprentice to Journeyworker Ratio:1:5													
LABORER - CARPENTER TENDER														
LABORERS - ZONE I														
			12/01/2016	\$36.35	\$7.60	\$14.15	\$0.00		12/01/2016	\$36.35	\$7.60	\$14.15	\$0.00	\$58.10
			06/01/2017	\$37.35	\$7.60	\$14.15	\$0.00		06/01/2017	\$37.35	\$7.60	\$14.15	\$0.00	\$59.10
			12/01/2017	\$38.20	\$7.60	\$14.15	\$0.00		12/01/2017	\$38.20	\$7.60	\$14.15	\$0.00	\$59.95
			06/01/2018	\$39.15	\$7.60	\$14.15	\$0.00		06/01/2018	\$39.15	\$7.60	\$14.15	\$0.00	\$60.90
			12/01/2018	\$40.10	\$7.60	\$14.15	\$0.00		12/01/2018	\$40.10	\$7.60	\$14.15	\$0.00	\$61.85
			06/01/2019	\$41.10	\$7.60	\$14.15	\$0.00		06/01/2019	\$41.10	\$7.60	\$14.15	\$0.00	\$62.85
			12/01/2019	\$42.10	\$7.60	\$14.15	\$0.00		12/01/2019	\$42.10	\$7.60	\$14.15	\$0.00	\$63.85
			12/01/2016	\$36.35	\$7.60	\$14.15	\$0.00	LABORER - HAZARDOUS WASTE/ASBESTOS REMOVER						
			06/01/2017	\$37.35	\$7.60	\$14.15	\$0.00	LABORERS - ZONE I						
			12/01/2017	\$38.20	\$7.60	\$14.15	\$0.00	For apprentice rates see "Apprentice-LABORER"						
			06/01/2018	\$39.15	\$7.60	\$14.15	\$0.00	12/01/2016	\$36.50	\$7.60	\$14.15	\$0.00	\$58.25	
			12/01/2018	\$40.10	\$7.60	\$14.15	\$0.00	06/01/2017	\$37.50	\$7.60	\$14.15	\$0.00	\$59.25	
			06/01/2019	\$41.10	\$7.60	\$14.15	\$0.00	12/01/2017	\$38.35	\$7.60	\$14.15	\$0.00	\$60.10	
			12/01/2019	\$42.10	\$7.60	\$14.15	\$0.00	06/01/2018	\$39.30	\$7.60	\$14.15	\$0.00	\$61.05	
								12/01/2018	\$40.25	\$7.60	\$14.15	\$0.00	\$62.00	
								06/01/2019	\$41.25	\$7.60	\$14.15	\$0.00	\$63.00	
								12/01/2019	\$42.28	\$7.60	\$14.15	\$0.00	\$64.03	

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER, MASON TENDER LABORERS - ZONE 1	12/01/2016	\$36.60	\$7.60	\$14.15	\$0.00	\$58.35
	06/01/2017	\$37.60	\$7.60	\$14.15	\$0.00	\$59.35
	12/01/2017	\$38.45	\$7.60	\$14.15	\$0.00	\$60.20
	06/01/2018	\$39.40	\$7.60	\$14.15	\$0.00	\$61.15
	12/01/2018	\$40.35	\$7.60	\$14.15	\$0.00	\$62.10
	06/01/2019	\$41.35	\$7.60	\$14.15	\$0.00	\$63.10
	12/01/2019	\$42.35	\$7.60	\$14.15	\$0.00	\$64.10
	12/01/2016	\$36.35	\$7.60	\$14.15	\$0.00	\$58.10
	06/01/2017	\$37.35	\$7.60	\$14.15	\$0.00	\$59.10
LABORER, MULTI-TRADE TENDER LABORERS - ZONE 1	12/01/2017	\$38.20	\$7.60	\$14.15	\$0.00	\$59.95
	06/01/2018	\$39.15	\$7.60	\$14.15	\$0.00	\$60.90
	12/01/2018	\$40.10	\$7.60	\$14.15	\$0.00	\$61.85
	06/01/2019	\$41.10	\$7.60	\$14.15	\$0.00	\$62.85
	12/01/2019	\$42.10	\$7.60	\$14.15	\$0.00	\$63.85
	12/01/2016	\$36.35	\$7.60	\$14.15	\$0.00	\$58.10
	06/01/2017	\$37.35	\$7.60	\$14.15	\$0.00	\$59.10
	12/01/2017	\$38.20	\$7.60	\$14.15	\$0.00	\$59.95
	06/01/2018	\$39.15	\$7.60	\$14.15	\$0.00	\$60.90
LABORER, TREE REMOVER LABORERS - ZONE 1	12/01/2018	\$40.10	\$7.60	\$14.15	\$0.00	\$61.85
	06/01/2019	\$41.10	\$7.60	\$14.15	\$0.00	\$62.85
	12/01/2019	\$42.10	\$7.60	\$14.15	\$0.00	\$63.85
	12/01/2016	\$36.60	\$7.60	\$14.15	\$0.00	\$58.35
	06/01/2017	\$37.60	\$7.60	\$14.15	\$0.00	\$59.35
	12/01/2017	\$38.45	\$7.60	\$14.15	\$0.00	\$60.20
	06/01/2018	\$39.40	\$7.60	\$14.15	\$0.00	\$61.15
	12/01/2018	\$40.35	\$7.60	\$14.15	\$0.00	\$62.10
	06/01/2019	\$41.35	\$7.60	\$14.15	\$0.00	\$63.10
LASER BEAM OPERATOR LABORERS - ZONE 1	12/01/2019	\$42.35	\$7.60	\$14.15	\$0.00	\$64.10
	02/01/2017	\$38.78	\$10.75	\$17.67	\$0.00	\$67.20

For apprentice rates see "Apprentice-LABORER"

This classification applies to all tree work associated with the removal of standing trees, and trimming and removal of branches and limbs, when the work is not done for a utility company for the purpose of operation, maintenance or repair of utility company equipment. For apprentice rates see "Apprentice-LABORER"

For apprentice rates see "Apprentice-LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Apprentice - MARBLE & TILE FINISHER - Local 3 Marble & Tile Effective Date - 02/01/2017	1	\$19.39	\$10.75	\$17.67	\$0.00	\$47.81
	2	\$23.27	\$10.75	\$17.67	\$0.00	\$51.69
	3	\$27.15	\$10.75	\$17.67	\$0.00	\$55.57
	4	\$31.02	\$10.75	\$17.67	\$0.00	\$59.44
	5	\$34.90	\$10.75	\$17.67	\$0.00	\$63.32
Notes:						
Apprentice to Journeyworker Ratio:1:3						
MARBLE MASONS/TILELAYERS & TERRAZZO MECH BRICKLAYERS/LOCAL 3 - MARBLE & TILE	02/01/2017	\$50.80	\$10.75	\$19.22	\$0.00	\$80.77
	1	\$25.40	\$10.75	\$19.22	\$0.00	\$55.37
	2	\$30.48	\$10.75	\$19.22	\$0.00	\$60.45
	3	\$35.56	\$10.75	\$19.22	\$0.00	\$65.53
	4	\$40.64	\$10.75	\$19.22	\$0.00	\$70.61
5	\$45.72	\$10.75	\$19.22	\$0.00	\$75.69	
Notes:						
Apprentice to Journeyworker Ratio:1:5						
MECH. SWEEPER OPERATOR (ON CONST. SITES) OPERATING ENGINEERS LOCAL 4	12/01/2016	\$44.94	\$10.00	\$15.25	\$0.00	\$70.19
	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17
For apprentice rates see "Apprentice-OPERATING ENGINEERS"						
MECHANICS MAINTENANCE OPERATING ENGINEERS LOCAL 4	12/01/2016	\$44.94	\$10.00	\$15.25	\$0.00	\$70.19
	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17
For apprentice rates see "Apprentice-OPERATING ENGINEERS"						
MILL WRIGHT (Zone 1) MILL WRIGHTS LOCAL 111 - Zone 1	04/01/2017	\$38.62	\$9.90	\$18.50	\$0.00	\$67.02
	10/01/2017	\$39.52	\$9.90	\$18.50	\$0.00	\$67.92
	04/01/2018	\$40.42	\$9.90	\$18.50	\$0.00	\$68.82
	10/01/2018	\$41.32	\$9.90	\$18.50	\$0.00	\$69.72
	04/01/2019	\$42.22	\$9.90	\$18.50	\$0.00	\$70.62

Apprentice - MILLWRIGHT - Local 1121 Zone 1
 Effective Date - 04/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$21.24	\$9.90	\$5.31	\$0.00	\$36.45
2	65	\$25.10	\$9.90	\$15.13	\$0.00	\$50.13
3	75	\$28.97	\$9.90	\$16.10	\$0.00	\$54.97
4	85	\$32.83	\$9.90	\$17.06	\$0.00	\$59.79

Effective Date - 10/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$21.74	\$9.90	\$5.31	\$0.00	\$36.95
2	65	\$25.69	\$9.90	\$15.13	\$0.00	\$50.72
3	75	\$29.64	\$9.90	\$16.10	\$0.00	\$55.64
4	85	\$33.59	\$9.90	\$17.06	\$0.00	\$60.55

Notes: Steps are 2,000 hours
 Apprentice to Journeyworker Ratio:1:5

MORTAR MIXER
 LABORERS - ZONE 1

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
12/01/2016	\$36.60	\$7.60	\$14.15	\$0.00	\$58.35
06/01/2017	\$37.60	\$7.60	\$14.15	\$0.00	\$59.35
12/01/2017	\$38.45	\$7.60	\$14.15	\$0.00	\$60.20
06/01/2018	\$39.40	\$7.60	\$14.15	\$0.00	\$61.15
12/01/2018	\$40.35	\$7.60	\$14.15	\$0.00	\$62.10
06/01/2019	\$41.35	\$7.60	\$14.15	\$0.00	\$63.10
12/01/2019	\$42.35	\$7.60	\$14.15	\$0.00	\$64.10

For apprentice rates see "Apprentice-LABORER"
 OILER (OTHER THAN TRUCK CRANES/GRADALLS)

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
12/01/2016	\$22.96	\$10.00	\$15.25	\$0.00	\$48.21
06/01/2017	\$23.47	\$10.00	\$15.25	\$0.00	\$48.72
12/01/2017	\$23.99	\$10.00	\$15.25	\$0.00	\$49.24

For apprentice rates see "Apprentice-OPERATING ENGINEERS"
 OILER (TRUCK CRANES, GRADALLS)

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
12/01/2016	\$26.94	\$10.00	\$15.25	\$0.00	\$52.19
06/01/2017	\$27.54	\$10.00	\$15.25	\$0.00	\$52.79
12/01/2017	\$28.15	\$10.00	\$15.25	\$0.00	\$53.40

For apprentice rates see "Apprentice-OPERATING ENGINEERS"
 OTHER POWER DRIVEN EQUIPMENT - CLASS II

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
12/01/2016	\$44.94	\$10.00	\$15.25	\$0.00	\$70.19
06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17

For apprentice rates see "Apprentice-OPERATING ENGINEERS"
 PAINTER (BRIDGES/TANKS)

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
01/01/2017	\$51.41	\$7.85	\$16.10	\$0.00	\$75.36

PAINTER (SPRAY OR SANDBLAST, NEW)
 * If 30% or more of surfaces to be painted are new construction,
 NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2

Apprentice - PAINTER Local 35 - BRIDGESTANKS
 Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.71	\$7.85	\$0.00	\$0.00	\$33.56
2	55	\$28.28	\$7.85	\$3.66	\$0.00	\$39.79
3	60	\$30.85	\$7.85	\$3.99	\$0.00	\$42.69
4	65	\$33.42	\$7.85	\$4.32	\$0.00	\$45.59
5	70	\$35.99	\$7.85	\$14.11	\$0.00	\$57.95
6	75	\$38.56	\$7.85	\$14.44	\$0.00	\$60.85
7	80	\$41.13	\$7.85	\$14.77	\$0.00	\$63.75
8	90	\$46.27	\$7.85	\$15.44	\$0.00	\$69.56

Notes: Steps are 750 hrs.
 Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW)
 * If 30% or more of surfaces to be painted are new construction,
 NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
01/01/2017	\$42.31	\$7.85	\$16.10	\$0.00	\$66.26

Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - New
 Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.16	\$7.85	\$0.00	\$0.00	\$29.01
2	55	\$23.27	\$7.85	\$3.66	\$0.00	\$34.78
3	60	\$25.39	\$7.85	\$3.99	\$0.00	\$37.23
4	65	\$27.50	\$7.85	\$4.32	\$0.00	\$39.67
5	70	\$29.62	\$7.85	\$14.11	\$0.00	\$51.58
6	75	\$31.73	\$7.85	\$14.44	\$0.00	\$54.02
7	80	\$33.85	\$7.85	\$14.77	\$0.00	\$56.47
8	90	\$38.08	\$7.85	\$15.44	\$0.00	\$61.37

Notes: Steps are 750 hrs.
 Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT)
 PAINTERS LOCAL 35 - ZONE 2

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
01/01/2017	\$40.37	\$7.85	\$16.10	\$0.00	\$64.32

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER / TAPER (BRUSH, REPAINT) PAINTERS LOCAL 35 - ZONE 2	01/01/2017	\$38.97	\$7.85	\$16.10	\$0.00	\$62.92

Step	percent	Apprentice Base Wage				Total Rate
		Health	Pension	Supplemental Unemployment	Total Rate	
1	50	\$19.49	\$7.85	\$0.00	\$0.00	\$27.34
2	55	\$21.43	\$7.85	\$3.66	\$0.00	\$32.94
3	60	\$23.38	\$7.85	\$3.99	\$0.00	\$35.22
4	65	\$25.33	\$7.85	\$4.32	\$0.00	\$37.50
5	70	\$27.28	\$7.85	\$4.65	\$0.00	\$39.78
6	75	\$29.23	\$7.85	\$4.98	\$0.00	\$42.06
7	80	\$31.18	\$7.85	\$5.31	\$0.00	\$44.34
8	90	\$35.07	\$7.85	\$5.64	\$0.00	\$48.56

Notes:
Steps are 750 hrs.
Apprentice to Journeyworker Ratio:1:1

Step	percent	Apprentice Base Wage				Total Rate
		Health	Pension	Supplemental Unemployment	Total Rate	
1	50	\$19.49	\$7.85	\$0.00	\$0.00	\$27.34
2	55	\$21.43	\$7.85	\$3.66	\$0.00	\$32.94
3	60	\$23.38	\$7.85	\$3.99	\$0.00	\$35.22
4	65	\$25.33	\$7.85	\$4.32	\$0.00	\$37.50
5	70	\$27.28	\$7.85	\$4.65	\$0.00	\$39.78
6	75	\$29.23	\$7.85	\$4.98	\$0.00	\$42.06
7	80	\$31.18	\$7.85	\$5.31	\$0.00	\$44.34
8	90	\$35.07	\$7.85	\$5.64	\$0.00	\$48.56

Notes:
Steps are 750 hrs.
Apprentice to Journeyworker Ratio:1:1

Step	percent	Apprentice Base Wage				Total Rate
		Health	Pension	Supplemental Unemployment	Total Rate	
1	50	\$21.02	\$9.80	\$19.23	\$0.00	\$50.05
2	60	\$25.22	\$9.80	\$19.23	\$0.00	\$54.25
3	70	\$29.43	\$9.80	\$19.23	\$0.00	\$58.46
4	75	\$31.53	\$9.80	\$19.23	\$0.00	\$60.56
5	80	\$33.63	\$9.80	\$19.23	\$0.00	\$62.66
6	80	\$33.63	\$9.80	\$19.23	\$0.00	\$62.66
7	90	\$37.84	\$9.80	\$19.23	\$0.00	\$66.87
8	90	\$37.84	\$9.80	\$19.23	\$0.00	\$66.87

Notes:
Steps are 750 hrs.
Apprentice to Journeyworker Ratio:1:3

Step	percent	Apprentice Base Wage				Total Rate
		Health	Pension	Supplemental Unemployment	Total Rate	
1	50	\$21.02	\$9.80	\$19.23	\$0.00	\$50.05
2	60	\$25.22	\$9.80	\$19.23	\$0.00	\$54.25
3	70	\$29.43	\$9.80	\$19.23	\$0.00	\$58.46
4	75	\$31.53	\$9.80	\$19.23	\$0.00	\$60.56
5	80	\$33.63	\$9.80	\$19.23	\$0.00	\$62.66
6	80	\$33.63	\$9.80	\$19.23	\$0.00	\$62.66
7	90	\$37.84	\$9.80	\$19.23	\$0.00	\$66.87
8	90	\$37.84	\$9.80	\$19.23	\$0.00	\$66.87

Notes:
Steps are 750 hrs.
Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER (TRAFFIC MARKINGS) LABORERS - ZONE 1	01/01/2017	\$36.33	\$7.85	\$15.44	\$0.00	\$59.62

Step	percent	Apprentice Base Wage				Total Rate
		Health	Pension	Supplemental Unemployment	Total Rate	
1	50	\$20.19	\$7.85	\$0.00	\$0.00	\$28.04
2	55	\$22.20	\$7.85	\$3.66	\$0.00	\$33.71
3	60	\$24.22	\$7.85	\$3.99	\$0.00	\$36.06
4	65	\$26.24	\$7.85	\$4.32	\$0.00	\$38.41
5	70	\$28.26	\$7.85	\$4.65	\$0.00	\$40.76
6	75	\$30.28	\$7.85	\$4.98	\$0.00	\$43.11
7	80	\$32.30	\$7.85	\$5.31	\$0.00	\$45.46
8	90	\$36.33	\$7.85	\$5.64	\$0.00	\$49.82

Notes:
Steps are 750 hrs.
Apprentice to Journeyworker Ratio:1:1

Step	percent	Apprentice Base Wage				Total Rate
		Health	Pension	Supplemental Unemployment	Total Rate	
1	50	\$20.46	\$7.85	\$0.00	\$0.00	\$28.31
2	55	\$22.50	\$7.85	\$3.66	\$0.00	\$34.01
3	60	\$24.55	\$7.85	\$3.99	\$0.00	\$36.39
4	65	\$26.59	\$7.85	\$4.32	\$0.00	\$38.76
5	70	\$28.64	\$7.85	\$4.65	\$0.00	\$41.14
6	75	\$30.68	\$7.85	\$4.98	\$0.00	\$43.51
7	80	\$32.73	\$7.85	\$5.31	\$0.00	\$45.89
8	90	\$36.82	\$7.85	\$5.64	\$0.00	\$50.31

Notes:
Steps are 750 hrs.
Apprentice to Journeyworker Ratio:1:1

Step	percent	Apprentice Base Wage				Total Rate
		Health	Pension	Supplemental Unemployment	Total Rate	
1	50	\$20.46	\$7.85	\$0.00	\$0.00	\$28.31
2	55	\$22.50	\$7.85	\$3.66	\$0.00	\$34.01
3	60	\$24.55	\$7.85	\$3.99	\$0.00	\$36.39
4	65	\$26.59	\$7.85	\$4.32	\$0.00	\$38.76
5	70	\$28.64	\$7.85	\$4.65	\$0.00	\$41.14
6	75	\$30.68	\$7.85	\$4.98	\$0.00	\$43.51
7	80	\$32.73	\$7.85	\$5.31	\$0.00	\$45.89
8	90	\$36.82	\$7.85	\$5.64	\$0.00	\$50.31

Notes:
Steps are 750 hrs.
Apprentice to Journeyworker Ratio:1:1

Step	percent	Apprentice Base Wage				Total Rate
		Health	Pension	Supplemental Unemployment	Total Rate	
1	50	\$21.02	\$9.80	\$19.23	\$0.00	\$50.05
2	60	\$25.22	\$9.80	\$19.23	\$0.00	\$54.25
3	70	\$29.43	\$9.80	\$19.23	\$0.00	\$58.46
4	75	\$31.53	\$9.80	\$19.23	\$0.00	\$60.56
5	80	\$33.63	\$9.80	\$19.23	\$0.00	\$62.66
6	80	\$33.63	\$9.80	\$19.23	\$0.00	\$62.66
7	90	\$37.84	\$9.80	\$19.23	\$0.00	\$66.87
8	90	\$37.84	\$9.80	\$19.23	\$0.00	\$66.87

Notes:
Steps are 750 hrs.
Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC DRILL/TOOL OPERATOR <i>LABORERS - ZONE 1</i>	12/01/2016	\$36.60	\$7.60	\$14.15	\$0.00	\$58.35
	06/01/2017	\$37.60	\$7.60	\$14.15	\$0.00	\$59.35
	12/01/2017	\$38.45	\$7.60	\$14.15	\$0.00	\$60.20
	06/01/2018	\$39.40	\$7.60	\$14.15	\$0.00	\$61.15
	12/01/2018	\$40.35	\$7.60	\$14.15	\$0.00	\$62.10
For apprentice rates see "Apprentice-LABORER"	06/01/2019	\$41.35	\$7.60	\$14.15	\$0.00	\$63.10
	12/01/2019	\$42.35	\$7.60	\$14.15	\$0.00	\$64.10
POWDERMAN & BLASTER <i>LABORERS - ZONE 1</i>	12/01/2016	\$37.35	\$7.60	\$14.15	\$0.00	\$59.10
	06/01/2017	\$38.35	\$7.60	\$14.15	\$0.00	\$60.10
	12/01/2017	\$39.20	\$7.60	\$14.15	\$0.00	\$60.95
	06/01/2018	\$40.15	\$7.60	\$14.15	\$0.00	\$61.90
	12/01/2018	\$41.10	\$7.60	\$14.15	\$0.00	\$62.85
For apprentice rates see "Apprentice-LABORER"	06/01/2019	\$42.10	\$7.60	\$14.15	\$0.00	\$63.85
	12/01/2019	\$43.10	\$7.60	\$14.15	\$0.00	\$64.85
POWER SHOVEL/DERRICK/TRENCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2016	\$45.38	\$10.00	\$15.25	\$0.00	\$70.63
	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
For apprentice rates see "Apprentice-OPERATING ENGINEERS"	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63
	12/01/2016	\$45.38	\$10.00	\$15.25	\$0.00	\$70.63
PUMP OPERATOR (CONCRETE) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63
For apprentice rates see "Apprentice-OPERATING ENGINEERS"	12/01/2016	\$31.17	\$10.00	\$15.25	\$0.00	\$56.42
	06/01/2017	\$31.86	\$10.00	\$15.25	\$0.00	\$57.11
For apprentice rates see "Apprentice-OPERATING ENGINEERS"	12/01/2017	\$32.55	\$10.00	\$15.25	\$0.00	\$57.80
	07/01/2016	\$28.03	\$8.23	\$9.31	\$0.00	\$45.57
READY MIX CONCRETE DRIVERS after 4/30/10 (Drivers Hired After 4/30/2010) <i>TEAMSTERS LOCAL 25c</i>	05/01/2017	\$28.18	\$8.23	\$9.72	\$0.00	\$46.13
	07/01/2017	\$28.18	\$8.48	\$9.72	\$0.00	\$46.38
READY-MIX CONCRETE DRIVER <i>TEAMSTERS LOCAL 25c</i>	07/01/2016	\$29.33	\$8.23	\$9.31	\$0.00	\$46.87
	05/01/2017	\$29.48	\$8.23	\$9.72	\$0.00	\$47.43
For apprentice rates see "Apprentice-OPERATING ENGINEERS"	07/01/2017	\$29.48	\$8.48	\$9.72	\$0.00	\$47.68
	12/01/2016	\$44.94	\$10.00	\$15.25	\$0.00	\$70.19
RECLAIMERS <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17
For apprentice rates see "Apprentice-OPERATING ENGINEERS"	06/01/2016	\$25.32	\$9.80	\$16.82	\$0.00	\$51.94
	04/01/2017	\$26.31	\$7.07	\$7.18	\$0.00	\$40.56
RESIDENTIAL WOOD FRAME CARPENTER ** ** The Residential Wood Frame Carpenter classification applies only to the construction of new, wood frame residences that do not exceed four stories including the basement. <i>CARPENTERS-ZONE 2 (Residential Wood)</i>	10/01/2017	\$26.93	\$7.07	\$7.18	\$0.00	\$41.18
	04/01/2018	\$27.35	\$7.07	\$7.18	\$0.00	\$41.60
For apprentice rates see "Apprentice-OPERATING ENGINEERS"	10/01/2018	\$27.77	\$7.07	\$7.18	\$0.00	\$42.02
	04/01/2019	\$28.20	\$7.07	\$7.18	\$0.00	\$42.45
As of 9/1/09 Carpentry work on wood-frame residential WEATHERIZATION projects shall be paid the RESIDENTIAL WOOD FRAME CARPENTER rate.	10/01/2019	\$28.63	\$7.07	\$7.18	\$0.00	\$42.88

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIPELAYER <i>LABORERS - ZONE 1</i>	12/01/2016	\$36.60	\$7.60	\$14.15	\$0.00	\$58.35
	06/01/2017	\$37.60	\$7.60	\$14.15	\$0.00	\$59.35
	12/01/2017	\$38.45	\$7.60	\$14.15	\$0.00	\$60.20
	06/01/2018	\$39.40	\$7.60	\$14.15	\$0.00	\$61.15
	12/01/2018	\$40.35	\$7.60	\$14.15	\$0.00	\$62.10
For apprentice rates see "Apprentice-LABORER"	06/01/2019	\$41.35	\$7.60	\$14.15	\$0.00	\$63.10
	12/01/2019	\$42.35	\$7.60	\$14.15	\$0.00	\$64.10
For apprentice rates see "Apprentice-LABORER"	03/01/2017	\$52.69	\$11.32	\$15.46	\$0.00	\$79.47
	03/01/2017	\$51.19	\$9.70	\$18.14	\$0.00	\$79.03
PLUMBERS & GASFITTERS <i>PLUMBERS & GASFITTERS LOCAL 12</i>	12/01/2016	\$36.60	\$7.60	\$14.15	\$0.00	\$58.35
	06/01/2017	\$37.60	\$7.60	\$14.15	\$0.00	\$59.35
	12/01/2017	\$38.45	\$7.60	\$14.15	\$0.00	\$60.20
	06/01/2018	\$39.40	\$7.60	\$14.15	\$0.00	\$61.15
	12/01/2018	\$40.35	\$7.60	\$14.15	\$0.00	\$62.10
For apprentice rates see "Apprentice-LABORER"	06/01/2019	\$41.35	\$7.60	\$14.15	\$0.00	\$63.10
	12/01/2019	\$42.35	\$7.60	\$14.15	\$0.00	\$64.10
For apprentice rates see "Apprentice-LABORER"	03/01/2017	\$52.69	\$11.32	\$15.46	\$0.00	\$79.47
	03/01/2017	\$51.19	\$9.70	\$18.14	\$0.00	\$79.03
Apprentice - PLUMBER/GASFITTER - Local 12 Apprentice to Journeyworker Ratio:**	1	\$20.48	\$9.70	\$7.50	\$0.00	\$37.68
	2	\$23.04	\$9.70	\$18.14	\$0.00	\$50.88
	3	\$30.71	\$9.70	\$18.14	\$0.00	\$58.55
	4	\$35.83	\$9.70	\$18.14	\$0.00	\$63.67
	5	\$40.95	\$9.70	\$18.14	\$0.00	\$68.79
Notes: ** 1,3; 3,15; 1,10 thereafter / Steps are 1 yr. Refrig/AC Mechanic **1;1-2,2-4,3-6,4-8,5-10,6-12,7-14,8-17,9-20,10-23(Max)						
Apprentice - PLUMBER/GASFITTER - Local 12 Apprentice to Journeyworker Ratio:**	1	\$18.44	\$11.32	\$5.74	\$0.00	\$35.50
	2	\$21.08	\$11.32	\$6.49	\$0.00	\$38.89
	3	\$28.98	\$11.32	\$8.73	\$0.00	\$49.03
	4	\$34.25	\$11.32	\$10.23	\$0.00	\$55.80
	5	\$39.52	\$11.32	\$11.72	\$0.00	\$62.56
Notes: ** 1,2; 2,6; 3-10; 4-14; 5-19/Steps are 1 yr Step4 with lic\$58.50 Step5 with lic\$65.36						
PNEUMATIC CONTROLS (TEMP) <i>PIPEFITTERS LOCAL 537</i>	03/01/2017	\$51.19	\$9.70	\$18.14	\$0.00	\$79.03
For apprentice rates see "Apprentice-PIPEFITTER" or "PLUMBER/PIPEFITTER"						

Apprentice - CARPENTER (Residential Wood Frame) - Zone 2
Effective Date - 04/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$15.79	\$7.07	\$0.00	\$0.00	\$22.86
2	60	\$15.79	\$7.07	\$0.00	\$0.00	\$22.86
3	65	\$17.10	\$7.07	\$7.18	\$0.00	\$31.35
4	70	\$18.42	\$7.07	\$7.18	\$0.00	\$32.67
5	75	\$19.73	\$7.07	\$7.18	\$0.00	\$33.98
6	80	\$21.05	\$7.07	\$7.18	\$0.00	\$35.30
7	85	\$22.36	\$7.07	\$7.18	\$0.00	\$36.61
8	90	\$23.68	\$7.07	\$7.18	\$0.00	\$37.93

Apprentice - ROOFER - Local 33
Effective Date - 02/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.68	\$11.10	\$3.44	\$0.00	\$35.22
2	60	\$24.82	\$11.10	\$13.80	\$0.00	\$49.72
3	65	\$26.88	\$11.10	\$13.80	\$0.00	\$51.78
4	75	\$31.02	\$11.10	\$13.80	\$0.00	\$55.92
5	85	\$35.16	\$11.10	\$13.80	\$0.00	\$60.06

Apprentice to Journeyworker Ratio:1:5

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.23	\$11.10	\$3.44	\$0.00	\$35.77
2	60	\$25.48	\$11.10	\$13.80	\$0.00	\$50.38
3	65	\$27.60	\$11.10	\$13.80	\$0.00	\$52.50
4	75	\$31.85	\$11.10	\$13.80	\$0.00	\$56.75
5	85	\$36.09	\$11.10	\$13.80	\$0.00	\$60.99

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:1:5

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.23	\$11.10	\$3.44	\$0.00	\$35.77
2	60	\$25.48	\$11.10	\$13.80	\$0.00	\$50.38
3	65	\$27.60	\$11.10	\$13.80	\$0.00	\$52.50
4	75	\$31.85	\$11.10	\$13.80	\$0.00	\$56.75
5	85	\$36.09	\$11.10	\$13.80	\$0.00	\$60.99

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:1:5

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.23	\$11.10	\$3.44	\$0.00	\$35.77
2	60	\$25.48	\$11.10	\$13.80	\$0.00	\$50.38
3	65	\$27.60	\$11.10	\$13.80	\$0.00	\$52.50
4	75	\$31.85	\$11.10	\$13.80	\$0.00	\$56.75
5	85	\$36.09	\$11.10	\$13.80	\$0.00	\$60.99

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)

ROOFER SLATE/TILE/PRECAST CONCRETE
ROOFERS LOCAL 33

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
02/01/2017	\$41.61	\$11.10	\$13.80	\$0.00	\$66.51
08/01/2017	\$42.71	\$11.10	\$13.80	\$0.00	\$67.61
02/01/2018	\$43.86	\$11.10	\$13.80	\$0.00	\$68.76
08/01/2018	\$44.96	\$11.10	\$13.80	\$0.00	\$69.86
02/01/2019	\$46.11	\$11.10	\$13.80	\$0.00	\$71.01

SHEETMETAL WORKER
SHEETMETAL WORKERS LOCAL 17-A

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
02/01/2017	\$43.72	\$11.45	\$23.07	\$2.35	\$80.59
08/01/2017	\$44.82	\$11.45	\$23.07	\$2.35	\$81.69
02/01/2018	\$45.97	\$11.45	\$23.07	\$2.35	\$82.84

ROOFER (Inc. Roofer Waterproofing &Roofing Dampproof)
ROOFERS LOCAL 33

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
02/01/2017	\$41.36	\$11.10	\$13.80	\$0.00	\$66.26
08/01/2017	\$42.46	\$11.10	\$13.80	\$0.00	\$67.36
02/01/2018	\$43.61	\$11.10	\$13.80	\$0.00	\$68.51
08/01/2018	\$44.71	\$11.10	\$13.80	\$0.00	\$69.61
02/01/2019	\$45.86	\$11.10	\$13.80	\$0.00	\$70.76

ROLLE-ON MOTORIZED BUGGY OPERATOR
LABORERS - ZONE 1

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
12/01/2016	\$36.60	\$7.60	\$14.15	\$0.00	\$58.35
06/01/2017	\$37.60	\$7.60	\$14.15	\$0.00	\$59.35
12/01/2017	\$38.45	\$7.60	\$14.15	\$0.00	\$60.20
06/01/2018	\$39.40	\$7.60	\$14.15	\$0.00	\$61.15
12/01/2018	\$40.35	\$7.60	\$14.15	\$0.00	\$62.10
06/01/2019	\$41.35	\$7.60	\$14.15	\$0.00	\$63.10
12/01/2019	\$42.35	\$7.60	\$14.15	\$0.00	\$64.10

ROLLER/SPREADER/MULCHING MACHINE
OPERATING ENGINEERS LOCAL 4

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
12/01/2016	\$44.94	\$10.00	\$15.25	\$0.00	\$70.19
06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17

ROOFER (Inc. Roofer Waterproofing &Roofing Dampproof)
ROOFERS LOCAL 33

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
02/01/2017	\$41.36	\$11.10	\$13.80	\$0.00	\$66.26
08/01/2017	\$42.46	\$11.10	\$13.80	\$0.00	\$67.36
02/01/2018	\$43.61	\$11.10	\$13.80	\$0.00	\$68.51
08/01/2018	\$44.71	\$11.10	\$13.80	\$0.00	\$69.61
02/01/2019	\$45.86	\$11.10	\$13.80	\$0.00	\$70.76

ROOFER (Inc. Roofer Waterproofing &Roofing Dampproof)
ROOFERS LOCAL 33

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
12/01/2016	\$44.94	\$10.00	\$15.25	\$0.00	\$70.19
06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17

ROOFER (Inc. Roofer Waterproofing &Roofing Dampproof)
ROOFERS LOCAL 33

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
02/01/2017	\$41.36	\$11.10	\$13.80	\$0.00	\$66.26
08/01/2017	\$42.46	\$11.10	\$13.80	\$0.00	\$67.36
02/01/2018	\$43.61	\$11.10	\$13.80	\$0.00	\$68.51
08/01/2018	\$44.71	\$11.10	\$13.80	\$0.00	\$69.61
02/01/2019	\$45.86	\$11.10	\$13.80	\$0.00	\$70.76

ROOFER (Inc. Roofer Waterproofing &Roofing Dampproof)
ROOFERS LOCAL 33

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
12/01/2016	\$44.94	\$10.00	\$15.25	\$0.00	\$70.19
06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17

ROOFER (Inc. Roofer Waterproofing &Roofing Dampproof)
ROOFERS LOCAL 33

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
02/01/2017	\$41.36	\$11.10	\$13.80	\$0.00	\$66.26
08/01/2017	\$42.46	\$11.10	\$13.80	\$0.00	\$67.36
02/01/2018	\$43.61	\$11.10	\$13.80	\$0.00	\$68.51
08/01/2018	\$44.71	\$11.10	\$13.80	\$0.00	\$69.61
02/01/2019	\$45.86	\$11.10	\$13.80	\$0.00	\$70.76

ROOFER (Inc. Roofer Waterproofing &Roofing Dampproof)
ROOFERS LOCAL 33

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
12/01/2016	\$44.94	\$10.00	\$15.25	\$0.00	\$70.19
06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - SHEET METAL WORKER - Local 17-A
Effective Date - 02/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$17.49	\$11.45	\$5.24	\$0.00	\$34.18
2	40	\$17.49	\$11.45	\$5.24	\$0.00	\$34.18
3	45	\$19.67	\$11.45	\$10.31	\$1.24	\$42.67
4	45	\$19.67	\$11.45	\$10.31	\$1.24	\$42.67
5	50	\$21.86	\$11.45	\$11.21	\$1.34	\$45.86
6	50	\$21.86	\$11.45	\$11.46	\$1.34	\$46.11
7	60	\$26.23	\$11.45	\$13.02	\$1.52	\$52.22
8	65	\$28.42	\$11.45	\$13.93	\$1.61	\$55.41
9	75	\$32.79	\$11.45	\$15.74	\$1.80	\$61.78
10	85	\$37.16	\$11.45	\$17.05	\$1.97	\$67.63

Effective Date - 08/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$17.93	\$11.45	\$5.24	\$0.00	\$34.62
2	40	\$17.93	\$11.45	\$5.24	\$0.00	\$34.62
3	45	\$20.17	\$11.45	\$10.31	\$1.26	\$43.19
4	45	\$20.17	\$11.45	\$10.31	\$1.26	\$43.19
5	50	\$22.41	\$11.45	\$11.21	\$1.35	\$46.42
6	50	\$22.41	\$11.45	\$11.46	\$1.36	\$46.68
7	60	\$26.89	\$11.45	\$13.02	\$1.54	\$52.90
8	65	\$29.13	\$11.45	\$13.93	\$1.64	\$56.15
9	75	\$33.62	\$11.45	\$15.74	\$1.82	\$62.63
10	85	\$38.10	\$11.45	\$17.05	\$2.00	\$68.60

Notes: Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

SIGN ERECTOR
 PAINTERS LOCAL 33 - ZONE 2

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
06/01/2013	\$25.81	\$7.07	\$7.05	\$0.00	\$39.93

Apprentice - SIGN ERECTOR - Local 35 Zone 2

Effective Date -	Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
06/01/2013	1	50	\$12.91	\$7.07	\$0.00	\$0.00	\$19.98
	2	55	\$14.20	\$7.07	\$2.45	\$0.00	\$23.72
	3	60	\$15.49	\$7.07	\$2.45	\$0.00	\$25.01
	4	65	\$16.78	\$7.07	\$2.45	\$0.00	\$26.30
	5	70	\$18.07	\$7.07	\$7.05	\$0.00	\$32.19
	6	75	\$19.36	\$7.07	\$7.05	\$0.00	\$33.48
	7	80	\$20.65	\$7.07	\$7.05	\$0.00	\$34.77
	8	85	\$21.94	\$7.07	\$7.05	\$0.00	\$36.06
	9	90	\$23.23	\$7.07	\$7.05	\$0.00	\$37.35

Notes: Steps are 4 mos.

Apprentice to Journeyworker Ratio:1:1

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
12/01/2016	\$33.54	\$10.91	\$10.89	\$0.00	\$55.34
12/01/2016	\$33.83	\$10.91	\$10.89	\$0.00	\$55.63
03/01/2017	\$56.08	\$8.77	\$17.20	\$0.00	\$82.05

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

Effective Date -	Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
03/01/2017	1	35	\$19.63	\$8.52	\$8.70	\$0.00	\$36.85
	2	40	\$22.43	\$8.52	\$8.70	\$0.00	\$39.65
	3	45	\$25.24	\$8.52	\$8.70	\$0.00	\$42.46
	4	50	\$28.04	\$8.52	\$8.70	\$0.00	\$45.26
	5	55	\$30.84	\$8.52	\$8.70	\$0.00	\$48.06
	6	60	\$33.65	\$8.52	\$10.20	\$0.00	\$52.37
	7	65	\$36.45	\$8.52	\$10.20	\$0.00	\$55.17
	8	70	\$39.26	\$8.52	\$10.20	\$0.00	\$57.98
	9	75	\$42.06	\$8.52	\$10.20	\$0.00	\$60.78
	10	80	\$44.86	\$8.52	\$10.20	\$0.00	\$63.58

Notes: Apprentice entered prior 9/30/10:
 40/45/50/55/60/65/70/75/80/85
 Steps are 8-50 hours

Apprentice to Journeyworker Ratio:1:3

Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
12/01/2016	\$44.94	\$10.00	\$15.25	\$0.00	\$70.19
06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN OPERATING ENGINEERS LOCAL 4 <small>For apprentice rates see "Apprentice-OPERATING ENGINEERS"</small>	12/01/2016	\$44.94	\$10.00	\$15.25	\$0.00	\$70.19
	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17
TELECOMMUNICATION TECHNICIAN ELECTRICIANS LOCAL 103 <small>For apprentice rates see "Apprentice-OPERATING ENGINEERS"</small>	03/01/2017	\$36.25	\$13.00	\$15.60	\$0.00	\$64.85
	09/01/2017	\$36.96	\$13.00	\$15.62	\$0.00	\$65.58
	03/01/2018	\$37.86	\$13.00	\$15.65	\$0.00	\$66.51
	09/01/2018	\$38.75	\$13.00	\$15.67	\$0.00	\$67.42
	03/01/2019	\$39.65	\$13.00	\$15.70	\$0.00	\$68.35

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
APPRENTICE - TELECOMMUNICATION TECHNICIAN - LOCAL 103 <small>For apprentice rates see "Apprentice-OPERATING ENGINEERS"</small>	1	\$14.50	\$13.00	\$0.44	\$0.00	\$27.94
	2	\$14.50	\$13.00	\$0.44	\$0.00	\$27.94
	3	\$16.31	\$13.00	\$1.24	\$0.00	\$31.55
	4	\$16.31	\$13.00	\$1.24	\$0.00	\$31.55
	5	\$18.13	\$13.00	\$1.81	\$0.00	\$34.94
	6	\$19.94	\$13.00	\$1.89	\$0.00	\$36.83
	7	\$21.75	\$13.00	\$1.37	\$0.00	\$38.12
	8	\$23.56	\$13.00	\$1.65	\$0.00	\$40.21
	9	\$25.38	\$13.00	\$1.93	\$0.00	\$42.31
	10	\$27.19	\$13.00	\$1.21	\$0.00	\$44.40

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
APPRENTICE TO JOURNEYWORKER RATIO: 1:1 <small>For apprentice rates see "Apprentice-OPERATING ENGINEERS"</small>	1	\$14.78	\$13.00	\$0.44	\$0.00	\$28.22
	2	\$14.78	\$13.00	\$0.44	\$0.00	\$28.22
	3	\$16.63	\$13.00	\$1.25	\$0.00	\$32.88
	4	\$16.63	\$13.00	\$1.25	\$0.00	\$32.88
	5	\$18.48	\$13.00	\$1.82	\$0.00	\$36.30
	6	\$20.33	\$13.00	\$1.30	\$0.00	\$38.63
	7	\$22.18	\$13.00	\$1.39	\$0.00	\$40.57
	8	\$24.02	\$13.00	\$1.66	\$0.00	\$43.68
	9	\$25.87	\$13.00	\$1.95	\$0.00	\$46.82
	10	\$27.72	\$13.00	\$1.22	\$0.00	\$49.94

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate	
APPRENTICE TO JOURNEYWORKER RATIO: 1:1 <small>For apprentice rates see "Apprentice-OPERATING ENGINEERS"</small>	1	\$24.85	\$10.75	\$19.22	\$0.00	\$54.82	
	2	\$29.82	\$10.75	\$19.22	\$0.00	\$59.79	
	3	\$34.79	\$10.75	\$19.22	\$0.00	\$64.76	
	4	\$39.76	\$10.75	\$19.22	\$0.00	\$69.73	
	5	\$44.73	\$10.75	\$19.22	\$0.00	\$74.70	
	Notes:						
	APPRENTICE TO JOURNEYWORKER RATIO: 1:3						
	TEST BORING DRILLER LABORERS - FOUNDATION AND MARINE <small>For apprentice rates see "Apprentice-LABORER"</small>	12/01/2016	\$37.70	\$7.60	\$14.35	\$0.00	\$59.65
		12/01/2016	\$36.42	\$7.60	\$14.35	\$0.00	\$58.37
	TEST BORING LABORER LABORERS - FOUNDATION AND MARINE <small>For apprentice rates see "Apprentice-LABORER"</small>	12/01/2016	\$36.30	\$7.60	\$14.35	\$0.00	\$58.25
12/01/2016		\$44.94	\$10.00	\$15.25	\$0.00	\$70.19	
TRACTORS/PORTABLE STEAM GENERATORS OPERATING ENGINEERS LOCAL 4 <small>For apprentice rates see "Apprentice-OPERATING ENGINEERS"</small>	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18	
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17	
TRAILERS FOR EARTH MOVING EQUIPMENT TEAMSTERS JOINT COUNCIL NO. 10 ZONE A	12/01/2016	\$34.12	\$10.91	\$10.89	\$0.00	\$55.92	
	12/01/2016	\$48.58	\$7.60	\$14.75	\$0.00	\$70.93	
TUNNEL WORK - COMPRESSED AIR LABORERS (COMPRESSED AIR) <small>For apprentice rates see "Apprentice-LABORER"</small>	12/01/2016	\$50.58	\$7.60	\$14.75	\$0.00	\$72.93	
	12/01/2016	\$40.65	\$7.60	\$14.75	\$0.00	\$63.00	
TUNNEL WORK - FREE AIR LABORERS (FREE AIR TUNNEL) <small>For apprentice rates see "Apprentice-LABORER"</small>	12/01/2016	\$42.65	\$7.60	\$14.75	\$0.00	\$65.00	
	12/01/2016	\$33.54	\$10.91	\$10.89	\$0.00	\$55.34	

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN OPERATING ENGINEERS LOCAL 4 <small>For apprentice rates see "Apprentice-OPERATING ENGINEERS"</small>	12/01/2016	\$44.94	\$10.00	\$15.25	\$0.00	\$70.19
	06/01/2017	\$45.93	\$10.00	\$15.25	\$0.00	\$71.18
	12/01/2017	\$46.92	\$10.00	\$15.25	\$0.00	\$72.17
TELECOMMUNICATION TECHNICIAN ELECTRICIANS LOCAL 103 <small>For apprentice rates see "Apprentice-OPERATING ENGINEERS"</small>	03/01/2017	\$36.25	\$13.00	\$15.60	\$0.00	\$64.85
	09/01/2017	\$36.96	\$13.00	\$15.62	\$0.00	\$65.58
	03/01/2018	\$37.86	\$13.00	\$15.65	\$0.00	\$66.51
	09/01/2018	\$38.75	\$13.00	\$15.67	\$0.00	\$67.42
	03/01/2019	\$39.65	\$13.00	\$15.70	\$0.00	\$68.35

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
APPRENTICE - TELECOMMUNICATION TECHNICIAN - LOCAL 103 <small>For apprentice rates see "Apprentice-OPERATING ENGINEERS"</small>	1	\$14.50	\$13.00	\$0.44	\$0.00	\$27.94
	2	\$14.50	\$13.00	\$0.44	\$0.00	\$27.94
	3	\$16.31	\$13.00	\$1.24	\$0.00	\$31.55
	4	\$16.31	\$13.00	\$1.24	\$0.00	\$31.55
	5	\$18.13	\$13.00	\$1.81	\$0.00	\$34.94
	6	\$19.94	\$13.00	\$1.89	\$0.00	\$36.83
	7	\$21.75	\$13.00	\$1.37	\$0.00	\$38.12
	8	\$23.56	\$13.00	\$1.65	\$0.00	\$40.21
	9	\$25.38	\$13.00	\$1.93	\$0.00	\$42.31
	10	\$27.19	\$13.00	\$1.21	\$0.00	\$44.40

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
APPRENTICE TO JOURNEYWORKER RATIO: 1:1 <small>For apprentice rates see "Apprentice-OPERATING ENGINEERS"</small>	1	\$14.78	\$13.00	\$0.44	\$0.00	\$28.22
	2	\$14.78	\$13.00	\$0.44	\$0.00	\$28.22
	3	\$16.63	\$13.00	\$1.25	\$0.00	\$32.88
	4	\$16.63	\$13.00	\$1.25	\$0.00	\$32.88
	5	\$18.48	\$13.00	\$1.82	\$0.00	\$36.30
	6	\$20.33	\$13.00	\$1.30	\$0.00	\$38.63
	7	\$22.18	\$13.00	\$1.39	\$0.00	\$40.57
	8	\$24.02	\$13.00	\$1.66	\$0.00	\$43.68
	9	\$25.87	\$13.00	\$1.95	\$0.00	\$46.82
	10	\$27.72	\$13.00	\$1.22	\$0.00	\$49.94

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate	
APPRENTICE TO JOURNEYWORKER RATIO: 1:1 <small>For apprentice rates see "Apprentice-OPERATING ENGINEERS"</small>	1	\$24.85	\$10.75	\$19.22	\$0.00	\$54.82	
	2	\$29.82	\$10.75	\$19.22	\$0.00	\$59.79	
	3	\$34.79	\$10.75	\$19.22	\$0.00	\$64.76	
	4	\$39.76	\$10.75	\$19.22	\$0.00	\$69.73	
	5	\$44.73	\$10.75	\$19.22	\$0.00	\$74.70	
	Notes:						
	APPRENTICE TO JOURNEYWORKER RATIO: 1:1						
	TERRAZZO FINISHERS BRICKLAYERS LOCAL 3 - MARBLE & TILE	02/01/2017	\$49.70	\$10.75	\$19.22	\$0.00	\$79.67
		02/01/2017	\$49.70	\$10.75	\$19.22	\$0.00	\$79.67

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
WAGON DRILL OPERATOR LABORERS - ZONE 1	12/01/2016	\$36.60	\$7.60	\$14.15	\$0.00	\$58.35
	06/01/2017	\$37.60	\$7.60	\$14.15	\$0.00	\$59.35
	12/01/2017	\$38.45	\$7.60	\$14.15	\$0.00	\$60.20
	06/01/2018	\$39.40	\$7.60	\$14.15	\$0.00	\$61.15
	12/01/2018	\$40.35	\$7.60	\$14.15	\$0.00	\$62.10
	06/01/2019	\$41.35	\$7.60	\$14.15	\$0.00	\$63.10
	12/01/2019	\$42.35	\$7.60	\$14.15	\$0.00	\$64.10
For apprentice rates see "Apprentice-LABORER"						
WASTE WATER PUMP OPERATOR OPERATING ENGINEERS LOCAL 4	12/01/2016	\$45.38	\$10.00	\$15.25	\$0.00	\$70.63
	06/01/2017	\$46.38	\$10.00	\$15.25	\$0.00	\$71.63
	12/01/2017	\$47.38	\$10.00	\$15.25	\$0.00	\$72.63
For apprentice rates see "Apprentice-OPERATING ENGINEERS"						
WATER METER INSTALLER PLUMBERS & GASFITTERS LOCAL 12	03/01/2017	\$52.69	\$11.32	\$15.46	\$0.00	\$79.47
For apprentice rates see "Apprentice-PLUMBER/PIPEFITTER" or "PLUMBER GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	08/28/2016	\$26.61	\$7.50	\$1.80	\$0.00	\$35.91
	09/03/2017	\$27.14	\$7.75	\$1.81	\$0.00	\$36.70
For apprentice rates see "Apprentice-LINEMAN"						
CABLEMAN (Underground Ducts & Cables) OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	08/28/2016	\$37.70	\$7.50	\$8.87	\$0.00	\$54.07
	09/03/2017	\$38.45	\$7.75	\$9.53	\$0.00	\$55.73
For apprentice rates see "Apprentice-LINEMAN"						
DRIVER / GROUNDMAN CDL OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	08/28/2016	\$31.05	\$7.50	\$8.89	\$0.00	\$47.44
	09/03/2017	\$31.66	\$7.75	\$9.44	\$0.00	\$48.85
For apprentice rates see "Apprentice-LINEMAN"						
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	08/28/2016	\$24.39	\$7.50	\$1.73	\$0.00	\$33.62
	09/03/2017	\$24.88	\$7.75	\$1.75	\$0.00	\$34.38
For apprentice rates see "Apprentice-LINEMAN"						
EQUIPMENT OPERATOR (Class A CDL) OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	08/28/2016	\$37.70	\$7.50	\$12.95	\$0.00	\$58.15
	09/03/2017	\$38.45	\$7.75	\$13.61	\$0.00	\$59.81
For apprentice rates see "Apprentice-LINEMAN"						
EQUIPMENT OPERATOR (Class B CDL) OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	08/28/2016	\$33.26	\$7.50	\$9.63	\$0.00	\$50.39
	09/03/2017	\$33.92	\$7.75	\$10.21	\$0.00	\$51.88
For apprentice rates see "Apprentice-LINEMAN"						
GROUNDMAN OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	08/28/2016	\$24.39	\$7.50	\$1.73	\$0.00	\$33.62
	09/03/2017	\$24.88	\$7.75	\$1.75	\$0.00	\$34.38
For apprentice rates see "Apprentice-LINEMAN"						
GROUNDMAN -Inexperienced (<2000 Hrs) OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	08/28/2016	\$19.96	\$7.50	\$1.60	\$0.00	\$29.06
	09/03/2017	\$20.35	\$7.75	\$1.61	\$0.00	\$29.71
For apprentice rates see "Apprentice-LINEMAN"						
JOURNEYMAN LINEMAN OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	08/28/2016	\$44.35	\$7.50	\$15.83	\$0.00	\$67.68
	09/03/2017	\$45.23	\$7.75	\$16.61	\$0.00	\$69.59

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Apprentice - LINEMAN (Outside Electrical) - East Local 104						
Step percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate	
1 60	\$26.61	\$7.50	\$3.30	\$0.00	\$37.41	
2 65	\$28.83	\$7.50	\$3.36	\$0.00	\$39.69	
3 70	\$31.05	\$7.50	\$3.43	\$0.00	\$41.98	
4 75	\$33.26	\$7.50	\$5.00	\$0.00	\$45.76	
5 80	\$35.48	\$7.50	\$5.06	\$0.00	\$48.04	
6 85	\$37.70	\$7.50	\$5.13	\$0.00	\$50.33	
7 90	\$39.92	\$7.50	\$7.20	\$0.00	\$54.62	
Effective Date - 09/03/2017						
Step percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate	
1 60	\$27.14	\$7.75	\$3.31	\$0.00	\$38.20	
2 65	\$29.40	\$7.75	\$3.38	\$0.00	\$40.53	
3 70	\$31.66	\$7.75	\$3.45	\$0.00	\$42.86	
4 75	\$33.92	\$7.75	\$5.02	\$0.00	\$46.69	
5 80	\$36.18	\$7.75	\$5.09	\$0.00	\$49.02	
6 85	\$38.45	\$7.75	\$5.15	\$0.00	\$51.35	
7 90	\$40.71	\$7.75	\$7.22	\$0.00	\$55.68	
Notes:						
Apprentice to Journeyworker Ratio:1:2						
TELEDATA CABLE SPLICER OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	01/01/2016	\$28.98	\$4.25	\$3.12	\$0.00	\$36.35
TELEDATA LINEMAN/EQUIPMENT OPERATOR OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	01/01/2016	\$27.31	\$4.25	\$3.07	\$0.00	\$34.63
TELEDATA WIREMAN/INSTALLER/TECHNICIAN OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	01/01/2016	\$27.31	\$4.25	\$3.07	\$0.00	\$34.63
TREE TRIMMER OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	01/31/2016	\$18.51	\$3.55	\$0.00	\$0.00	\$22.06
This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company's equipment, and (c) by a person who is using hand or mechanical cutting methods and is not on the ground. This classification does not apply to wholesale tree removal.						
TREE TRIMMER GROUNDMAN OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	01/31/2016	\$16.32	\$3.55	\$0.00	\$0.00	\$19.87
This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company's equipment, and (c) by a person who is using hand or mechanical cutting methods and is on the ground. This classification does not apply to wholesale tree removal.						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Additional Apprentices 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. Apprentices 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.

BY-LAWS OF THE TOWN OF ARLINGTON
TITLE 1
ARTICLE 16: CONSTRUCTION PROJECTS

ART. 15, A.T.M. 4/22/96

Section 1. Women Work Force Participation

Any Town board or official in charge of a construction or reconstruction project is required to include in the contract documents the following:

ART. 17, A.T.M. 4/28/99

- A. The contractor shall maintain as a goal on this project a not less than five percent ratio of women work force to total project hours in both the general contract and individual filed sub-bid contract, if applicable. The preceding sentence shall be included in all construction contracts whether entered into the Town pursuant to the provisions of M.G.L. c.149 or M.G.L. c.30 §.39M, et seq., provided however, that if entered into under Chapter 30 same shall not be deemed to apply where the projected bid price as determined by the Director of Public Works is not likely to exceed \$200,000.
- B. A Labor Scheduling Table which will be used as a tool for achieving a range of women work force participation for the entire project in both the general contract and each individual filed sub-bid contract.

Section 2. Equal Opportunity Goal Compliance

Any Town board or official in charge of a construction or reconstruction project is required to include in the contract documents the following:

ART. 16 A.T.M. 4/24/96; ART. 17, A.T.M. 4/28/99

- A. Before starting work, the contractors (includes general contractor, for itself and its subcontractors, as well as all filed sub-bid contractors, if applicable) will submit plans for achievement of the equal opportunity goals of the contract. All contractors will be required to make a good faith effort to achieve these goals. The plan will indicate if the contractors expect to achieve the requirements during the first quarter. If there are reasons why the contractors do not expect to achieve the requirements during the first quarter year of the contract construction phase, then the contractors shall provide a plan calculated to address, to the extent reasonably possible, these obstacles to a good faith effort to achieve such goals.
- B. Not more than ten days following the end of each work quarter, the contractors will report on the achievement of the goals, detailing the good faith efforts that have been made and will continue to be made and any other appropriate efforts not yet undertaken.
- C. All reports will be signed by an officer or principal of the company who has the authority to contractually obligate the company.

Section 3. Recruitment and Training

ART. 53 ATM 5/19/97

Any board, officer, committee, or other agency of the Town, which acts on behalf of the Town in making or supervising any contract, in an amount exceeding the sum of \$100,000 for the purchase of goods or services or for the construction, renovation, or repair of buildings or other improvement of real estate, may make arrangements with contractors and other interested agencies for special programs of recruitment and training in connection with the work to be performed on such contract, with the objective of promoting equal employment opportunity for members of minority groups protected by the fair employment

laws of the Commonwealth and the United States. Any board, officer, committee or other Town agency may expend Town funds in carrying them out provided that appropriations specifically designed for such purposes have been voted by the Town Meeting.
ART. 32, ATM 5/14/03

Section 4. LEED

It is the intent of the Town to reduce the life-cycle operating costs and increase the environmental efficiency of Town buildings, by adopting the goal that all construction of new Town buildings and major renovations and additions to existing Town buildings meet or exceed a Silver Certification based on the most current criteria of the Leadership in Energy and Environmental Design (LEED) Green Building Rating System promulgated by the United States Green Building Council, or comparable scoring system. The Town shall include a minimum of LEED Silver Certification, or equivalent level in comparable building scoring system, as a required element in requests for proposal or bids it issues soliciting architectural design services for construction, major renovation, and addition to its buildings, unless the Permanent Town Building Committee makes the finding that such certification is not in keeping with the use or purpose of the building or is otherwise inappropriate. No building project shall be deemed complete until LEED Silver Certification or greater, or equivalent, has been confirmed, unless the PTBC makes the finding that such certification is not in keeping with the use or purpose of the building or is otherwise inappropriate.
ART. 18, ATM 4/00, ART. 32 ATM 5/14/03

http://www.town.arlington.ma.us/Public_Documents/ArlingtonMA_TownBylaws/title1#article16

END OF SECTION

INSURANCE REQUIREMENTS

1. GENERAL

A. This section specifies the Owner's requirements for insurance and relates to the General Conditions of the Contract for Construction and Supplementary Conditions of the Contract for Construction.

B. Provisions of the General Conditions of the Contract for Construction and Supplementary General Conditions of the Contract for Construction, which are not modified by the following insurance Requirements, remain in full effect.

2. INSURANCE REQUIREMENTS

A. Insurance Limits: The insurance required should be written for not less than the limits of liability required by law or the following limits, whichever is greater: State and federal Workmen's Compensation Statutory Benefits required by union contract as required.

GENERAL LIABILITY*

General Liability- Bodily Injury and Property Damage Each Occurrence	\$1,000,000.00
General Liability — Bodily Injury and Property Damage Aggregate	\$2,000,000.00

General Liability shall include coverage for the following:

- Comprehensive form
- Premise/Operations Liability
- Explosion, Collapse and Underground (XCU). Products/Completed Operations (aggregate limit \$2,000,000.00) Contractual Liability
- Independent Contractors Broad
- Form Property Damage
- Personal Injury Including Libel and Slander Coverage Broad
- Form CGL Endorsement

AUTOMOBILE LIABILITY**

Comp. Automobile Liability** Bodily Injury and Property Damage Per Accident	\$1,000,000.00
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**Provide coverage for All Owned, Non-Owned, and Hired vehicles.

EXCESS LIABILITY – Umbrella Form

Each occurrence	\$5,000,000.00
Aggregate	\$5,000,000.00

B. Exclusions: The Owner's property insurance shall not cover tools, equipment, shoring, staging, forms, temporary buildings or other equipment owned or rented by the Contractor, its Subcontractors, or any Worker.

C. Named Insured: Each Insurance policy certificate of insurance provided by the Contractor shall name the Town of Arlington as an additional insured. Each insurance policy and certificate of insurance provided by the Contractor shall contain a provision that the Owner shall be notified of cancellation or restrictive amendment at least thirty (30) days prior to the effective date of such cancellation or amendment.

D. Insurance Certificates: Submit insurance certificates for the Owner's review and approval prior to commencement of the work. The Contractor and all subcontractors who are required to provide insurance under the Contract shall provide accurate and bona fide "Certificates of insurance "issued by a responsible agent of the insurance company.

1. Certificate Content: Such "Certificates of Insurance" shall clearly indicate the insurance coverage. Each "Certificate of Insurance" shall be accompanied by a sworn and duly notarized statement from the responsible agent of the insurance company issuing the certificate clearly stating that all insurance specified and required by the Contract Documents is provided and in force, and also a clear statement of all exceptions and deviations, if any, from the Contract Document issuance requirements.

2. Responsibility: The insurance agent issuing and authorizing the "Certificate of Insurance" shall be responsible and liable for the accuracy and validity of the "Certificate of Insurance". Each insured party shall certify by sworn and duly notarized statement that the "Certificate of Insurance" issued for them are bona fide.

3. Disclaimers Prohibited: "Certificates of Insurance" shall not contain any disclaimers such as: "This Certificate is issued as a matter of information only and confers no right upon the certificate holder. This Certificate does not amend, extend, or alter the coverage afforded by the policies listed below." Disclaimers are not acceptable.

4. Certificates of Insurance Can Be Relied Upon: Parties receiving "Certificates of insurance" shall be entitled to rely upon the "Certificates of insurance" and shall have the right to claim the benefits and protection provided by the insurance as it applies to them.

5. Alternate to "Certificates of Insurance": Instead of providing the "Certificates of Insurance" and the sworn statements required above, the insured may provide bona fide and accurate copies of all insurance policies and riders accompanied by a sworn and duly notarized statement from the insured that the policies, riders, and documents submitted are bona fide and valid, and that parties receiving the insurance documents may rely on the documents as satisfaction of the Contract insurance requirements.

E. The Contractor shall provide "builder's risk" insurance as described in the General Conditions of the Contract for Construction and with limits equal to the full insurable completed value of the building under construction. The "Builder's Risk" insurance shall include "all risk" insurance for physical loss and damage including theft, vandalism, and malicious mischief. The "Builder's Risk" insurance shall be amended to delete any and all endorsements relating to cancellation of the policy due to partial occupancy by the Owner.

1. Builder's Risk Deductible Amount: \$1,000,000.00

END OF SECTION

SECTION 00890

PERMITS

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This Section provides specific information and defines specific requirements of the Contractor regarding the preparation and acquisition of permits required to perform the work of this Project. The permits and terminations required include, but are not limited to, those specifically described in this Section.
- B. The following items are addressed in this Section.
 - 1. Arlington Fire Department / Arlington Department of Public Works
 - 2. Department of Safety Trench Permit

1.02 RELATED WORK:

- A. Section 01110 – CONTROL OF WORK AND MATERIALS
- B. Section 01562 – DUST CONTROL
- C. Section 01570 – ENVIRONMENTAL PROTECTION
- D. Section 02240 – DEWATERING
- E. Section 02300 – EARTHWORK

1.03 GENERAL PERMIT AND TERMINATION REQUIREMENTS:

- A. The Contractor shall apply for, obtain, and pay for all permits and licenses required, including but not limited to the permits listed below. Contractor shall also be responsible for all fees and costs associated with decommissioning and terminations of services.
- B. The Contractor shall procure all other permits, licenses, and approvals from Federal, State, and local authorities and such other agencies as may be necessary in connection with the work of this Contract.
- C. The Contractor shall perform the work in accordance with the Contract Documents, and any applicable Federal, State, and local requirements, and permits.
- D. The Contractor shall provide all required certificates to show that the work has been completed in conformity with the permits and shall submit such Certificates of Approval to the Engineer before final acceptance of the work.

1.04 ARLINGTON FIRE DEPARTMENT / ARLINGTON DEPARTMENT OF PUBLIC WORKS:

- A. The Contractor shall coordinate with the Taunton Fire Department and Taunton Department of Public Works related to hydrant usage for dust control.

1.05 TRENCH PERMIT (520 CMR 14.00):

- A. The Contractor shall obtain a Trench Permit, in accordance with the Massachusetts Department of Safety regulations on excavation and trench safety (520 CMR 14.00), prior to excavations of all regulated trenches.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION 00890

SECTION 01110

CONTROL OF WORK AND MATERIALS

1. Hauling, Handling and Storage of Materials
2. Open Excavations
3. Maintenance of Traffic
4. Care and Protection of Property
5. Protection of Existing Structures
6. Maintenance of Flow
7. Rejected Materials and Defective Work
8. Sanitary Regulations
9. Safety and Health Regulations
10. Site Investigation
11. Electric Service
12. Hazardous Waste
13. Clean-up and Disposal of Excess Material

1. HAULING, HANDLING AND STORAGE OF MATERIALS:

- A. The Contractor shall, at his own expense, handle and haul all materials furnished by him and shall remove any of his surplus materials at the completion of the work.
- B. The Contractor shall provide suitable and adequate storage for equipment and materials furnished by him that are liable to injury and shall be responsible for any loss of or damage to any equipment or materials by theft, breakage, or otherwise.
- C. All excavated materials and equipment to be incorporated in the Work shall be placed so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the work. Materials and equipment shall be kept neatly piled and compactly stored in such location as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.
- D. The Contractor shall be responsible for all damages to the work under construction during its progress and until final completion and acceptance even though partial payments have been made under the Contract.

2. OPEN EXCAVATIONS:

- A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property. The Contractor shall, at his own expense, provide suitable and safe means for completely covering all open excavations and for accommodating travel when work is not in progress.

- B. The length of open trench will be controlled by the particular surrounding conditions but shall always be confined to the limits prescribed by the Engineer.
- C. If the excavation becomes a hazard, then special construction procedures shall be taken, such as limiting the length of trench and prohibiting stocking excavated material in the street.
- D. All street excavations shall be completely closed at the end of each work day. Backfilling or use of steel plates of adequate strength to carry traffic shall be used.

3. MAINTENANCE OF TRAFFIC:

- A. All excavated materials and equipment shall be placed so that vehicular and pedestrian traffic may be maintained at all times.
- B. For the entire duration of the Project, the Contractor shall maintain open and safe access to the Site as shown on the Contract Drawings.
- C. The Contractor shall, at his own expense, provide and erect acceptable barricades, barrier fences, traffic signs, and all other traffic devices not specifically covered in a bid item, to protect the work from traffic, pedestrians, and animals.
- D. The Contractor shall furnish all construction signs that are deemed necessary by and in accordance with Part VI of the Manual on Uniform Traffic Control Devices as published by the U.S. Department of Transportation. In addition, the Contractor may be required to furnish special construction warning signs. Locations, wording, and size of signs shall be coordinated with the Owner and Engineer after the Contract is awarded.
- E. Nothing contained herein shall be construed as relieving the Contractor of any of his responsibilities for protection of persons and property under the terms of the Contract.
- F. Conduct operations and removal of debris to ensure minimum interference with the normal use of public ways and other adjacent facilities. Do not close or obstruct traffic ways, streets, walks or other facilities without the written permission of the Owner and authorities having jurisdiction.
- G. The Contractor shall contact the Engineer before starting any work at the work site to review any traffic requirements.
- H. Provision shall be made for safe passage at all times for emergency vehicles onto the work site.

4. CARE AND PROTECTION OF PROPERTY:

- A. The Contractor shall be responsible for the preservation of all public and private

property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be promptly restored by the Contractor, at his expense, to a condition similar or equal to that existing before the damage was done, to the satisfaction of the Engineer.

5. PROTECTION OF EXISTING STRUCTURES:

- A. The Contractor shall assume full responsibility for the protection of all structures and utilities that are not scheduled for removal. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. The Contractor shall repair any damage resulting from his/her operations at his/her expense.
- B. The location of existing underground services and utilities shown on the Contract Drawings are based on available records. Although these documents may indicate the approximate location of existing utilities in the vicinity of the work, it is not warranted that all existing utilities and services are shown, or that indicated locations are correct. The Contractor shall coordinate all work involving utilities and shall verify the existing conditions of the areas in which the work is to be performed.
- C. The Contractor shall confirm the location of all underground utility services (including existing water services, drain lines, sewers, gas and fuel lines, electrical lines, and communications). The Contractor shall be responsible for having the utility companies locate their respective utilities at and in the vicinity of the site prior to excavating. To satisfy the requirements of Massachusetts law, Chapter 82, Section 40, the Contractor shall, at least 72 hours, exclusive of Saturdays Sundays and holidays, prior to excavation in the proximity of telephone, gas, cable television, and electric utilities, notify the utilities concerned by calling "DIG SAFE" at 811 or 1-888-DIG-SAFE.
- D. All existing site utilities shall be terminated as shown on the Contract Drawings, and as required by the Engineer.
- E. Fire hydrants shall at all times be left clear of obstructions and readily accessible to fire apparatus, and no material or other obstructions shall be placed within ten (10) feet of a fire hydrant. Refer to the Contract Drawings for locations of hydrants.
- F. All property damaged by the Contractor's operations, outside the Limits of Work shall be restored to a condition at least equal to that in which it was found immediately before work was begun. Suitable materials and methods shall be used for such restoration.

6. MAINTENANCE OF FLOW:

- A. The Contractor shall surround catch basins around the perimeter of the Site that may receive runoff from the work area with straw wattles and use silt traps as described in Section 01570 – ENVIRONMENTAL PROTECTION and shown on the Contract

Drawings, to protect drainage systems from sediment accumulation. If the Contractor damages or impairs any of the aforesaid drainage facilities, he shall repair the same within the same day.

- B. At the conclusion of the work, the Contractor shall remove all silt in drainage structures caused by his operations as described in Section 01740 – CLEANING UP.
- C. The Contractor shall maintain flow and keep in operation the fire hydrants for fire suppression purposes, in accordance with Protection and Relocation of Existing Structures and Utilities.

7. REJECTED MATERIALS AND DEFECTIVE WORK:

- A. Materials furnished by the Contractor and condemned by the Engineer as unsuitable or not in conformity with the specifications shall forthwith be removed from the work by the Contractor, and shall not be made use of elsewhere in the work.
- B. Any errors, defects or omissions in the execution of the work or in the materials furnished by the Contractor, even though they may have been passed or overlooked or have appeared after the completion of the work, discovered at any time before the final payment is made hereunder, shall be forthwith rectified and made good by and at the expense of the Contractor and in a manner satisfactory to the Engineer.
- C. The Contractor shall reimburse the Owner for any expense, losses or damages incurred in consequence of any defect, error, omission or act of the Contractor or his employees, as determined by the Engineer, occurring previous to the final payment.

8. SANITARY REGULATIONS:

Sanitary conveniences for the use of all persons employed on the work, properly screened from public observation, shall be provided in sufficient numbers in such manner and at such locations as may be approved. The contents shall be removed and disposed of in a satisfactory manner as the occasion requires. The Contractor shall rigorously prohibit the committing of nuisances within, on or about the work. Any employees found violating these provisions shall be discharged and not again employed on the work without the written consent of the Engineer. The sanitary conveniences specified above shall be the obligation and responsibility of the Contractor.

9. SAFETY AND HEALTH REGULATIONS:

This project is subject to the Safety and Health regulations of the U.S. Department of Labor set forth in 29 CFR, Part 1926, and to the Massachusetts Department of Labor and Industries, Division of Industrial Safety "Rules and Regulations for the Prevention of Accidents in Construction Operations (454 CMR 10.0 et. seq.)." Contractors shall be familiar with the requirements of these regulations.

10. SITE INVESTIGATION:

The Contractor acknowledges that he has satisfied himself as to the conditions existing at the site of the work, the type of equipment required to perform this work, the quality and quantity of the materials furnished insofar as this information is reasonably ascertainable from an inspection of the site, as well as from information presented by the drawings and specifications made a part of this contract. Any failure of the Contractor to acquaint himself with available information will not relieve him from the responsibility for estimating properly the difficulty or cost of successfully performing the work. The Owner assumes no responsibility for any conclusion or interpretation made by the Contractor on the basis of the information made available by the Owner.

11. ELECTRIC SERVICE:

- A. There is no temporary power available at the site. The Contractor shall make all necessary applications and arrangements and pay for all fees and charges for electrical energy for power and light necessary for the proper completion of this contract during its entire progress. The Contractor shall provide generators and pay for all temporary wiring, switches, connections, and meters, as required.
- B. There shall be sufficient electric lighting so that all work may be done in a workmanlike manner where there is not sufficient daylight.

12. HAZARDOUS WASTE:

Should the Contractor, while performing work under this contract, uncover suspected hazardous materials, as defined in Massachusetts Hazardous Waste Regulations 310 CMR 30.00, he shall immediately notify the Engineer.

13. CLEAN-UP AND DISPOSAL OF EXCESS MATERIAL

- A. During the course of the work, the Contractor shall keep the site of his operations in as clean and neat a condition as is possible. The Engineer and the Owner reserve the right to direct site cleanup if deemed necessary. Contractor shall dispose of all debris and residue resulting from the construction work and, at the conclusion of the work in each area, shall remove and haul away any surplus excavation, equipment, temporary structures, excess materials, and any other refuse and debris remaining from the construction operations in each area and shall leave the entire site of the work in a neat and orderly condition. The Contractor shall not remove excavated material or debris from the Site without the approval of the Engineer.
- B. The Contractor shall prevent carry-out or spillage of material from his/her vehicles onto public ways. The Contractor shall promptly clean up and dispose of all material and debris deposited on public ways to the Engineer and Owner's satisfaction. The Contractor also shall not create conditions that allow silt laden runoff to run onto public ways. Any silt and debris deposited onto public ways by runoff shall be cleaned up to the satisfaction of the Engineer and the Owner and means shall be employed to prevent

recurrence of run-off deposits.

- C. In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, the Contractor shall, and his subcontractors shall, comply with all applicable Federal, State, and local laws and regulations concerning waste material disposal, as well as the specific requirements stated elsewhere in these Specifications.
- D. The Contractor is advised that the disposal of excess excavated material in wetlands, stream corridors, and plains is strictly prohibited even if the permission of the property owner is obtained. Any violation of this restriction by the Contractor or any person employed by him will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. Therefore, the Contractor will be required to remove the material at his own expense and restore the area impacted.

END OF SECTION 01110

SECTION 01140

SPECIAL PROVISIONS

1. Water for Demolition Purposes
2. Occupying Private Property
3. Existing Utility Locations and Dimensions
4. Coordination of Work
5. Time for Completion of Contract
6. Project Signs
7. Compliance with Permits
8. Cutting, Fitting and Patching
9. Connections to Existing Water Systems
10. Contractor's Representative
11. Hours of Site Activity and Trucking Requirements

1. Water for Demolition Purposes

- A. The Contractor shall provide necessary hoses to use the nearby hydrant located on Eastern Avenue, including approvals/ requirements from the Arlington Department of Public Works (DPW) and Arlington Fire Department to run the hose for dust control. The Contractor shall install temporary metered water lines with backflow preventers, as required, to provide water for dust control activities, and shall provide protection for the hydrant. Backflow preventers and meters are to be inspected and approved by the DPW prior to: (1) installation; and (2) use. Hydrants shall at all times be left clear of obstructions and readily accessible to fire apparatus, and no material or other obstructions shall be placed within ten (10) feet of a hydrant. Beyond the applicable Arlington Department of Public Works/Arlington Water Division permit/set-up fees, there will be no charge for the water usage; however, waste of water by the Contractor shall be sufficient cause for withdrawing the privilege of unrestricted use.

2. Occupying Private Property

The Contractor shall not enter upon nor occupy with men, equipment or materials any property outside of the Limits of Work shown on the Contract Drawings, except with the written consent of the property owner or property owner's agent.

3. Existing Utility Locations and Dimensions

- A. The location of existing underground services and utilities shown on the Contract Drawings is based on available records. It is not warranted that all existing utilities and services are shown, or that shown locations are correct. The Contractor shall be responsible for having the utility companies locate their respective utilities on the ground prior to excavating.

- B. To satisfy the requirements of Massachusetts law, Chapter 82, Section 40, the Contractor shall, at least 72 hours, exclusive of Saturdays Sundays and holidays, prior to excavation on the Site, notify utilities by calling "DIG SAFE" at 811.
- C. The Contractor shall coordinate all work involving utilities and shall satisfy himself as to the existing conditions of the areas in which he is to perform his work. He shall conduct and arrange his work so as not to impede or interfere with the work of other contractors working in the same or adjacent areas.
- D. Where the dimensions and locations of existing structures and pipes are of importance for any part of the Work, the Contractor shall verify such dimensions and locations in the field before the fabrication of any material or equipment that is dependent on the correctness of such information
- E. Up to 50 cubic yards of test pits for the purpose of locating underground pipelines or structures shall be excavated and backfilled by the Contractor at the direction of the Engineer at no additional cost to the Owner. Test pits shall be backfilled immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the Engineer.

4. Coordination of Work

- A. The General Contractor shall be responsible for coordinating his own work as well as that of any subcontractors. He shall be responsible for notification of the Engineer when each phase of work is expected to begin and the approximate completion date.

5. Time for Completion of Contract

The time for completion of this contract is stipulated in the FORM FOR GENERAL BID. The Bidder shall base his bid on completing the proposed work by the completion date stipulated in Section 00410 – FORM FOR GENERAL BID.

6. Project Signs

- A. The Contractor shall install and maintain construction signs for the duration of the Project. Signs to be installed and maintained by the Contractor include, but not limited to: project signs, "Construction Area" signs, and "No Trespassing/Keep Out" signs. Locations, wording, and size of signs shall be coordinated with Owner after the Contract is awarded. The Contractor shall fabricate and install signs as specified in Section 01110 – CONTROL OF WORK AND MATERIALS, including up to 128 square feet of additional traffic and/or project signs. Prior to sign fabrication, the Contractor shall submit a draft template of the sign to the Engineer or approval of the layout and wording.
- B. The Contractor shall provide, and install where directed by the Engineer, one 4-foot by 8-foot project sign. The sign shall be plywood, MDO Exterior APA, supported on two 4-inch by 4-inch posts, with adequate bracing. Paint all surfaces with sign paint and provide lettering of size and type as required by the Owner and Engineer.

- C. The project signs shall be erected within ten (10) days after the construction contract is awarded. The project signs shall be fabricated, erected, and maintained by the Contractor.
- C. The Contractor shall provide adequate support for the signs as determined by the Engineer.
- D. The project signs shall be maintained by the Contractor in good condition at all times for the duration of construction. The Contractor shall remove the signs upon completion of construction.

7. Compliance with Permits

- A. The Contractor shall perform all work in conformance with requirements of the permits, which appear in Section 00890 - PERMITS.

8. Cutting, Fitting and Patching

- A. The Contractor shall do all cutting, fitting, or patching of his work that may be required to make its several parts come together properly and fit it to receive or be received by work of other Contractors, as shown upon or reasonably implied by the drawings and the specifications for the completed structure, including all existing work.
- B. The Contractor shall not endanger any work by cutting, digging, or otherwise and shall not cut or alter the work of any other Contractor, save with the consent of the Engineer.
- C. All holes or openings required to be made in new or existing work, particularly at pipe, conduit, or other penetrations not covered by escutcheons or plates shall be neatly patched. All such holes shall be made completely watertight as approved by the Engineer.
- D. Workmanship and materials of patching and repair work shall match the adjacent similar work and shall conform to the applicable sections of the specification. Patches and joints with existing work shall provide, as applicable in each case, visual, structural, and waterproofing continuity.

9. Connections to Existing Water Systems

- A. The Contractor shall coordinate with the Arlington DPW and Arlington Fire Department for water hydrant usage.

10. Contractor's Representative

The Contractor shall designate a representative who will be available to respond to emergency calls by the Owner at any time day and night and on weekends and holidays should such a situation arise.

11. Hours of Site Activity and Trucking Requirements

- A. The Contractor shall conduct all construction activity between 7:00 a.m. and 5:00 p.m., Monday through Friday. No construction work shall be allowed on Saturdays, Sundays or Holidays without written authorization from the Owner.
- B. The Contractor shall limit all construction-related trucking (which shall mean all trucking of construction materials, excavated materials, and demolition debris by vehicles over 18,000 pounds GVW) to and from the Site to the hours of 7:00 a.m. to 5:00 p.m. Monday through Friday, except holidays.
- C. The Contractor shall be responsible for scheduling any necessary police details with the Arlington Police Department. All detail officers will be paid by the Owner directly and fees should not be included in the Contractor bid prices.

END OF SECTION 01140

SECTION 01311

CONSTRUCTION MEETINGS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This Section specifies requirements for project meetings including but not limited to Pre-Construction Conference and Progress Meetings.
- B. It shall be the responsibility of the Contractor to coordinate work between all subcontractors, sections, and trades required for the proper completion of the Work.

1.02 PRE-CONSTRUCTION CONFERENCE:

- A. After the bids have been opened but prior to the start of the construction there will be a pre-construction conference to discuss the phasing and scheduling of the Project. The specific time and place of the conference shall be arranged by the Engineer after the Contract has been awarded.
- B. This pre-construction conference is intended to establish lines of communication between the parties involved, review responsibilities and personnel assignments, establish project schedules, discuss proposed performance methods, and coordinate Work to be performed by subcontractors.
- C. Authorized representatives of the Owner, Engineer and their consultants, the Contractor, its Superintendent and Site Foreman, and all others invited by the Contractor, shall attend the pre-construction conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.
- D. Discuss items of significance at the pre-construction conference that could affect progress including at least the following:
 - 1. Tentative construction schedule
 - 2. Critical Work sequencing
 - 3. Designation of responsible personnel
 - 4. Procedures for processing field decisions and Change Orders
 - 5. Procedures for processing Applications for Payment
 - 6. Review of Davis Bacon and other federal requirements
 - 7. Distribution of Contract Documents

8. Submittal of Shop Drawings, Product Data and Samples
9. Preparation of record documents
10. Use of the premises
11. Office, work and storage, and laydown areas
12. Equipment deliveries
13. Construction safety procedures
14. Environmental health and safety procedures
15. First aid
16. Security
17. Housekeeping
18. Working hours
19. Traffic Control
20. Emergency Vehicle Access to and around work site
21. Environmental protection measures for construction site

1.03 PROGRESS MEETINGS:

- A. During the course of the Project, the Contractor shall attend weekly progress meetings as scheduled by the Owner. The Owner, based on work progress and activities, may adjust the progress meetings to biweekly or other. The attendance of subcontractors may be required during the progress of the Work. The Contractor's delegate to the meeting shall be prepared and authorized to discuss the following items:
1. Progress of Work/Critical Work Sequencing in relation to Contract Schedule.
 2. Proposed Work activities for forthcoming period.
 3. Resources committed to Contract.
 4. Coordination of Work with others.
 5. Status of procurement of equipment and materials.
 6. Status of Submittals.
 7. Outstanding actions, decisions, or approvals that affect Work activities.
 8. Site access and/or security issues
 9. Hazards and risks
 10. Housekeeping
 11. Quality issues
 12. Potential Claims
 13. Change Orders
 14. Costs, budget, and payment requests
- B. The Contractor shall revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized and the revised schedule shall be submitted to the Engineer and Owner.

PART 2 - PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

END OF SECTION 01311

SECTION 01330

SUBMITTALS

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. The Contractor shall provide the Engineer with submittals as required by the contract documents.

1.02 RELATED WORK:

- A. Divisions 1 – 16 of these specifications that require submittals.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 GENERAL:

- A. As required by the General Conditions, Contractor shall submit a schedule of shop and working drawing submittals.
- B. The Contractor shall submit the shop and working drawing submittals either electronically or hard copy.

3.02 ELECTRONIC SUBMITTALS:

- A. In accordance with the accepted schedule, the Contractor shall submit promptly to the Engineer by email (chroustc@wseinc.com), attention: Cassidy Chroust. One electronic copy in Portable Document Format (PDF) of shop or working drawings required as noted in the specifications, of equipment, structural details and materials fabricated especially for this Contract.
- B. Each electronic copy of the shop or working drawing shall be accompanied by the Engineer's standard shop drawing transmittal form, included as Exhibit 1 of this section (use only for electronic submittals), on which is a list of the drawings, descriptions and numbers and the names of the Owner, Project, Contractor and building, equipment or structure.
- C. The Contractor shall receive a shop drawing memorandum with the Engineer's approval or comments via email.
- D. If electronic submittals are used, hard copy submittals are not required.

3.03 HARD COPY SUBMITTALS:

- A. In accordance with the accepted schedule, the Contractor shall submit promptly to the Engineer, by mail (to Weston & Sampson Engineers, attention: Cassidy Chroust), six (6) copies each of shop or working drawings required as noted in the specifications, of equipment, structural details and materials fabricated especially for this Contract.
- B. Each shipment of drawings shall be accompanied by the Engineer's (if applicable) standard shop drawing transmittal form on which is a list of the drawings, descriptions and numbers and the names of the Owner, Project, Contractor and building, equipment or structure.

3.04 SHOP AND WORKING DRAWINGS:

- A. Shop and working drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish of shop coat, grease fittings, etc., depending on the subject of the drawings. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct for this Contract.
- B. All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from his subcontractors and returning reviewed drawings to them. All shop and working drawings shall be prepared on standard size, 24-inch by 36-inch sheets, except those, which are made by changing existing standard shop or working drawings. All drawings shall be clearly marked with the names of the Owner, Project, Contractor and building, equipment or structure to which the drawing applies, and shall be suitably numbered. Each shipment of drawings shall be accompanied by the Engineer's (if applicable) standard shop drawing transmittal form on which is a list of the drawings, descriptions and numbers and the names mentioned above.
- C. Only drawings that have been prepared, checked and corrected by the fabricator should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the Contract Documents in all respects. Shop drawings shall be reviewed and marked with the date, checker's name and indication of the Contractor's approval, and only then shall be submitted to the Engineer. Shop drawings unsatisfactory to the Contractor shall be returned directly to their source for correction, without submittal to the Engineer. Shop drawings submitted to the Engineer without the Contractor's approval stamp and signature will be rejected. Any deviation from the Contract Documents indicated on the shop drawings must be identified on the drawings and in a separate submittal to the Engineer.

- D. The Contractor shall be responsible for the prompt submittal and resubmittal, as necessary, of all shop and working drawings so that there will be no delay in the work due to the absence of such drawings.
- E. The Engineer will review the shop and working drawings as to their general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Corrections of comments made on the drawings during the review do not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for: confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner. The review of the shop drawings is general and shall not relieve the Contractor of the responsibility for details of design, dimensions, code compliance, etc., necessary for interfacing with other components, proper fitting and construction of the work required by the Contract and for achieving the specified performance. The Engineer will review submittals two times: once upon original submission and a second time if the Engineer requires a revision or corrections. The Contractor shall reimburse the Owner amounts charged to the Owner by the Engineer for performing any review of a submittal for the third time or greater.
- F. With few exceptions, shop drawings will be reviewed and returned to the Contractor within 30 days of submittal.
- G. No material or equipment shall be purchased or fabricated especially for this Contract nor shall the Contractor proceed with any portion of the work, the design and details of which are dependent upon the design and details of equipment or other features for which review is required, until the required shop and working drawings have been submitted and reviewed by the Engineer as to their general conformance and compliance with the project and its Contract Documents. All materials and work involved in the construction shall then be as represented by said drawings.
- H. Two copies of the shop and working drawings and/or catalog cuts will be returned to the Contractor. The Contractor shall furnish additional copies of such drawings or catalog cuts when he needs more than two copies or when so requested.

3.05 SAMPLES:

- A. Samples specified in individual Sections include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols, and units of work to be used by the Engineer or the Owner for independent inspection and testing, as applicable to the work.

- B. The number of samples submitted shall be as specified. Submittal and processing of samples shall follow the procedures outlined for shop and working drawings unless the specifications call for a field submittal or mock-up.
- C. Acceptance of samples will be acknowledged via a copy of the transmittal noting status. When samples are not acceptable, prompt resubmittal will be required.

END OF SECTION 01330

EXHIBIT 1 TO SECTION 01330 SUBMITTALS
SHOP DRAWING TRANSMITTAL FORM



Shop Drawing Transmittal

Instructions for Preparing Transmittal

No action will be taken on any item unless accompanied by this form. Type or print all entries.

TRANSMITTAL NOS. to be consecutive (1, 2, 3, etc.).

Each resubmittal of same item shall use same number with suffix letter (A, B, etc.).

SPEC. SECT. NO.: Only one spec. section no. to each transmittal.

DESCRIPTION: Complete identification of document or group of documents.

SOURCE: Originator of document(s) being submitted.

DRAWING NO: Identification of document(s).

NO. of COPIES: Usually 6 or as directed/specified.

CONTRACT DRAWING REFERENCE: Contract drawing number(s) showing details of document(s) being submitted.

SPECIAL INSTRUCTIONS: Special cases and emergencies, changes in distribution and special handling requests, etc. should be entered here.

SIGNATURE OF CONTRACTOR: Signature of individual who reviews and approves material prior to submittal to engineer.

Contractor to retain last copy. Submit original with two pink and two yellow copies.

THIS SECTION TO BE COMPLETED BY CONTRACTOR							
TRANSM. NO.	SPEC. SECT. NO.	DATE / /	CONTRACTOR'S JOB NO.	W&S JOB NO.			
PROJECT NAME & CONTRACT NO.			LOCATION				
T O F R O M Attention: CSD Weston & Sampson Engineers, Inc. 5 Centennial Drive Peabody, MA 01960-7985			(CONTRACTOR)				
ITEM NO.	DESCRIPTION	SOURCE	DRAWINGS NO. CATALOG NO. BROCHURE, ETC.	NO. OF COPIES	CONTRACT DRAWING REF.	BY W&S ACTION CODE	REVIEWED BY
1							
2							
3							
4							
THIS CERTIFIES THAT ALL ITEMS SUBMITTED HERewith HAVE BEEN CHECKED BY THE CONTRACTOR, ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS, EXCEPT AS NOTED, AND ARE APPROVED BY THE CONTRACTOR FOR THIS PROJECT.							
SPECIAL INSTRUCTIONS: (FOR CONTRACTOR) SIGNATURE & TITLE: _____ _____ BY _____ DATE ____/____/____							
THIS SECTION TO BE COMPLETED BY W&S							
ACTION CODE 1. NO EXCEPTIONS TAKEN 2. MAKE CORRECTIONS NOTED 3. AMEND AND RESUBMIT 4. REJECTED - SEE REMARKS 5. ACKNOWLEDGMENT			a. INSTALLATION SHALL PROCEED ONLY WHEN ACTION CODE IS 1 or 2. b. ACTION CODED 3 SHALL BE RESUBMITTED WITHIN TIME LIMIT SET IN CONTRACT. c. REVIEW DOES NOT RELIEVE CONTRACTOR FROM RESPONSIBILITY OF COMPLIANCE WITH ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS.				
FIELD OFFICE REC'D BY _____ DATE ____/____/____			WESTON & SAMPSON ENGINEERS, INC.				

Please! BEAR DOWN WHEN HANDWRITING — THIS IS A 6 COPY FORM & THE LAST COPY IS YOURS!

SECTION 01450

SAMPLING AND TESTING

PART 1- GENERAL

1.01 SCOPE OF WORK

- A. The work under this Section shall consist of performing or ordering the work of collecting samples for testing, having tests performed by a Certified Testing Laboratory satisfactory to the Owner's Representative, having all test results forwarded to the Owner's Representative for approval, and paying all costs associated with the collection and sampling, transportation, shipping, postage, and testing, and the coordination of test results and approvals.

1.02 SUBMITTALS

- A. In accordance with Section 01330 of these Specifications, submit the names, addresses and certification of laboratories to be utilized for approval by the Owner's Representative.

PART 2 - MATERIALS

2.01 CONTAINERS AND TOOLS

- A. Utilize tools recommended by the laboratory to obtain samples, packaging or containers suitable to or furnished by, the laboratory, and collect all samples in the proper number and quantity to permit tests to be conducted.

2.02 TESTS

- A. Refer to section specifications for test requirements and criteria for results; coordinate with the Owner's Representative.
- B. All irrigation systems, and any other components from the scope of work as requested by the Owner's Representative shall be tested to ensure complete compliance with manufacturer's installation instructions and warranty requirements.
- C. Cast in place concrete requires a slump and air entrainment test for every load of concrete delivered. All costs shall be the responsibility of the Contractor.
- D. The Contractor shall perform, at their full expense, disposal characterization sampling for all surplus soil at a frequency of 1 sample every 100 cubic yards of surplus soil. It is expected that the site has typical urban fill component that may include brick, concrete, tires, and the like. These materials are to be disposed of

at no additional expense to the owner.

- E. The Contractor shall provide up to four (4) test pits where indicated by the owner's representative to perform percolation and water quality testing as required at no additional expense to the owner.
- F. Compaction tests are required on all base surfaces. Contractor shall provide testing at 5 locations at designer's direction or per Owner's direction. At the Contractor's expense, an independent testing agency must perform the work and submit the results directly to the Owner's Representative.
- G. All other tests as indicated or required in the drawings and specifications.

PART 3 - EXECUTION

3.01 METHODOLOGY

- A. Unless otherwise directed by the Section specifications, perform sampling and testing will be ordered by the Contractor and approved by the Owner's Representative. Locations, number and quantity of samples shall be submitted for approval as directed in accordance with the Specifications.
- B. Sampling and Testing results must be provided to the Owner's Representative and Approved prior to the installation of any work potentially impacted by unacceptable test results.

3.02 DISPOSAL CHARACTERIZATION SAMPLING

- A. The Contractor shall be responsible for sampling and characterizing excavated material for the purpose of obtaining approvals from the reuse or disposal/recycling facility(ies). The Contractor shall provide the Owner's Representative with a minimum of 2-days notice prior to sampling and shall not sample unless the Owner's Representative has approved the Contractor's reuse or disposal/recycling facility(ies) and the Owner's Representative is present to witness the collection of the samples.
- B. The Contractor shall perform disposal characterization sampling and analytical testing of the excavated material as required by the permitted disposal/recycling facility and at a minimum frequency of one (1) sample every 100 cubic yards of surplus soil. The Contractor shall collect additional samples to perform additional testing of the excavated material as required by the disposal/recycling facility(ies) at no additional cost to the Owner.
- C. All analyses shall be performed by a laboratory certified for such analyses by the Commonwealth of Massachusetts. The collected samples shall be submitted, at a minimum, for the following chemical analyses: total petroleum hydrocarbons

(TPH) using modified EPA Method 8100, semi-volatile organic compounds (SVOCs) using EPA Method 8270, volatile organic compounds (VOCs) using EPA Method 8260, polychlorinated biphenyls using EPA Method 8082, RCRA 8 metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) using Method 6010/7471, reactive cyanide and sulfide using EPA Method SW-846, Ignitability using modified EPA Method 1010, corrosivity using EPA Method 9045, and conductivity using EPA Method 120.1. Any samples found to contain contaminant concentrations equal to or greater than “20 times” their hazardous waste toxicity threshold (i.e., the 20-times rule) shall be analyzed for toxicity characteristic leaching procedure (TCLP).

- D. Submit a copy of all chemical analyses and a tabulated summary of the data in Microsoft Excel format to the Owner’s Representative within 2-days of receipt of the laboratory report.
- E. The Owner’s Representative may stop the Contractor’s work in a particular location at any time in order to have samples taken and analyzed. If necessary, the Contractor shall assist the Owner’s Representative in collecting samples. The work shall not resume in that area until directed by the Owner’s Representative. Stoppage of work for this reason, or until laboratory results are delivered to the Owner’s Representative, shall not be a cause for the Contractor to request additional compensation or an extension of time to the Contract or to other intermediate Contract deadlines.

END OF SECTION 01450

SECTION 01562

DUST CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This Section specifies requirements for controlling and monitoring air (odors/vapors) and dust generated during work of this Contract. Work activities requiring special attention to odor/vapor and dust control include demolition of subsurface structures, excavating, stockpiling, loading and removal of material from the Site, and earthwork.
- B. The Contractor is responsible for control of odors/vapors and dust at all times during work of this Contract, 24 hours per day, 7 days per week, including non-working hours, weekends, and holidays.
- C. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of streets as necessary, to minimize creation and dispersion of dust. The Engineer may perform air/dust monitoring for confirmation purposes. If dust emissions exceed action levels described in this Section, or determined to be a nuisance by the Engineer, the Contractor shall be responsible for implementing additional engineering controls (e.g. additional dust suppression agents, wind screens), as required by the Engineer, and described in this Section at no additional cost to the Owner.
- D. The Contractor is responsible for daily clean-up of public roadways affected by work of this Contract. A wet spray power vacuum street sweeper shall be used on pavement. Dry power sweeping is prohibited.

1.02 RELATED WORK:

- A. Section 00890 – PERMITS
- B. Section 01570 – ENVIRONMENTAL PROTECTION
- C. Section 02300 – EARTHWORK

1.03 REGULATORY REQUIREMENTS:

- A. The Contractor shall perform all work specified under this Section in accordance with the Massachusetts Department of Environmental Protection, Code of Massachusetts Regulations (CMR) 310 CMR 7.00, “Air Pollution Control Regulations”, specifically 310 CMR 7.09, “Dust, Odor, Construction, and Demolition” and in compliance with any requirements imposed by Region 1 of the Environmental Protection Agency.
- B. Work of this Contract shall be conducted in a manner that will not result in excessive particulate matter emissions, nuisance dust conditions, PM₁₀ (particulate matter with an aerodynamic diameter less than or equal to 10 microns) emissions or PM₁₀

concentrations exceeding the Massachusetts and National Ambient Air Quality Standard of $150 \mu\text{g}/\text{m}^3$ on 24-hour average basis.

1.04 SUBMITTALS:

- A. Contractor shall submit a Dust Control Plan that outlines, in detail, the means and measures that will be implemented to comply with this Section, including dust suppression (e.g. calcium chloride, water), prevention, cleanup, and other measures. The Dust Control Plan shall be submitted to the Engineer within 14 days after issuance of the Notice to Proceed.
- B. Contractor shall submit to the Engineer product literature and Material Safety Data Sheets for any odor/vapor and dust suppression wetting agents and stabilizers prior to use.

1.05 DUST MONITORING:

- A. The Engineer may conduct air monitoring with a Mini RAM monitor, or equivalent, to ensure dust is being controlled at the site. During the course of the Work, the Contractor shall be responsible for implementing engineering controls (e.g., wetting, calcium chloride) to minimize or eliminate fugitive dust emissions. If dust exceeds action levels described below, or determined to be a nuisance by the Engineer, the Contractor shall be responsible for implementing additional engineering controls (e.g. additional dust suppression agents, wind screens), as required by the Engineer. If additional wet suppression (water) and/or wind screens, barriers, or covers are required per the Engineer based on air/dust monitoring results, they shall be at no additional cost to the Owner.
- B. The Dust Control Plan shall use the following actions levels for implementation of dust suppression controls, increased personal protective equipment, and additional monitoring:

Dust Action Level: 150 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$)

PART 2 - PRODUCTS

2.01 DUST SUPPRESSION AGENTS:

1. Calcium Chloride

- A. Calcium chloride shall conform to the requirements of AASHTO-M 144, Type I or Type II and Specification for Calcium Chloride, ASTM D98. The calcium chloride shall be packaged in moisture proof bags or in airtight drums with the manufacturer, name of product, net weight, and percentage of calcium chloride guaranteed by the manufacturer legibly marked on each container.
- B. Calcium chloride failing to meet the requirements of the aforementioned specifications

or that which has become caked or sticky in shipment may be rejected by the Engineer.

2. Water

- A. Water shall not be brackish and shall be free from oil, acid, and injurious alkali or vegetable matter.

2.02 BARRIERS, SCREENS, AND COVERS:

- A. Mesh Fabric/Wind screens shall be a durable fabric mesh of 50 percent porosity, attached to the temporary chain link fence as shown on the Contract Drawings. This temporary chain link fence shall be pile-driven along Eastern Avenue.
- B. Wind barriers, if required, shall be solid wood fences or solid durable fabric, attached to Site's chain link fence, or other solid barriers intended to block the passage of wind.
- C. Covers for stockpiles shall be 10-mil (minimum) nylon-reinforced polyethylene (NRPE) or 20-mil (minimum) polyethylene sheeting.

PART 3 - EXECUTION

3.01 CONSTRUCTION SITE DUST CONTROL – GENERAL:

- A. Wet suppression shall be used to provide temporary control of dust. Several applications per day may be necessary to control dust depending upon meteorological conditions and work activity. The Contractor shall apply wet suppression on a routine basis as necessary or required by the Engineer, to control dust.
 - 1. Wet suppression consists of the application of water or a wetting agent in solution with water. Ensure wetting agent is not used on plantable soils.
 - 2. Wet suppression equipment shall consist of nozzle-equipped spray bar, sprinkler pipelines, pressure gauge, tanks, tank trucks, or other devices capable of providing regulated flow, uniform spray, and positive shut-off.

The Contractor shall provide the necessary means to retain, on-Site, all water runoff generated by dust control and dispose of such water in accordance with the requirements of the appropriate regulatory agencies. The Contractor shall be responsible for providing water, a means of disposal, necessary permits, and all appurtenances required to control dust.

- B. Calcium chloride shall be applied when ordered by the Engineer and only in areas which will not be adversely affected by the application. See Section 01570 – ENVIRONMENTAL PROTECTION.
- C. Calcium chloride shall be used to control dust instead of wet suppression when freezing

conditions exist. Calcium chloride shall be uniformly applied by a mechanical spreader at 1 ½ pounds per square yard, unless otherwise required by the Engineer. Ensure vegetation or soil to be used for vegetation is not treated.

- D. The use of petroleum products for dust suppression is prohibited in this Contract.
- E. Provide wind screens and wind barriers, if required, in locations where they would be effective in minimizing wind erosion and spread of dust. The Contractor shall keep wind screens and barriers in good repair for the life of the Contract.

3.02 PUBLIC ROADWAY DUST CONTROL:

- A. Vehicles leaving the Site shall not carry out mud or dirt from the Site on the vehicle body or wheels. Any foreign matter on the vehicle body or wheels shall be physically removed prior to vehicle's entering of a public roadway. Contractor shall not permit any truck to leave the Site with exterior mud or dirt that has the potential to be deposited on public roadways. Contractor shall be responsible for assuring that each vehicle is properly decontaminated prior to exiting the Site. The Contractor shall prevent carry-out or spillage of material from his/her vehicles onto public ways. The Contractor shall promptly clean up and dispose of all material and debris deposited on public ways to the Owner's satisfaction. If vehicles tracking mud and dirt off-Site, the Contractor shall be responsible for additional engineering controls such as wheel washing at no extra cost to the Owner. The Contractor shall be responsible for collecting all wash water and sediment, as required, at no additional cost to the Owner. The Contractor shall ensure that material hauling vehicles remain on paved surfaces as much as possible.
- B. Vehicle mud and dirt carryout, material spills, and soil wash-out onto public roadways and walkways and other paved areas shall be cleaned up immediately. The Contractor also shall not create conditions that allow silt laden runoff to run onto public ways. Any silt and debris deposited onto public ways by runoff shall be cleaned up to the satisfaction of the Owner and means shall be employed to prevent recurrence of run-off deposits at no additional expense to the Owner.
- C. Haul truck cargo areas shall be securely covered during material transport on public roadways.
- D. The Contractor is responsible for daily clean-up of public roadways and walkways affected by work of this Contract. A wet spray power vacuum street sweeper shall be used on paved roadway. Dry power sweeping is prohibited. Costs associated with cleaning/sweeping of public roadways is considered incidental to the Project.

3.03 CONTROL OF EARTHWORK DUST:

- A. During batch drop operations (i.e., earthwork with front-end loader, clamshell bucket, or backhoe) the free drop height of excavated or aggregate material shall be reduced as much as practical to minimize the generation of dust.

- B. To prevent spills during transport, freeboard space shall be maintained between the material load and the top of the truck cargo bed rail.

3.04 CONTROL OF STOCKPILE DUST:

- A. At a minimum the Contractor shall use the following methods to control dust and wind erosion of active and inactive stockpiles:
 - 1. Polyethylene tarps on stockpiles shall be placed both below and on top of stockpiles, and secured with sandbags or an equivalent method to prevent the cover from being dislodged by the wind. The Contractor shall repair or replace covers whenever damaged or dislodged, at no additional cost to the Owner.
 - 2. The tarps shall be bermed 12-inches high at all edges to prevent any infiltration of storm water or exfiltration of leachate.
- B. The methods to be used shall be submitted to the Engineer as part of the Dust Control Plan.

3.05 DEBRIS AND DEMOLITION HANDLING DUST CONTROL MEASURES:

- A. The Contractor shall use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in the air to the lowest practical level. Sufficient water shall be supplied for the building, demolition-related debris and Site compacting to meet Federal, State, and local air-quality regulations and to minimize dust during demolition and debris handling.
- B. During transport of debris, the truck cargo area shall be securely covered.

END OF SECTION 01562

SECTION 01740

CLEANING UP

PART 1 - GENERAL

1.01 DESCRIPTION:

The Contractor must employ at all times during the progress of his work adequate cleanup measures and safety precautions to prevent injuries to persons or damage to property. The Contractor shall immediately, upon request by the Engineer provide adequate material, equipment and labor to cleanup and make safe any and all areas deemed necessary by the Engineer.

1.02 RELATED WORK:

- A. Section 01110 – CONTROL OF WORK AND MATERIALS
- B. Section 01140 – SPECIAL PROVISIONS
- C. Section 01570 – ENVIRONMENTAL PROTECTION

PART 2 - PRODUCTS

Not applicable

PART 3 - EXECUTION

2.01 DAILY CLEANUP:

- A. The Contractor shall clean up, at least daily, all refuse, rubbish, scrap and surplus material, debris and unneeded construction equipment resulting from the construction operations and sweep the area. The site of the work and the adjacent areas affected thereby shall at all times present a neat, orderly and workmanlike appearance.
- B. Upon written notification by the Engineer, the Contractor shall within 24 hours clean up those areas, which in the Engineer's opinion are in violation of this section and the above referenced sections of the specifications.
- C. If in the opinion of the Engineer, the referenced areas are not satisfactorily cleaned up, all other work on the project shall stop until the cleanup is satisfactory.

2.02 MATERIAL OR DEBRIS IN DRAINAGE FACILITIES:

- A. Where material or debris has washed or flowed into or has been placed in existing watercourses, ditches, gutters, drains, pipes, 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.

2.03 REMOVAL OF TEMPORARY BUILDINGS, STRUCTURES AND EQUIPMENT:

- A. On or before completion of the work, the Contractor shall, unless otherwise specifically directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools and machinery or other construction equipment furnished by him; shall remove all rubbish from any grounds, which he has occupied; shall remove silt fences and straw wattles used for trapping sediment; and shall leave the roads and all parts of the property and adjacent property affected by his operations in a neat and satisfactory condition.

2.04 RESTORATION OF DAMAGED PROPERTY:

- A. The Contractor shall restore or replace, when and as directed, any property damaged by his work, equipment or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk and landscaping work. Materials, equipment, and methods for such restoration shall be as approved by the Engineer.

2.05 FINAL CLEANUP:

- A. Before acceptance by the Owner, the Contractor shall perform a final cleanup to bring the construction site to its original or specified condition. This cleanup shall include removing all trash and debris off of the premises. Before acceptance, the Engineer shall approve the condition of the site.

END OF SECTION 01740

SECTION 01770

PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers administrative and procedural requirements for closing out the project, including, but not limited to:
 - 1. Project As-Built Documents
 - 2. Checkout and Certification
 - 3. Final Cleaning
 - 4. Substantial Completion
 - 5. Closeout Procedures
 - 6. Final Completion
- B. Closeout checklist to be completed by the Engineer.

1.02 RELATED WORK:

- A. General Requirements in their entirety.
- B. Section 01740 - CLEANING UP

1.03 AS-BUILT DOCUMENTS:

- A. The Contractor shall maintain on site, separate from the documents used for construction, one set of the documents listed below, and as construction progresses, shall legibly record on these documents all changes made during construction.
 - 1. Contract Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other Modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.
 - 6. Written interpretations and clarifications.
 - 7. Field Orders.
 - 8. Field test reports properly verified.
- B. The completed set of As-Built Documents shall be submitted to the Engineer with the final Application for Payment. As-Built documents shall include excavation areas and depths, survey of the BUD Area (including limits of BUD Area, depth of BUD material, Rain Garden excavations and final built-up reuse areas per the Drawings), final grades and GPS coordinates, including depths below grade, for all structures left

in place (e.g., cistern).

- C. The As Built documents shall include survey/grading information of the final conditions at the Site.

1.04 CHECKOUT AND CERTIFICATIONS:

- A. Prior to checkout and certifications the following tasks shall be completed:
 - 1. Construction shall be complete. For this purpose, completion of construction is defined as follows:
 - a. The Contractor has completed site activities in conformance with the Contract Drawings and Specifications.
 - 2. All shop drawings shall have final approval.
 - 3. All sampling test results, if required, submitted to the Engineer.

1.05 FINAL CLEANING:

- A. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
 - 1. Clean the site, including landscape development areas of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to smooth, even textured surfaces.
 - 2. Remove waste and surplus materials, rubbish, fencing equipment, temporary utilities and construction facilities from the site, unless otherwise required by the Engineer.
 - 3. Comply with requirements of Section 01740 - CLEANING UP.

1.06 SUBSTANTIAL COMPLETION:

- A. Substantial Completion is officially defined in the General and Supplementary Conditions. The date of substantial completion will be certified by the Engineer. This date will not be certified until the following requirements have been satisfied by the Contractor:
 - 1. All Contract requirements are complete. All individual units of equipment and treatment are fully operative and performing at specified efficiencies. Where efficiencies are not specified, performance shall meet acceptable standards for the particular unit.

2. All field tests and inspections have been satisfactorily completed and reports forwarded to the Engineer.

1.07 CLOSEOUT PROCEDURES:

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and is complete in accordance with Contract Documents and ready for Engineer's and the Owner's inspection.
- B. Accompany Engineer and Owner on inspection to verify conformance with the Contract Documents. Prepare a punch list of work items that have been determined by inspection to not conform to Contract Documents. Punch list items shall include work items that are missing, incomplete, damaged, incorrect items, or improperly installed or constructed. The Contractor shall correct the punch list deficiencies by re-work, modifications, or replacement, as appropriate, until the items conform to the Contract Documents. The initial punch list shall be produced by the Contractor, with copies to the Engineer and Owner's Project Manager. When the Contractor has reduced the number of deficient items to a reasonable level, the Engineer will develop a definitive punch list for the use of the Contractor.
- C. Provide submittals to Engineer that are required by governing or other authorities.
- D. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due. The Contractor shall submit the following documents with or prior to Final Application for Payment: Set of as-built documents, Contract Completion and Acceptance Certificate, Consent of Surety to Final Payment, Release and Waiver of Liens and Claims, Affidavit of Payment of Debts and Claims, and remaining releases, waivers, warranties/guarantees, and all other data required by the Contract Documents.

1.08 CLOSEOUT SUBMITTALS

- A. The closeout submittals include but are not necessarily limited to:
 - a. Evidence of payment and release of liens.
 - b. Waste shipment manifests, Bills of Lading (if required), weight slips, and shipping records.
 - c. Records of quantities/weights of materials shipped off-site, including all contaminated materials to disposal facilities, construction debris to recycling/disposal facilities, and all recycled/reused materials.
 - d. All other records or documents as necessary (i.e. personal air sampling records, injury reports, etc.)
 - e. Construction photographs
 - f. As-Built drawings, including survey/GPS information as described in Paragraph 1.03.B of this Section and final grades.

1.09 FINAL COMPLETION:

A. Prior to final completion, the following tasks shall be completed:

1. All items in the punch list shall be completed.
2. All Contract closeout documentation shall be submitted to and accepted by the Engineer.

1.10 COMPLETION CHECKLIST:

A. When the project has been fully completed, Final Payment can be approved.

PROJECT COMPLETION CHECKLIST

Project _____

Job No. _____

As part of the project closeout, all items listed below must be checked off as being complete or otherwise accounted for. The person verifying completion of the item shall list the completion date and his/her initials.

Project Closeout Checklist		
	Date Completion Verified	Verified by
AS-BUILT DOCUMENTS HANDED OVER		
1. Contract Drawings		
2. Specifications		
3. Addenda		
4. Change Orders/Contract Modifications		
5. Reviewed Shop Drawings, Product Data and Samples		
6. Written Interpretations/Clarifications		
7. Field Orders		
8. Field Test Reports		

Project Closeout Checklist		
	Date Completion Verified	Verified By
FINAL CLEANING		
1. All Construction Facilities Removed		
2. All Construction Debris Removed		
3. All Areas Swept/Cleared		
SUBSTANTIAL COMPLETION		
1. All Items Complete		
CLOSEOUT PROCEDURES		
1. Written Certification Submitted that Work is Ready for OWNER & Engineer Inspector		
2. Inspection by OWNER, Engineer, Contractor completed		
3. Punch List of Nonconforming Items Prepared		
4. Documents Required by Governing or Other Authorities Submitted (List Them)		
5. Final Application for Payment Received		
6. Contact Completion and Acceptance Certificate Submittal		
7. Consent of Surety to Final Payment Submittal		
8. Release and Waiver of Liens and Claims Submitted		
9. Affidavit of Payment of Debts and Claims Submitted		
10. Warranties/Guarantees Submitted		
11. Other Required Releases and Waivers Submitted (List Them)		
12. Permits Submitted (List Them)		
13. Weekly Payrolls Submitted as Required by Law		
FINAL COMPLETION		
1. All Items in Punch List Completed		
2. All Other Required Documentation Submitted (List It)		
CORRECTION/WARRANTY PERIOD		

Project Closeout Checklist

	Date Completion Verified	Verified By
1. Correction Period Start Date: _____ End Date: _____		
2. Specific Warranties Provided <p align="center"><u>Item</u> <u>Warranty Duration</u></p>		

Full name of persons signing their initials on this checklist:

END OF SECTION 01770

SECTION 02071

GEOTEXTILE FABRIC

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers furnishing of all labor, materials, and equipment necessary to install specified geotextile fabrics as indicated on the Contract Drawings, specified in this Section, and as required by the Engineer.

1.02 SUBMITTALS:

Digital shop drawings or working drawings and material specifications shall be submitted to the Engineer for review for each type of geotextile fabric furnished. General installation practices and installation schedule shall be included.

PART 2 - PRODUCTS

2.01 EROSION CONTROL FABRIC

- A. Erosion Control Fabric shall be of the best quality proven design and construction and shall be entirely suitable in every respect for the intended service.
- B. Erosion Control fabric shall be Miramat Erosion Control/Revegetation MAT (ECRM) as manufactured by Mirafi Inc., Pendergrass, GA; Enkamat Soil Erosion Matting as manufactured by BASF Corporation Fibers Division, Enka, N.C.; Tenax Erosion Control Netting as manufactured by ATP Corporation, Ashtabula; Ohio or approved equal.

2.02 FILTER/DRAINAGE FABRIC:

- A. The filter/drainage fabric shall be composed of continuous-filament fibers bonded together to form a sheet. The fabric shall be an average of 20 mils thick and possess the characteristics of Mirafi 140N.
- B. The filter/drainage fabric shall be Mirafi 140N as manufactured by Mirafi Inc., Pendergrass, GA; Foss-65 by Foss Manufacturing Co., Hampton, NH; US 120NW, as manufactured by US Fabrics, Cincinnati, OH, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. GENERAL:

Installation of the geotextile fabric shall be strictly in accordance with manufacturer's instructions and specific layout plans and details reviewed by the Engineer.

B. EROSION CONTROL FABRIC:

Erosion control fabric shall be placed over the prepared surface in drainage swales and other locations as required by the Engineer. The fabric shall be unrolled, placed in the direction of water flow, overlapped, pinned down with wood stakes, and seeded. All installation work shall be in accordance with manufacturer's recommendations or as required by the Engineer.

C. FILTER/DRAINAGE FABRIC:

The filter/drainage fabric shall be installed in the final graded trench bottom prior to placement of the crushed stone bedding and at other locations shown on the drawings or designated by the Engineer. The drainage fabric in place shall cover the entire trench bottom and trench sides as shown on the drawings. Each width of drainage fabric shall be overlapped in accordance with manufacturer's recommendations, but not less than 2 feet, to prevent intrusion of soil fines into the bedding.

3.02 FINAL INSPECTION AND ACCEPTANCE:

- A. The Contractor shall repair any defects and/or tears per the manufacturer's recommendation prior to backfilling.
- B. The Engineer and Owner shall inspect the work at completion of the installation. Any work found to be unsatisfactory shall be corrected at the Contractor's expense.

END OF SECTION

SECTION 02220

SITE DEMOLITION

PART 1 - GENERAL

1. SCOPE OF WORK:

- A. Work under this Section shall consist of the careful removal, storage for reuse, transportation off-site, or demolition, of all site features encountered or noted to be removed complete and the removal and disposal of all materials not called for to be reused or salvaged, in accordance with the contract drawings, these specifications, and Engineer's requirements. Provide all labor, equipment, materials and transportation necessary to complete the work.
- B. Items plan referenced to be removed and stored shall be carefully removed and stored on site in a manner and location designated by the Engineer for reinstallation later as shown on the plans or as indicated by the Engineer.
- C. Items plan referenced, or as indicated by the Engineer to be removed and disposed of shall be removed from the site and properly and legally disposed of by the Contractor.
- D. Items indicated on the contract drawings or in the specifications to be removed and salvaged, or other items required to be removed by the Owner's Representative, shall be transported to a municipal storage facility, located within the Town confines, and unloaded and stacked as required by the Engineer.
- E. Items indicated on the contract drawings or in the specification to be removed and reset shall be carefully removed and reset in the same location as existing according to the specification and details.
- F. The following scope describes the general work/demolition requirements of this Section.
 - 1. Stripping and stockpiling of existing soils
 - 2. Complete demolition and complete removal of bituminous concrete pavement at the basketball court.
 - 3. Complete demolition and complete removal of basketball post footing, post, backboard and goal.
 - 4. Removal of chain link fence fabric and ties at the existing back stop.
 - 5. Identifying, cutting, capping and abandonment of all utilities as shown on the drawings.
 - 6. Installation of environmental controls including silt fencing / erosion controls prior to commencing work of any kind on

premises.

7. Other features as indicated on the drawings.

2. PROTECTION:

- A. The Contractor shall assume complete responsibility and liability for the safety and structural integrity of all work and utilities to remain during demolition.
- B. Provide safeguards including, but not limited to, warning signs, barricades, temporary fences, warning lights and other items required for protection of personnel and the general public during performance of all work.
- C. All features related to protection shall be maintained until that work has been completed to the point when such safeguards are no longer required.

3. SPECIAL REQUIREMENTS:

- A. The Contractor shall salvage items labelled to be salvaged onsite in a designated location, unless these are called for to be reused or required by the Owner's Representative to be disposed of.
- B. Where items to be demolished are located within or adjacent to pavements to remain, the Contractor shall make provisions to protect that pavement to remain. Cut concrete pavement back to score line and cut bituminous concrete pavement back far enough so as not to allow disturbance to base course materials. Pavements damaged as a result of Contractor activities shall be replaced to the extent determined by the Owner's Representative at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 TEMPORARY FENCE:

- A. The work under these Items shall conform to the relevant provisions of section 644 of the MassDOT standard specifications.
- B. The work shall include temporary installation of 6' chain link fence around the perimeter of the work limits where shown on the plans, and as required by the Engineer, and as Contractor sees fit to protect work.
- C. Temporary fence shall consist of 6 foot high chain link fence anchored into a base that is both stable and movable to allow access and adjustment as needed. The fence posts along Eastern Avenue shall be pile-driven. The Contractor shall submit a shop drawing to the Engineer for approval prior to installation.
- D. Once the project has reached substantial completion, protective fencing must be

installed around the playing fields to protect the grass and allow suitable growing seasons. This shall be a 6' chain link fence with posts driven into the ground and shall not be movable. There must be two (2) double gates that are at least 10' to allow for maintenance access. Gates to be located in field by Engineer and Owner.

2.02 BACKFILL:

- A. The Contractor shall provide suitable backfill as specified under Section 02300 of these Specifications, to fill voids left by removal or abandonment of site features.
- B. Suitable materials shall be used as base course fill and topsoil to the depth as specified herein. Restore disturbed areas with similar materials blended to match the line and grades of adjacent surfaces.

PART 3 - EXECUTION

1. SALVAGEABLE MATERIAL:

- A. Salvageable material shall be carefully removed to minimize damage and stored for later reuse, transport, or removal from site.

END OF SECTION 02223

SECTION 02240

DEWATERING

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This section specifies designing, furnishing, installing, maintaining, operating and removing temporary dewatering systems as required to lower and control water levels and hydrostatic pressures during construction; disposing of pumped water; constructing, maintaining, observing and, except where indicated or required to remain in place, removing of equipment and instrumentation for control of the system.
- B. Test pit information is attached at the end of Section 02300, EARTHWORK

1.02 RELATED WORK:

- A. Section 01570, ENVIRONMENTAL PROTECTION
- B. Section 02300, EARTHWORK
- C. Section 02252, SUPPORT OF EXCAVATION

1.03 SYSTEM DESCRIPTION:

- A. Dewatering includes lowering the water table and intercepting seepage which would otherwise emerge from the slopes or bottom of the excavation; increasing the stability of excavated slopes; preventing loss of material from beneath the slopes or bottom of the excavation; reducing lateral loads on sheeting and bracing; improving the excavation and hauling characteristics of sandy soil; preventing rupture or heaving of the bottom of any excavation; and disposing of pumped water.
- B. Normal dewatering is defined as using conventional pumps installed in open excavations, ditches, or sumps.

1.04 QUALITY ASSURANCE:

- A. The Contractor is responsible for the adequacy of the dewatering systems.
- B. The dewatering systems shall be capable of effectively reducing the hydrostatic pressure and lowering the groundwater levels to a minimum of 2 feet below excavation bottom, unless otherwise required by the Engineer, so that all excavation bottoms are firm and dry.
- C. The dewatering system shall be capable of maintaining a dry and stable subgrade until the structures, pipes and appurtenances to be built therein have been completed to the extent

that they will not be floated or otherwise damaged.

- D. The dewatering system and excavation support (see Section 02252, SUPPORT OF EXCAVATION) shall be designed so that lowering of the groundwater level outside the excavation does not adversely affect adjacent structures, utilities or wells.

1.05 SUBMITTALS

- A. Contractor shall submit a plan indicating how they intend to control the discharge from any dewatering operations on the project, whether it is discharge of groundwater from excavations or Stormwater runoff during the life of the project.

PART 2 - EXECUTION

2.01 DEWATERING OPERATIONS:

- A. All water pumped or drained from the work shall be disposed of in a manner which will not result in undue interference with other work or damage to adjacent properties, pavements and other surfaces, buildings, structures and utilities. Suitable temporary pipes, flumes or channels shall be provided for water that may flow along or across the site of the work. All disposal of pumped water shall conform to the requirements of the owner.
- B. Dewatering facilities shall be located where they will not interfere with utilities and construction work to be done by others.
- C. Dewatering procedures to be used shall be as described below:
 1. Crushed stone shall encapsulate the suction end of the pump to aid in minimizing the amount of silt discharged.
 2. For dewatering operations with relatively minor flows, pump discharges shall be directed into hay bale sedimentation traps lined with filter fabric. Water is to be filtered through the hay bales and filter fabric prior to being allowed to seep out into its natural water course.
 3. For dewatering operations with larger flows, pump discharges shall be into a steel dewatering basin. Steel baffle plates shall in used to slow water velocities to increase the contact time and allow adequate settlement of sediment prior to discharge into waterways.
 4. Where indicated on the contract drawings or in conditions of excess silt suspended in the discharge water, silt control bags are to be utilized in catch basins.
 5. The Contractor shall be responsible for repair of any damage caused by his dewatering operations, at no cost to the Owner.

END OF SECTION

SECTION 02252

SUPPORT OF EXCAVATION

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This section of the specification covers wood sheeting and bracing for support of excavations. The requirements of this section shall also apply, as appropriate, to other methods of excavation support and underpinning which the Contractor elects to use to complete the work.
- B. The Contractor shall furnish and place timber sheeting of the kinds and dimensions required, complying with these specifications, where indicated on the drawings or required by the Engineer.

1.02 RELATED WORK:

- A. Section 02240, DEWATERING.
- B. Section 02300, EARTHWORK.

1.03 QUALITY ASSURANCE:

- A. This project is subject to the Safety and Health regulations of the U.S. Department of Labor set forth in 29 CFR, Part 1926, and to the Massachusetts Department of Safety and Department of Labor, Division of Occupational Safety "Excavation & Trench Safety Regulation (520 CMR 14.00)" and "Rules and Regulations for the Prevention of Accidents in Construction Operations (454 CMR 10.0 et seq.)." Contractors shall be familiar with the requirements of these regulations.
- B. The excavation support system shall be of sufficient strength and be provided with adequate bracing to support all loads to which it will be subjected. The excavation support system shall be designed to prevent any movement of earth that would diminish the width of the excavation or damage or endanger adjacent structures.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Timber sheeting shall be sound spruce, pine, or hemlock, planed on one side and either tongue and grooved or splined. Timber sheeting shall not be less than nominal 2-inches thick.
- B. Timber and steel used for bracing shall be of such size and strength as required in the excavation support design. Timber or steel used for bracing shall be new or undamaged used material which does not contain splices, cutouts, patches, or other alterations which would impair its integrity or strength.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Work shall not be started until all materials and equipment necessary for their construction are either on the site of the work or satisfactorily available for immediate use as required.
- B. The sheeting shall be securely and satisfactorily braced to withstand all pressures to which it may be subjected and be sufficiently tight to minimize lowering of the groundwater level outside the excavation, as required in Section 02240, DEWATERING.
- C. The sheeting shall be driven by approved means to the design elevation. No sheeting may be left so as to create a possible hazard to safety of the public or a hindrance to traffic of any kind.
- D. If boulders or very dense soils are encountered, making it impractical to drive a section to the desired depth, the section shall, as required, be cut off.
- E. The sheeting shall be left in place where indicated on the drawings or required by the Engineer in writing. At all other locations, the sheeting may be left in place or salvaged at the option of the Contractor. Steel or wood sheeting permanently left in place shall be cut off at a depth of not less than two feet below finish grade unless otherwise required.
- F. All cut-off will become the property of the Contractor and shall be removed by him from the site.
- G. Responsibility for the satisfactory construction and maintenance of the excavation support system, complete in place, shall rest with the Contractor. Any work done, including incidental construction, which is not acceptable for the intended purpose shall be either repaired or removed and reconstructed by the Contractor at his expense.
- H. The Contractor shall be solely responsible for repairing all damage associated with installation, performance, and removal of the excavation support system.

END OF SECTION

SECTION 02290

SEEDING

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section includes furnishing all labor, materials, equipment, seed and incidental materials necessary to accomplish all grass seeding and related work, complete in place, maintained, and accepted, in accordance with the Contact Drawings and Specifications. All grassed areas disturbed by the Contractor's operations shall be repaired as herein specified.
- B. The Contractor shall bear the responsibility and cost of furnishing and applying water or any other substances, as necessary to ensure the sustainability of grass seeded areas, as part of the work of this contract.

1.02 RELATED WORK:

- A. Section 02910, SCREENED LOAM BORROW AND TOPSOIL REUSED.
- B. Section 02911, ROOT ZONE MIX PREPARATION AND BLECAVATION

1.03 SUBMITTALS:

In accordance with requirements of general specifications, the Contractor shall submit the following to the Engineer for review and approval:

- A. Six copies of information for seed mixes including the following:
 - 1. Name and address of the seed supplier.
 - 2. Source of origin and dates of harvest for each of the various types of seed
 - 3. Certification of seed mix composition and proportion, indicating named seed varieties by percent, percent germination, purity, and percent crop seed, percent inert matter, and percent weed seed content.
 - 4. Estimated number of seeds per pound of each type of seed in the mix
 - 5. Ingredients that comprise the hydroseed mix
 - 6. Soil amendments and fertilizers and indicated in Appendix E – Sand and Soil Amendments

- B. Six copies of information detailing proposed limestone, fertilizers, mulch materials, hydroseeding materials (as required), and slope protection material (as required) to be applied to seeded areas.
- C. Six copies of watering, fertilizing and maintenance schedule.
- D. Six copies of marked up prints indicating the square footage of all proposed seeded areas with quantities of various soil additives and amendments, and quantities of seed for each area prior to beginning work.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. LOAM BORROW;

1. Loam Borrow shall be as specified in Section 02910, SCREENED LOAM BORROW AND TOPSOIL REUSED.

B. LIMESTONE:

1. Lime shall be an approved agricultural limestone containing at least 50 percent total oxides (calcium oxide and magnesium oxide). The material will be ground such that 50 percent of the material will pass through a No. 100 mesh sieve and 98 percent will pass a No. 2 mesh sieve. Lime shall be uniform in composition, dry and free-flowing and shall be delivered to the site in the original sealed containers, each bearing the manufacturer's guaranteed analysis.

C. FERTILIZER:

1. Fertilizer shall be a complete, standard commercial fertilizer, homogenous and uniform in composition, dry and free-flowing, and shall be delivered to the site in the manufacturer's original sealed containers, each bearing the manufacturer's guaranteed analysis and marketed in compliance with State and Federal Laws. All fertilizer shall be used in accordance with the manufacturer's recommendations. Refer to 02911 Appendix – Sand and Soil Amendments for required fertilizers. All fertilizers and soil amendments shall meet these requirements or be an approved equal.
2. Refer to 02911 Appendix – Sand and Soil Amendments for required fertilization requirements.

D. SEED:

1. Seed shall be of an approved perennial variety mixture, the previous year's crop, clean, and high in germinating value. Weed seed content shall be less than 0.5 percent and include no noxious weeds. Seed shall be obtained from a reliable seed company and shall be accompanied by certificates of compliance relative to mixture

purity and germinating value. Seed shall be furnished and delivered in new, clean, sealed and properly labeled containers. All seed shall comply with applicable State and Federal laws. Seed that has become wet, moldy or otherwise damaged shall not be accepted.

- 2. Grass seed for playing field areas shall conform to the following requirements: TOUCHDOWN 80/20 MIX or approved equal.

Botanical and Common Names	Proportion by Weight	Germination Rate	Purity Minimum
Touchdown Kentucky Bluegrass	30%	70%	97%
Mercury Kentucky Bluegrass	30%	90%	98%
Armada Bluegrass	20%	80%	85%
Futura 3000 Ryegrass Blend	20%	90%	98%

Refer to 02911 Appendix – for technical information on the seed types

- 3. Grass seed for general lawn areas shall conform to the following requirements:

Botanical and Common Names	Proportion by Weight	Germination Rate	Purity Minimum
Chewing’s Fescue (Festuca rubra commutata)	30%	70%	97%
‘Kentucky 31’ Tall Fescue (Festuca arundinacea ‘Kentucky 31’)	30%	90%	98%
Kentucky Bluegrass (Poa pratensis)	20%	80%	85%
Perennial Ryegrass (Lolium perenne)	20%	90%	98%

G. MULCH

- 1. Materials to be used in mulching seeded areas shall be free of weed seed and shall conform to the following requirements:
 - a. Hay Mulch shall consist of mowed and properly cured grass, clover or other acceptable plants. No salt hay shall be used.

b. Straw Mulch shall consist of stalks or stems of grain after threshing.

H. HYDROSEED MULCH, TACKIFIERS AND WATER RETENTION AGENTS:

1. Wood fiber mulch for Hydroseed application shall be a manufactured product of natural wood cellulose fibers with a non-toxic green marking dye incorporated to ensure uniform distribution. Mulch shall be packed in sealed original containers, clearly labeled with brand name and manufacturer. It shall have delivered moisture content less than 12 percent.
2. Hydroseed tackifier shall be a powdered starch-based product approved by the Engineer. Hydroseed tackifier shall be applied in conjunction with the hydroseed slurry in accordance with the manufacturer's recommendations.
3. Moisture retention agent shall be a powdered starch-based product, approved by the Engineer, and shall be capable of retaining up to 400 times their weight in water. Moisture retaining agents shall be added to the hydroseed slurry in accordance with the manufacturer's recommendations. Moisture retention agent shall be 'Hydro-Gel', as manufactured by Finn Corporation, Fairfield, OH.
4. Contractor to submit mix ingredients prior to installation of hydroseed.

I. SLOPE EROSION PROTECTION:

1. Erosion control blanket shall be 100 percent biodegradable mesh with 100 percent biodegradable straw or straw/coconut fill. Fill shall be held together by biodegradable fastening. Weight shall be 0.50 pounds per square yard. Erosion control blankets shall be applied parallel to direction of water flow. The erosion control blankets shall be by North American Green, Evansville, IN or approved equal. For slopes 4:1 or greater, erosion control blanket shall be composed of 70 percent straw 30 percent coconut fiber, Model SC150. For slopes less than 4:1, erosion control blanket shall be high velocity straw matting, Model S150.
2. Six-inch wire staples shall be placed in accordance with the manufacturer's recommendations to anchor the mesh material. Staples shall be biodegradable.

J. WATER:

1. Water shall be furnished by the Contractor, unless otherwise specified, and shall be suitable for irrigation and free from ingredients harmful to plant growth and viability. The delivery and distribution equipment required for the application of water shall be the furnished by the Contractor, at no additional cost to the Owner.

PART 3 - EXECUTION

3.01 GENERAL:

- A. All work shall be performed by skilled workers with a minimum of 2 years of seeded lawn construction and establishment experience and under the full-time supervision of a qualified foreman.
- B. Seeding operations shall not begin less than 4 days after the application of lime and fertilizer and the seedbed areas are reviewed and approved by the Engineer.
- C. Seeding shall be done when soil and weather conditions permit in early spring, until June 15, or from September 10 to October 15, unless otherwise approved. If it becomes necessary for seed to be sown after June 15, provisions shall be made for supplementary water and using mulch cover over lawn areas.
- D. If there is a delay in seeding, during which weeds grow, or soil is washed out, the Contractor shall eliminate the weeds by physical means, or replace the soil before sowing the seed, without additional compensation. Immediately before seeding is begun, the soil shall be lightly raked.
- E. Seed shall be sown at the approved rate, on a non-windy day by machine, or as approved by the Engineer.
- F. The surface shall be kept moist by a fine spray until the seed shows uniform germination over the entire area. Wherever poor germination occurs in areas larger than 3 square feet, the Contractor shall reseed, roll, straw and water as necessary to obtain proper germination.
- G. If there is insufficient time in the planting season to complete soil preparations, fertilizing, and seeding, permanent seeding may be left until the following planting season, at the option of the Contractor, or on order of the Engineer. In that event, a temporary cover crop shall be sown. This cover crop shall be cut and watered as necessary until the beginning of the following planting season, at which time it shall be plowed or harrowed into the soil, the area shall be fertilized and the permanent seed crop shall be sown as specified.
- H. Protection of all newly loamed and graded areas is required and shall be accomplished by whatever means necessary such as mulch applied with a tackifier, or by other means approved by the Engineer. The Contractor shall be responsible for the prevention of siltation in areas beyond the limit of work and for all means of protection throughout the maintenance period at no additional cost to the Owner.

3.02 ROOT ZONE MIX TESTING REQUIREMENTS

- A. Root zone mix (vegetative support layer) samples shall be collected from in-place loam at a minimum of every 1000 cubic yards and analyzed for grain size (ASTM D422), pH (Astm D6276) and organic content (ignition test).

3.02 SURFACE PREPARATION:

- A. Refer to SECTION 02911 – ROOT ZONE MIX PREPARATION AND BLECAVATION and Appendix – Sand and Soil Amendments for surface preparation.

3.03 BROADCAST SEEDING, PLACING MULCH AND SLOPE EROSION PROTECTION:

- A. The seed mix shall be broadcast at 6 pounds per 1000 square feet, as recommended by the seed supplier, or as directed by the Engineer. Seed shall be divided into 2 equal amounts and uniformly distributed in 2 applications at right angles to each other. Seed shall then be raked lightly into the soil to a depth of 1/4 inch.
- B. If mulch is not necessary the seed shall be directly firmed into the soil with a roller that will apply pressure between 75 and 100 pounds per linear foot of width.
- C. Hay or Straw Mulch shall be used based on time of seeding as previously specified over all seeded areas, as designated on the plans, or as otherwise directed. If mulch is to be used, it shall be loosely spread to a uniform depth at a rate of 4-1/2 tons per acre to provide ¼ inch of cover, or as otherwise directed. The seed and mulch shall then be firmed into the soil with a roller that will apply a pressure between 75 and 100 pounds per foot of width.
- D. Hay or Straw Mulch may be applied by mechanical apparatus, if in the judgment of the Engineer, the apparatus spreads the mulch uniformly and forms a suitable mat to control slope erosion. The apparatus shall be capable of spreading at least 80 percent of the hay or straw in lengths of 6-inches or more, otherwise it shall be spread by hand without additional compensation.
- E. Slope erosion control blankets shall be placed as indicated on the plans or as directed by the Engineer.

3.04 HYDROSEEDING:

- A. The application of lime, fertilizer, grass seed and mulch may be accomplished in a single operation with the use of approved hydroseeding equipment. The materials shall be mixed with water in the machine and kept in an agitated state in order that the materials may be uniformly suspended in the water. The slurry shall be of such consistency that it can be sprayed from a hydroseed gun or through at least 200 feet of 1 ½ inch diameter hose. The spraying equipment shall be so designed that when the solution is sprayed over an area, the resulting deposits of lime, fertilizer, grass seed, and mulch shall be equal to the specified quantities.
- B. Prior to the start of hydroseeding, the Contractor shall furnish to the Engineer, in writing, the weights of limestone, fertilizer, grass seed, mulch, tackifier (as required) and moisture retention agent (as required) per 100 gallons of water to be used. This statement should also specify the number of square yards of seeding that can be covered with the solution specified above. If the results of hydroseeding operations are unsatisfactory, the Contractor will be required to abandon this method and to apply the lime, fertilizer, grass seed and mulch by other means.

- C. Seed shall be incorporated with the mulching material to obtain minimum hydroseeded sown coverage of 200 pounds of the specified seed mix per acre, as recommended by the seed suppliers, or as directed by the Engineer.
- D. Wood fiber mulch shall be uniformly spread over certain selected seeded areas at the minimum rate of 1,400 pounds per acre unless otherwise directed. Mulch shall be placed by spraying from an approved spraying machine with pressure sufficient to cover the entire area in a single operation.
- E. The Contractor shall immediately cleanup hydroseed oversprays from plant materials, pavements, furnishings, etc., to the satisfaction of the Engineer.

3.05 MAINTENANCE:

- A. The Contractor shall maintain the entire seeded area, as necessary to ensure dense healthy growth, until completion of the guarantee period and final acceptance of the project which is two full growing seasons. If lawns are planted in late summer or during the fall, maintenance shall continue through the following fall. Maintenance shall include watering as specified, liming, fertilizing, removal of stones, control of weeds, insect pests and fungal pathogens, and regular mowing. Defective work shall be corrected as soon as possible after it becomes apparent and weather and season permit.
- B. The first cutting of lawn areas shall be done when the grass is between 2 ½ - 3 inches in height. The lawn shall be cut no shorter than 2 inches in height and shall be regularly mowed as necessary to maintain the above-prescribed conditions. All cuttings shall be removed from the lawn during the maintenance period and disposed of off-site. Cutting shall be accomplished with approved equipment that is weed free, clean of all herbicides and pesticides and has freshly sharpened blades. No mowing shall occur without inspection and approval of the owner or Engineer.
- C. The Contractor shall be responsible to regularly water seeded areas with the equivalent of 1-inch minimum of rainfall per week, or as necessary to develop and sustain dense, green growth.
- D. Six weeks after turf has established, and only during the months of April, May, or September, the Contractor shall apply fertilizer as specified above, at one half the rate recommended by the initial soils laboratory tests, or as directed by the Engineer.
- E. The Contractor shall be responsible for securing all seeded areas from physical damage as necessary, including warning signs, barriers, temporary fencing, or other means of protection, FOR TWO COMPLETE GROWING SEASONS AFTER INSTALLATION through the guarantee period until final acceptance. All damaged areas shall be repaired to reestablish healthy vigorous growth of turf to the satisfaction of the Engineer, at no additional cost to the Owner. All field protection fencing is to be 6' tall chain link with driven posts and two 10' gates to allow access for maintenance and shall remain the property of the Contractor and shall be removed by the Contractor upon final acceptance by the Engineer.

- F. Pavement shall be kept clean and clear of cuttings and debris at all times during the maintenance period to the satisfaction of the Engineer.

3.06 INSPECTION AND PRELIMINARY ACCEPTANCE:

- A. At the beginning of the planting season following that in which the permanent grass crop is sown, seeded areas will be inspected. Any section not showing dense, vigorous growth shall be promptly reseeded by the Contractor at no additional cost to the Owner. The seeded areas shall be watered, weeded, cut and otherwise maintained by the Contractor, as many times as necessary, in accordance with these specifications, until they are accepted.
- B. The Contractor shall provide written notice to the Engineer not less than 10 days before the anticipated date of inspection for preliminary acceptance. The Engineer shall recommend preliminary acceptance of the work of this Section only after completion and re-inspection of all necessary repairs, renewals, or replacements.
- C. Inspection and acceptance of seeded areas may be requested and granted in part, provided the areas for which acceptance is requested are relatively substantial in size, and with clearly definable boundaries. Acceptance and use of these areas by the Owner shall not waive any other provisions of this Contract.
- D. Refer to Appendix – Sand and Soil Amendments.

3.07 GUARANTEE:

- A. Seeded areas shall be guaranteed until final acceptance of the project, or, in the case of late summer or fall planting, the guarantee period shall extend through the following fall.
- B. When the work is accepted in part, the guarantee period shall extend from each partial acceptance to the terminal date of the last guarantee period. All guarantee periods terminate at one time.
- C. Guarantee shall not apply to the replacement of seeded lawns resulting from the removal, loss, or damage due to occupancy of the project in any part; vandalism or acts of neglect on the part of others; physical damage by animals, vehicles, etc.; and natural disasters, including but not limited to, catastrophic fire, hurricanes, riots (okay. . . seriously? A riot in Arlington?. . .), war, etc.
- D. In the instance of curtailment of water by local water authorities (when supply was to be furnished by the Owner), the Contractor shall furnish all necessary water by water tanker, the cost of which will be approved and paid for by the Owner.

3.08 FINAL INSPECTION AND FINAL ACCEPTANCE:

- A. At the end of the guarantee period, the Contractor shall provide written notice to the Engineer not less than 10 days before the anticipated date of final inspection for final acceptance.

- B. The Engineer shall recommend final acceptance of the work of this Section only after completion and re-inspection of all necessary repairs, renewals or replacements.

END OF SECTION

SECTION 02300

EARTHWORK

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. Under this Section, the Contractor shall furnish all labor, materials, equipment and transportation required to complete Earthwork as indicated on the drawings, as designated by the Engineer, or as specified herein, to complete all proposed work.
- A. The Contractor or Sub-contractor must have a minimum of five (5) years of experience installing walls, walkways and pavements, foundations, athletic fields, and trails of similar size and quality as this project.
- C. Without limiting the generality thereof, Earthwork shall include excavating, furnishing borrow materials as necessary, and backfilling for the construction of all proposed work from existing grades to finished grades. Work shall include the removal of unclassified material, such as bituminous pavements, curbs, ledge and boulders under one (1) cubic yard in size, concrete, reinforced and plain, structures, and metal or wood posts; and unsuitable materials of every nature throughout the site within twelve (12) inches below finished subgrade elevations for proposed work or as indicated or required for new construction; transportation of the excavated materials; backfilling to proposed base course subgrades with approved excavated and/or furnished materials; and the legal disposal of unsuitable, and/or surplus excavated materials.
- D. Work under this Section shall also include the skimming and removal of existing grass or topsoil areas to remove all sod clumps and vegetation and the complete excavation, stockpiling, rehandling, spreading, and re-use (placing) of on-site topsoil in conformity with the lines, grades and dimensions shown on the plans. This material may be utilized where general embankment (not beneath pavements, fields or structural improvements) is proposed at the sole discretion of the Owner. The Contractor shall take extreme care in the process of stripping and stockpiling existing topsoil to insure that subsoil to remain in place is not mixed with the topsoil. Compacted areas subject to construction traffic shall be disced to the full depth of topsoil without mixing in subsoil.
- E. Work under this Section shall include the furnishing of all borrow materials required to complete the proposed work as designed. Where "processed gravel", "gravel borrow", or "gravel" is indicated in the specifications or on the drawings, only gravel conforming to this section of the specifications may be utilized.
- F. All topsoil/loam for seeding, whether re-used or furnished from off-site, shall conform to Section 02910 of these Specifications.
- G. The Contractor shall make excavations of normal depth in earth for trenches and structures, shall backfill and compact such excavations to the extent necessary, shall

furnish the necessary material and construct embankments and fills, and shall make miscellaneous earth excavations and do miscellaneous grading.

1.02 RELATED WORK:

- A. Special Conditions, PERMITS
- B Section 01570, ENVIRONMENTAL PROTECTION
- C. Section 02910, SCREENED LOAM BORROW AND TOPSOIL REUSED
- D. Section 02290, SEEDING

1.03 REFERENCES:

AASHTO - American Association of State Highway and Transportation Officials (tests or specifications). AASHTO or AASHO

AWWA - American Waterworks Association

American Society for Testing and Materials (ASTM)

ASTM C 131 Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

ASTM C136 Method for Sieve Analysis of Fine and Coarse Aggregates.

ASTM C330 Specification for Lightweight Aggregate for Structural Concrete.

ASTM D1 556 Test Method for Density of Soil in Place by the Sand Cone Method.

ASTM D1557 Test Methods for Moisture-density Relations of Soils and Soil Aggregate Mixtures Using Ten-pound (10 Lb.) Hammer and Eighteen-inch (18") Drop.

ASTM D2922 Test Methods for Density of Soil and Soil-aggregate in Place by Nuclear Methods (Shallow Depth).

ASTM F-2396 – 04 Standard Guide for Construction of High Performance Sand-Based Rootzones for Sports Fields

Commonwealth of Massachusetts Highway Department Standard Specification for Highways and Bridges.

Code of Massachusetts Regulations (CMR) 310.40.0032 Contaminated Media and Contaminated Debris

Code of Massachusetts Regulations (CMR) 520 CMR 1400 Excavation & Trench Safety Regulations.

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Samples of all materials proposed for the project shall be submitted to the Engineer for review. Size of the samples shall be as approved by the Engineer.

1.05 PROTECTION OF EXISTING PROPERTY:

- A. The work shall be executed in such manner as to prevent any damage to facilities at the site and adjacent property and existing improvements, such as but not limited to parking areas, curbs, paving, service utility lines, structures, monuments, bench marks, observation wells, and other public or private property. Protect existing improvements from damage caused by settlement, lateral movements, undermining, washout and other hazards created by earthwork operations.
- B. In case of any damage or injury caused in the performance of the work, the Contractor shall, at its own expense, make good such damage or injury to the satisfaction of, and without cost to, the Owner. Existing roads, sidewalks, and curbs damaged during the project work shall be repaired or replaced to at least the condition that existed at the start of operations. The Contractor shall replace, at his own cost, existing benchmarks, observation wells, monuments, and other reference points, which are disturbed or destroyed.
- C. Buried drainage structures and pipes, observation wells and piezometers, including those which project less than eighteen inches (18") above grade, which are subject to damage from construction equipment shall be clearly marked to indicate the hazard. Markers shall indicate limits of danger areas, by means which will be clearly visible to operators of trucks and other construction equipment, and shall be maintained at all times until completion of project.

1.06 DRAINAGE:

- A. The Contractor shall provide, at its own expense, adequate drainage facilities to complete all work items in an acceptable manner. Drainage shall be done in a manner so that runoff will not adversely affect construction procedures or cause excessive disturbance of underlying natural ground or abutting properties. All work shall be done in the dry.

1.07 FROST PROTECTION AND SNOW REMOVAL:

- A. The Contractor shall, at its own expense, keep earthwork operations clear and free of accumulations of snow as required to carry out the work.
- B. The Contractor shall protect the subgrade beneath new structures and pipes from frost penetration when freezing temperatures are expected.

1.08 SPECIAL REQUIREMENTS:

- A. The sequence of all excavation operations shall be such as to insure the most efficient re-use of suitable excavated materials and the use of a minimum amount of specified borrow.
- B. The Contractor shall inform and satisfy himself as to the character, quantity, and distribution of all material to be excavated. No payment will be made for the placement of any excavated material which is used for purposes other than those designated and as specified herein. Further, these shall be removed at no cost to the Owner if so directed by

the Engineer.

- C. The Engineer shall have final determination over the excavation, moving, placing and disposition of all materials, and shall determine the suitability of materials to be placed in excavated areas.
- D. All backfill to subgrade, shall be compacted to not less than ninety-five percent (95%) of the maximum dry density of the material as determined by the Standard AASHTO Test Designation T-180-86, Modified Proctor Test with the exception of the athletic field areas which shall be compacted per Section 02911.
- E. Unsuitable and/or excess excavated materials shall be removed and properly disposed of in legal disposal areas off of the site at no additional cost to the Owner.
- F. Exploratory excavation to locate existing utilities or obstructions, shall be at the Contractor's discretion to assist him in the work of this project and no extra payment shall be made for such verification. Although extra payment is not considered, lack of such payment does not constitute a waiver of the Contractor's responsibility to verify all utilities. The contractor must ensure verification of existing services and ensure the safety of the Contractor's work forces.

PART 2 – PRODUCTS

2.01 BORROW MATERIALS:

- A. Excavated topsoil and furnished topsoil to be utilized for sodding, seeding and landscaping must conform to Section 02910 SCREENED LOAM BORROW AND TOPSOIL REUSED in order to be used as Loam Borrow. Existing topsoil not passing tests for Loam Borrow may be considered suitable as general fill below subgrade, in landscaped areas only and may be utilized throughout the proposed sod and seeded areas, up to subgrades of proposed work.
- B. Gravel Borrow shall be as specified under paragraph 2.03 of these Specifications and shall be utilized whenever gravel is noted, including beneath pavements and structural elements unless otherwise noted.
- C. Although suitable excavated backfill materials and topsoil may be reused to fill to subgrade as specified herein, if there are insufficient quantities of materials available the Contractor shall furnish Suitable Backfill as specified in paragraph 2.02A below.
- D. If approved by the Engineer, Suitable Backfill materials excavated from beneath pavements may be utilized as backfill from four inches above the overt of pipes so long as all material over four (4) inches in size is removed from the material prior to backfilling and all trench compaction requirements may be met.
- E. Where Sand Borrow is required, materials shall conform to Section M1.04.1 of the Massachusetts Standard Specifications. Utilize Sand Borrow as necessary for regrading subgrade.

2.02 SUITABLE ON SITE BACKFILL

- A. All other materials to be placed where Specifications or Drawings call for "fill," "backfilling," or "filling" to subgrade, shall be natural soil, well-graded and free from all organic weak, compressible, and frozen materials, and shall contain no stone larger than four (4) inches in maximum dimension. It shall be of such nature and character that it can be dried and compacted and shall be free of all expansive materials (such as high plastic clays) and of materials subject to decay, decomposition, or dissolution, and shall conform to the following gradations:

U.S. Sieve No. Total Percent Passing by Weight

4 inch	100
#4	20-75
#40	0-25
#200	0-5

- B. If, sufficient suitable fill material is not available from excavations under this Contract, to complete filling to subgrades as specified above, additional fill, as specified under paragraph 2.02A above, shall be furnished by the Contractor from other sources at no additional cost. Excavated material from the site, and furnished material for use as Suitable Backfill, shall be deemed suitable only if they meet the requirements of paragraph 2.02A above, can be properly compacted, and are satisfactory to the Engineer.
- C. Use Suitable Backfill compacted as specified for general grading as backfill except as specified herein; fill to sub-grades of proposed work where shown.

2.03 MATERIALS:

- A. GRAVEL BORROW:

Gravel Borrow shall satisfy the requirements listed in MASSDOT Specification Section M1.03.0, Type b.

- B. CRUSHED STONE:

Crushed stone shall satisfy the requirements listed in MASSDOT Specification Section M2.01.0.

- C. SAND BORROW:

Sand Borrow shall satisfy the requirements listed in MASSDOT Specification Section M1.04.0.

D. PEASTONE:

Peastone shall be smooth, hard, naturally occurring, rounded stone meeting the following gradation requirements:

Passing 5/8 inch square sieve opening	100%
Passing No. 8 sieve opening	0%

E. BACKFILL MATERIALS:

1. Class B Backfill:

Class B backfill shall be granular, well graded friable soil; free of rubbish, ice, snow, tree stumps, roots, clay and organic matter; with 30 percent or less passing the No. 200 sieve; no stone greater than two-third (2/3) loose lift thickness, or six inches, whichever is smaller.

2. Select Backfill:

Select backfill shall be granular, well graded friable soil, free of rubbish, ice, snow, tree stumps, roots, clay and organic matter, and other deleterious or organic material; graded within the following limits:

<u>Sieve Size</u>	<u>Percent Finer by Weight</u>
3"	100
No. 10	30-95
No. 40	10-70
No. 200	0-10

F. LOAM BORROW:

Loam Borrow shall satisfy the specification section 02910 included in these specifications.

G. PROCESSED GRAVEL:

1. Processed gravel shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials. The coarse aggregate shall have a percentage of wear, by the Los Angeles Abrasion Test, of not more than 50.
2. The gradation shall meet the following requirements:

<u>Sieve Designation</u>	<u>Percentage Passing</u>
3 in.	100
1 1/2 in.	70-100

1/4 in.	50-85
No. 4	30-60
No. 200	0-10

3. The approved source of bank-run gravel material shall be processed by mechanical means. The equipment for producing crushed gravel shall be of adequate size with sufficient adjustments to produce the desired materials. The processed material shall be stockpiled in such a manner to minimize segregation of particle sizes. All processed gravel shall come from approved stockpiles.

PART 3 - EXECUTION

3.01 DISTURBANCE OF EXCAVATED AND FILLED AREAS DURING CONSTRUCTION:

- A. Contractor shall take the necessary steps to avoid disturbance of subgrade during excavation and filling operations, including restricting the use of certain types of construction equipment and their movement over sensitive or unstable materials, dewatering and other acceptable control measures.
- B. Contractor shall not disturb sand filter layer that is located below the topsoil layer.

3.02 EXCAVATION:

A. GENERAL:

1. The Contractor shall perform all work of any nature and description required to accomplish the work as shown on the Drawings and as specified.
2. Excavations, unless otherwise required by the Engineer, shall be carried only to the depths and limits shown on the Drawings. If unauthorized excavation is carried out there could be damage to the landfill cap. Contractor will be required to repair at no additional cost to the owner.
3. In all excavation areas, the Contractor shall strip the surficial topsoil layer and underlying subsoil layer separate from underlying soils.
4. The Contractor shall follow a construction procedure, which permits visual identification of stable natural ground. Where groundwater is encountered, the size of the open excavation shall be limited to that which can be handled by the Contractor's chosen method of dewatering and which will allow visual observation of the bottom and backfill in the dry.
5. The Contractor shall excavate unsuitable materials to stable natural ground where encountered at proposed excavation subgrade, as directed by the Engineer. Unsuitable material includes topsoil, loam, peat, other organic materials, snow, ice,

and trash. Unless specified elsewhere or otherwise directed by the Engineer, areas where unsuitable materials have been excavated to stable ground shall be backfilled with compacted special bedding materials or crushed stone wrapped all around in non-woven filter fabric.

6. Confirm that the subgrade is at the proper elevation and that no further earthwork is required to bring the subgrade to proper elevations. Subgrade elevations shall slope parallel to the finished grade and or toward any subsurface drain lines as shown on the Contract Documents. Provide an As-Built survey to the Owner that the subgrade has been placed to the required elevations. The As-Built survey shall consist of a minimum 300 spot elevations evenly spaces across the entire baseball field area. Perform no work of placing and spreading loam borrow until elevations have been confirmed and the As-Built survey has been accepted by the Owner/Engineer.
7. When the plans require excavation in areas in proximity to existing sidewalks, structures and utilities, it shall be the responsibility of the Contractor, at his own expense, to provide adequate and suitable drainage away from proposed work and existing features or use other satisfactory means and methods to protect and maintain the stability of such construction within or adjacent to the limits of work.
8. Protect all existing trees, shrubs or other plan referenced features to remain. Hand excavate around all items to remain including tree roots or where utilities must be verified. Exposed tree roots shall be immediately covered with Loam Borrow in accordance with these specifications.
9. No roots greater than two (2) inches in diameter shall be cut from trees to remain without approval of the Engineer. Roots greater than one (1) inch in diameter that are cut or broken shall be promptly pruned to a smooth clean cut and painted with an approved compound.
10. Any removal of existing facilities required in order to achieve the excavation to proceed, such as fences, walls, walkways, etc., shall be accomplished by the Contractor at no additional cost to the owner. Restoration of these facilities shall be to a condition equal to that before removal, and safe and operational to the satisfaction of the Engineer.
11. Excavation shall be performed to the lines, grades, and elevations shown on the plans or as directed by the Engineer, and shall be made in such a manner that the requirements for formation of the subgrade can be followed.
12. No excavation shall be started until the Engineer has reviewed and acknowledged the area of proposed construction. All material encountered, of whatever nature within the limits indicated, shall be removed and disposed of as directed. During the process of excavation, the grade shall be maintained in such condition that it will be well drained at all times.
13. The planes at the bottom of the excavation (in cut), or the top of the fill, when completed, shall be known as the subgrade, and shall be true to the lines, grades and

cross section shown on the plans, to allow proposed work (base courses and finished courses) to be completed.

14. All unsuitable excavated material shall be legally disposed of outside of, and away from, the project limits. All suitable excavated material deemed surplus by the Engineer shall become the property of the Contractor and shall be properly removed from the site.
15. Fills to subgrade level shall be formed of successive layers not exceeding six (6) inches in depth and each layer shall be compacted to not less than 95 percent of maximum dry density of the material as determined by the standard AASHTO Test Designation T-180-86, Modified Proctor Test.
16. No additional payment will be made for materials removed, manipulated or replaced by the Contractor in order to obtain the specified density. Any removal, manipulation, aerating, replacement and re-compaction of materials necessary to obtain the required density shall be considered as incidental to the excavation and compaction operations and shall be performed by the Contractor at no additional cost.
17. After the areas to receive loam borrow have been brought to subgrade, and immediately prior to placing and spreading such material, the subgrade shall be loosened by discing to a depth of at least three inches to permit bonding of the finished material to the subgrade material. Upon completion of loosening/discing the subgrade the contractor shall remove and dispose of all stones/boulders encountered greater than 2 ½" in size from the subgrade prior to spreading the loam borrow. Then place and spread the loam borrow to the depths required by the Drawings to establish finish grades. Refer to Loam Borrow Specifications.
18. Protect all existing areas against damage due to the work under this Contract, and perform all repair and replacement work to any such areas which are damaged hereunder.
19. No extra work shall be initiated without notification of the Engineer in writing, and the written approval of the Engineer in response.
20. The Contractor shall be responsible for any and all pumping or bailing necessary to complete his operations, and to keep all areas sufficiently dry to guarantee compaction in accordance with the specifications.
21. Where insufficient suitable materials of any kind exist on site for incorporation into the proposed work within proposed work lines, the Contractor shall furnish materials from off site, as necessary and in accordance with these specifications, at no additional cost to the Owner.

C. EXCAVATION NEAR EXISTING STRUCTURES:

1. Attention is directed to the fact that there are pipes, manholes, drains, and other utilities in certain locations. An attempt has been made to locate all utilities on the

drawings, but the completeness or accuracy of the given information is not guaranteed. The contractor is responsible for contacting dig safe and appropriate municipal departments prior to construction operations begin to indicate general location of all utilities.

2. As the excavation approaches pipes, conduits, or other underground structures, digging by machinery shall be discontinued and excavation shall be done by means of hand tools, as required. Such manual excavation, when incidental to normal excavation, shall be included in the work to be done under items involving normal excavation.
3. Where determination of the exact location of a pipe or other underground structure is necessary for properly performing the work, the Contractor shall excavate test pits to determine the locations.

D. TRENCH HAND EXCAVATION

- a. When approaching the vicinity of significant tree roots, underground pipes, conduits, or other structures, or any suspected functioning underground features, digging by machinery shall be discontinued and the excavation shall be done by hand. Hand excavation shall also be undertaken when so directed by the Engineer. Such hand excavation shall be considered incidental to the trench excavation and no additional compensation will be allowed.
- b. Protection of Existing Structures - All existing pipes, conduits, poles, wires, fences, curbing, property line markers, and other structures which, in the opinion of the Engineer, are not required to be changed in location, shall be carefully supported and protected from injury by the Contractor, and in case of damage, they shall be restored by the Contractor without additional compensation, to as good a condition as that in which they were found.

3.03 BACKFILL PLACEMENT AND COMPACTION:

A. GENERAL:

1. Prior to backfilling, the Contractor shall compact the exposed natural subgrade to the densities as specified herein.
2. After approval of subgrade by the Engineer, the Contractor shall backfill areas to required contours and elevations with specified materials.
3. The Contractor shall place and compact materials to the specified density in continuous horizontal layers. The degree of compaction shall be based on maximum dry density as determined by ASTM Test D1557, Method C. The minimum degree of compaction for fill placed shall be as follows:

<u>Location</u>	<u>Percent of Maximum Density</u>
Below pipe centerline	95
Above pipe centerline	92
Below pavement (upper 3 ft.)	95
Embankments	95
Below pipe in embankments	95
Adjacent to structures	92
Below structures	95

4. The Engineer reserves the right to test backfill for conformance to the specifications and Contractor shall assist as required to obtain the information. Compaction testing will be performed by the Engineer or by an inspection laboratory designated by the Engineer, engaged and paid for by the Owner. If test results indicate work does not conform to specification requirements, the Contractor shall remove or correct the defective Work by recompacting where appropriate or replacing as necessary and approved by the Engineer, to bring the work into compliance, at no additional cost to the Owner. All backfilled materials under structures and buildings shall be field tested for compliance with the requirements of this specification.
5. The Contractor shall remove loam and topsoil, loose vegetation, stumps, large roots, etc., from areas upon which embankments will be built or areas where material will be placed for grading. The subgrade shall be shaped as indicated on the Drawings and shall be prepared by forking, furrowing, or plowing so that the first layer of the fill material placed on the subgrade will be well bonded to the subgrade.

3.04 DISPOSAL OF SURPLUS MATERIALS:

- A. Surplus excavated materials, which are acceptable to the Engineer, shall be used to backfill normal excavations in rock or to replace other materials unacceptable for use as backfill. Upon written approval of the Engineer, surplus excavated materials shall be neatly deposited and graded so as to make or widen fills, flatten side slopes, or fill depressions; or shall be neatly deposited for other purposes as indicated by the Owner, within its jurisdictional limits; all at no additional cost to the Owner.
- B. Surplus excavated material not needed as specified above shall be hauled away and disposed of by the Contractor at no additional cost to the Owner, at appropriate locations, and in accordance with arrangements made by him. Disposal of all rubble shall be in accordance with all applicable local, state and federal regulations.
- C. No excavated material shall be removed from the site of the work or disposed of by the Contractor unless approved by the Engineer.
- D. The Contractor shall comply with Massachusetts regulations (310 CMR 40.0032) that govern the removal and disposal of surplus excavated materials. Materials, including contaminated soils, having concentrations of oil or hazardous materials less than an

otherwise Reportable Concentration and that are not a hazardous waste, may not be disposed of at locations where concentrations of oil and/or hazardous material at the receiving site are significantly lower than the levels of those oil and /or hazardous materials present in the soil being disposed or reused.

- E. Soil testing, if required, for all materials to be reused on-site or removed and disposed of offsite, shall be the responsibility of the contractor. The town reserves the right to obtain its own test results from the same sample as the contractor without penalties to the owner. The contractor is required to obtain a large enough sample to divide with the owner for this proposes.

END OF SECTION

MEMORANDUM

TO: Cassidy Chroust, Cheri Ruane
FROM: Nathan Poretta
DATE: March 15, 2017
SUBJECT: Robbin's Farm – Test pit results

Test pits were performed at Robbin's Farm in Arlington, MA on February 8, 2017. They were conducted to better understand the subsurface soil and drainage conditions, so that proper drainage systems can be provided for the renovation of the playing field. The proposed design includes a multi-sport playing field and several new site features and amenities. The following is a brief summary of the test pit explorations. Detailed test pit logs and photos are attached to this memorandum.

Seven (7) test pits were performed on the site. With respect to the existing baseball field, test pit 1 was located in the deep right field corner, test pit 2 was located in right field, test pit 3 was located between home plate and the existing backstop, test pit 4 was located behind second base, test pit 5 was located in deep centerfield, test pit 6 was located in the left field corner, and test pit 7 was located behind third base. The test pits were excavated to depths ranging from about 3.5 feet to 6.8 feet below ground surface (b.g.s.). The test pits located in right field had features (e.g. sandy loam *w/ some silt*) that correlate with the poor drainage conditions in the existing fields.

All 7 test pits had a similar layer of dark brown sandy loam with roots, that begins at the surface to a depth of about one foot b.g.s. Test pits 1 and 2 had a similar soil structure. A grey gravelly sandy loam with some silt was underlain by brown gravelly loam to depths of 64 and 56 inches b.g.s., respectively, where standing groundwater was observed. Silt was also observed in the bottom layer of test pits 4 and 5. A grey gravelly sandy loam with some silt was observed at 26 and 20 inches b.g.s., respectively, to the bottom of the test pit excavations. In test pit 4, standing groundwater was observed at 82 inches b.g.s., while in test pit 5, ledge was observed at 74 inches b.g.s. Ledge was also observed in test pit 3 at 42 inches b.g.s. and in test pits 6 and 7, at 50 inches b.g.s.

Percolation tests were performed in test pits 1 and 7 to determine the infiltration rate of the soil. The estimated percolation rates using the obtained data were 23.67 and 6.33 minutes per inch (see attached).

TEST PIT LOG

PROJECT NAME/NO.	<u>Robbins Farm Park Redevelopment / 2160843</u>	TEST PIT NUMBER	<u>TP 1</u>
LOCATION	<u>Arlington, MA</u>	GROUND SURFACE	
CLIENT	<u>Town of Arlington</u>	ELEVATION	<u>see plan</u>
CONTRACTOR	<u>Town</u>	FOREMAN:	<u>D. Warren Jr.</u>
OBSERVED BY	<u>N. Poretta</u>	DATE	<u>2/9/17</u>
CHECKED BY	<u>A. Peck</u>	DATE	<u>3/15/17</u>
		DEPTH TO GROUNDWATER BELOW SURFACE	<u>64" (Standing)</u>

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION
8"	Dark brown sandy loam (w/ small roots)
11"	Grey gravelly sandy loam w/ some silt
64"	Brown gravelly loam w/ some cobbles and boulders up to 3' diameter
	- End of Exploration -

NOTES: 1. Groundwater at 64" (Standing)	TEST PIT NUMBER TP 1
	WESTON & SAMPSON ENGINEERS, INC.

TEST PIT LOG

PROJECT NAME/NO.	Robbins Farm Park Redevelopment / 2160843		TEST PIT NUMBER
LOCATION	Arlington, MA		TP 1
CLIENT	Town of Arlington		GROUND SURFACE
CONTRACTOR	Town	FOREMAN: D. Warren Jr.	ELEVATION see plan
OBSERVED BY	N. Poretta	DATE 2/9/17	DEPTH TO GROUNDWATER BELOW
CHECKED BY	A. Peck	DATE 3/15/17	SURFACE 64" (Standing)

DEPTH BELOW
GROUND
SURFACE (in.)

TEST PIT DIAGRAM AND SOIL DESCRIPTION



NOTES:

1. Groundwater at 64" (Standing)

TEST PIT NUMBER

TP 1

**WESTON & SAMPSON
ENGINEERS, INC.**

TEST PIT LOG

PROJECT NAME/NO.	<u>Robbins Farm Park Redevelopment / 2160843</u>	TEST PIT NUMBER	
LOCATION	<u>Arlington, MA</u>	TP 2	
CLIENT	<u>Town of Arlington</u>	GROUND SURFACE	
CONTRACTOR	<u>Town</u>	FOREMAN:	<u>D. Warren Jr.</u>
OBSERVED BY	<u>N. Poretta</u>	DATE	<u>2/9/17</u>
CHECKED BY	<u>A. Peck</u>	DATE	<u>3/15/17</u>
		ELEVATION	<u>see plan</u>
		DEPTH TO GROUNDWATER BELOW	<u>SURFACE 56" (Standing)</u>

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION
8"	Dark brown sandy loam (w/ small roots)
15"	Grey gravelly sandy loam w/ some silt
56"	Brown gravelly loam w/ some cobbles and boulders up to 3' diameter
	- End of Exploration -

NOTES: 1. Groundwater at 56" (Standing)	TEST PIT NUMBER
	TP 2
	WESTON & SAMPSON ENGINEERS, INC.

TEST PIT LOG

PROJECT NAME/NO.	<u>Robbins Farm Park Redevelopment / 2160843</u>		TEST PIT NUMBER
LOCATION	<u>Arlington, MA</u>		TP 2
CLIENT	<u>Town of Arlington</u>		GROUND SURFACE
CONTRACTOR	<u>Town</u>	FOREMAN: <u>D. Warren Jr.</u>	ELEVATION <u>see plan</u>
OBSERVED BY	<u>N. Poretta</u>	DATE <u>2/9/17</u>	DEPTH TO GROUNDWATER BELOW
CHECKED BY	<u>A. Peck</u>	DATE <u>3/15/17</u>	SURFACE <u>56" (Standing)</u>

DEPTH BELOW
GROUND
SURFACE (in.)

TEST PIT DIAGRAM AND SOIL DESCRIPTION



NOTES:

1. Groundwater at 56" (Standing)

TEST PIT NUMBER

TP 2

**WESTON & SAMPSON
ENGINEERS, INC.**

TEST PIT LOG

PROJECT NAME/NO.	<u>Robbins Farm Park Redevelopment / 2160843</u>	TEST PIT NUMBER	
LOCATION	<u>Arlington, MA</u>	TP 3	
CLIENT	<u>Town of Arlington</u>	GROUND SURFACE	
CONTRACTOR	<u>Town</u>	FOREMAN:	<u>D. Warren Jr.</u>
OBSERVED BY	<u>N. Poretta</u>	DATE	<u>2/9/17</u>
CHECKED BY	<u>A. Peck</u>	DATE	<u>3/15/17</u>
		ELEVATION	<u>see plan</u>
		DEPTH TO GROUNDWATER BELOW	
		SURFACE	<u>N/A</u>

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION
12"	Dark brown sandy loam w/ roots
19"	Light brown gravelly loamy sand w/ some cobbles and boulders up to 3' diameter
42"	Brown/grey gravelly loamy sand w/ some cobbles and boulders up to 3' diameter
	- End of Exploration -

NOTES: 1. Ledge at 42" limited backhoe excavation.	TEST PIT NUMBER TP 3
	WESTON & SAMPSON ENGINEERS, INC.

TEST PIT LOG

PROJECT NAME/NO.	Robbins Farm Park Redevelopment / 2160843		TEST PIT NUMBER	
LOCATION	Arlington, MA		TP 3	
CLIENT	Town of Arlington		GROUND SURFACE	
CONTRACTOR	Town	FOREMAN: D. Warren Jr.	ELEVATION see plan	
OBSERVED BY	N. Poretta	DATE	2/9/17	
CHECKED BY	A. Peck	DATE	3/15/17	
			DEPTH TO GROUNDWATER BELOW SURFACE N/A	

DEPTH BELOW
GROUND
SURFACE (in.)

TEST PIT DIAGRAM AND SOIL DESCRIPTION



NOTES:

1. Rock at 42" limited backhoe excavation.

TEST PIT NUMBER

TP 3

**WESTON & SAMPSON
ENGINEERS, INC.**

TEST PIT LOG

PROJECT NAME/NO.	<u>Robbins Farm Park Redevelopment / 2160843</u>	TEST PIT NUMBER
LOCATION	<u>Arlington, MA</u>	TP 4
CLIENT	<u>Town of Arlington</u>	GROUND SURFACE
CONTRACTOR	<u>Town</u> FOREMAN: <u>D. Warren Jr.</u>	ELEVATION <u>see plan</u>
OBSERVED BY	<u>N. Poretta</u> DATE <u>2/9/17</u>	DEPTH TO GROUNDWATER BELOW
CHECKED BY	<u>A. Peck</u> DATE <u>3/15/17</u>	SURFACE <u>82" (Standing)</u>

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION
12"	Dark brown sandy loam w/ small roots
26"	Brown gravelly loamy sand w/ cobbles up to 4"
82"	Grey gravelly sandy loam w/ some silt
	- End of Exploration -

NOTES: 1. Groundwater at 82" (Standing)	TEST PIT NUMBER TP 4 WESTON & SAMPSON ENGINEERS, INC.
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TEST PIT LOG

PROJECT NAME/NO.	Robbins Farm Park Redevelopment / 2160843		TEST PIT NUMBER
LOCATION	Arlington, MA		TP 4
CLIENT	Town of Arlington		GROUND SURFACE
CONTRACTOR	Town	FOREMAN: D. Warren Jr.	ELEVATION <u>see plan</u>
OBSERVED BY	N. Poretta	DATE <u>2/9/17</u>	DEPTH TO GROUNDWATER BELOW
CHECKED BY	A. Peck	DATE <u>3/15/17</u>	SURFACE <u>82" (Standing)</u>

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION
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NOTES:
1. Groundwater at 82" (Standing)

TEST PIT NUMBER
TP 4
WESTON & SAMPSON ENGINEERS, INC.

TEST PIT LOG

PROJECT NAME/NO.	<u>Robbins Farm Park Redevelopment / 2160843</u>	TEST PIT NUMBER	
LOCATION	<u>Arlington, MA</u>	TP 5	
CLIENT	<u>Town of Arlington</u>	GROUND SURFACE	
CONTRACTOR	<u>Town</u>	FOREMAN:	<u>D. Warren Jr.</u>
OBSERVED BY	<u>N. Poretta</u>	DATE	<u>2/9/17</u>
CHECKED BY	<u>A. Peck</u>	DATE	<u>3/15/17</u>
		ELEVATION	<u>see plan</u>
		DEPTH TO GROUNDWATER BELOW	
		SURFACE	<u>N/A</u>

DEPTH BELOW

GROUND SURFACE (in.)

TEST PIT DIAGRAM AND SOIL DESCRIPTION

9"	Dark brown sandy loam w/ small roots
20"	Brown gravelly sandy loam w/ some boulders 1' diameter
74"	Grey gravelly sandy loam w/ some silt
	- End of Exploration -

NOTES:
1. Ledge at 74"

TEST PIT NUMBER
TP 5
WESTON & SAMPSON ENGINEERS, INC.

TEST PIT LOG

PROJECT NAME/NO.	Robbins Farm Park Redevelopment / 2160843		TEST PIT NUMBER	
LOCATION	Arlington, MA		TP 5	
CLIENT	Town of Arlington		GROUND SURFACE	
CONTRACTOR	Town	FOREMAN: D. Warren Jr.	ELEVATION	see plan
OBSERVED BY	N. Poretta	DATE	2/9/17	DEPTH TO GROUNDWATER BELOW
CHECKED BY	A. Peck	DATE	3/15/17	SURFACE
				N/A

DEPTH BELOW
GROUND
SURFACE (in.)

TEST PIT DIAGRAM AND SOIL DESCRIPTION



NOTES:

- 1. Ledge at 74"

TEST PIT NUMBER

TP 5

**WESTON & SAMPSON
ENGINEERS, INC.**

TEST PIT LOG

PROJECT NAME/NO.	<u>Robbins Farm Park Redevelopment / 2160843</u>	TEST PIT NUMBER	<u>TP 6</u>
LOCATION	<u>Arlington, MA</u>	GROUND SURFACE	
CLIENT	<u>Town of Arlington</u>	ELEVATION	<u>see plan</u>
CONTRACTOR	<u>Town</u>	FOREMAN:	<u>D. Warren Jr.</u>
OBSERVED BY	<u>N. Poretta</u>	DATE	<u>2/9/17</u>
CHECKED BY	<u>A. Peck</u>	DATE	<u>3/15/17</u>
		DEPTH TO GROUNDWATER BELOW SURFACE	<u>N/A</u>

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION
10"	Dark brown sandy loam w/ small roots
50"	Grey gravelly loamy sand w/ some boulders 1' in diameter
	- End of Exploration -

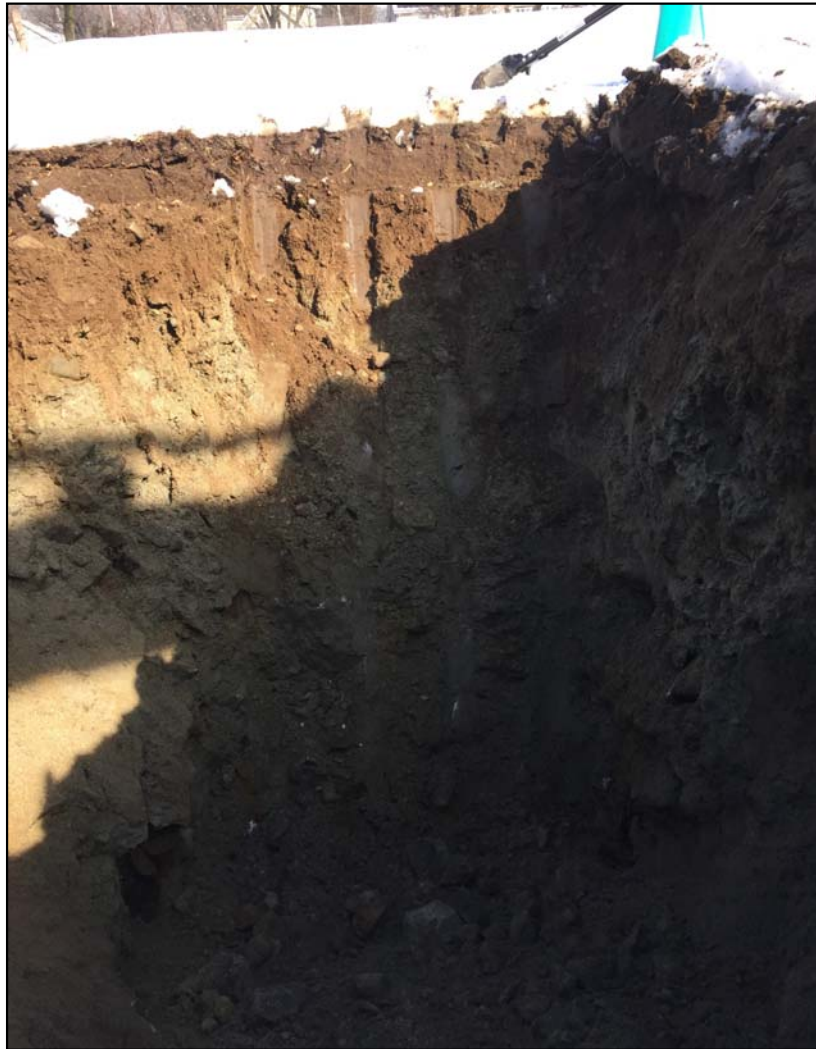
NOTES: 1. Ledge at 50"	TEST PIT NUMBER TP 6
	WESTON & SAMPSON ENGINEERS, INC.

TEST PIT LOG

PROJECT NAME/NO.	Robbins Farm Park Redevelopment / 2160843		TEST PIT NUMBER	
LOCATION	Arlington, MA		TP 6	
CLIENT	Town of Arlington		GROUND SURFACE	
CONTRACTOR	Town	FOREMAN: D. Warren Jr.	ELEVATION	see plan
OBSERVED BY	N. Poretta	DATE	2/9/17	
CHECKED BY	A. Peck	DATE	3/15/17	
			DEPTH TO GROUNDWATER BELOW SURFACE	N/A

DEPTH BELOW
GROUND
SURFACE (in.)

TEST PIT DIAGRAM AND SOIL DESCRIPTION



NOTES:

- 1. Ledge at 50"

TEST PIT NUMBER

TP 6

**WESTON & SAMPSON
ENGINEERS, INC.**

TEST PIT LOG

PROJECT NAME/NO.	<u>Robbins Farm Park Redevelopment / 2160843</u>	TEST PIT NUMBER	<u>TP 7</u>
LOCATION	<u>Arlington, MA</u>	GROUND SURFACE	
CLIENT	<u>Town of Arlington</u>	ELEVATION	<u>see plan</u>
CONTRACTOR	<u>Town</u>	FOREMAN:	<u>D. Warren Jr.</u>
OBSERVED BY	<u>N. Poretta</u>	DATE	<u>2/9/17</u>
CHECKED BY	<u>A. Peck</u>	DATE	<u>3/15/17</u>
		DEPTH TO GROUNDWATER BELOW SURFACE	<u>N/A</u>

DEPTH BELOW

GROUND SURFACE (in.)

TEST PIT DIAGRAM AND SOIL DESCRIPTION

9"	Dark brown sandy loam w/ small roots
50"	Grey gravelly loamy sand w/ some boulders 1' in diameter
	- End of Exploration -

NOTES:

- 1. Ledge at 50"

TEST PIT NUMBER

TP 7

**WESTON & SAMPSON
ENGINEERS, INC.**

TEST PIT LOG

PROJECT NAME/NO.	Robbins Farm Park Redevelopment / 2160843		TEST PIT NUMBER
LOCATION	Arlington, MA		TP 7
CLIENT	Town of Arlington		GROUND SURFACE
CONTRACTOR	Town	FOREMAN: D. Warren Jr.	ELEVATION see plan
OBSERVED BY	N. Poretta	DATE 2/9/17	DEPTH TO GROUNDWATER BELOW
CHECKED BY	A. Peck	DATE 3/15/17	SURFACE N/A

DEPTH BELOW
GROUND
SURFACE (in.)

TEST PIT DIAGRAM AND SOIL DESCRIPTION



NOTES:

- 1. Ledge at 50"

TEST PIT NUMBER

TP 7

**WESTON & SAMPSON
ENGINEERS, INC.**



Commonwealth of Massachusetts
 City/Town of
Percolation Test
 Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

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



A. Site Information

Owner Name _____
 Street Address or Lot # Robbin's Farm Park
 City/Town Arlington State MA Zip Code _____
 Contact Person (if different from Owner) _____ Telephone Number _____

B. Test Results

	Date	Time	Date	Time
Observation Hole #	<u>2/8/17</u>	<u>10:00 AM</u>	<u>2/8/17</u>	<u>12:55 pm</u>
	<u>#1</u>	<u>TP 1</u>	<u># 2</u>	<u>TP 7</u>
Depth of Perc	<u>4'</u>		<u>2'</u>	
Start Pre-Soak	<u>9:45am</u>		<u>12:40 pm</u>	
End Pre-Soak	<u>10:00am</u>		<u>12:55 pm</u>	
Time at 12"	<u>10:00 am</u>		<u>12:55 pm</u>	
Time at 9"	<u>11:43 am</u>		<u>1:08 pm</u>	
Time at 6"	<u>12:54 pm</u>		<u>1:27 pm</u>	
Time (9"-6")	<u>71 min</u>		<u>19 min</u>	
Rate (Min./Inch)	<u>23.67</u>		<u>6.3</u>	
	Test Passed: <input type="checkbox"/>	Test Failed: <input type="checkbox"/>	Test Passed: <input type="checkbox"/>	Test Failed: <input type="checkbox"/>

Test Performed By: Nathan Poretta

Board of Health Witness _____

Comments: _____

SECTION 02411

UTILITY ABANDONMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. This Section covers the abandonment, cutting/capping/plugging, termination and discontinuance of existing utilities within the limit of work as designated on the Contract Drawings and described herein, including storm, sewer, or water utilities.
- B. The location of existing underground services and utilities shown on the Contract Drawings is based on available records. It is not warranted that all existing utilities and services are shown, nor that shown locations are correct. The Contractor shall be responsible for determining the location of existing utilities and having the utility companies locate their respective utilities on the ground prior to excavating. The Contractor shall coordinate utility termination work with the applicable utility companies to ensure services have been shutoff.
- C. The Contractor shall furnish all materials, tools, labor, and equipment to abandon, cut/cap/plug, terminate, and discontinue existing utilities as specified herein.
- D. Except where specifically noted otherwise, the Contractor shall protect sewer manholes, hydrants, and the existing stormwater collection system (catchbasins, drain manholes, piping, and culverts).

1.02 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING

- A. The Contractor shall submit material specifications and shop drawings for all materials and equipment for abandoning existing utilities under this Section. The Contractor shall also submit details/plan for protecting utilities to be left in place. The specifications, shop drawings, details/plan shall be submitted to and reviewed by the Owner's Representative prior to utility termination/protection work.
- B. Submit to the Owner's Representative an As-Built Drawing showing locations of all utility abandonments/terminations. Horizontal locations shall be by survey location or a minimum of three swing ties to fixed structures to remain (hydrants, manholes, catch basins, etc.). The Contractor shall also indicate vertical location based on depth from existing grade. This As-Built Drawing will serve as the Owner's record of utility termination locations.

PART 2 - PRODUCTS

2.01 CAPPING MATERIALS

- A. Cast Iron/Ductile Iron Piping - Caps shall be ductile iron and mechanical jointed with individually actuated wedges of same diameter of pipe. Caps are to be "Megalug" as manufactured by EBAA Iron Sales, Inc. or approved equal. Provide concrete thrust blocks.

2.02 CONCRETE AND MASONRY PLUGS

- A. Plugs installed at the open ends of the pipe to be abandoned shall be 12-inch thick 3,000-psi cement concrete, or 8-inch thick brick masonry as directed. The pipes to be abandoned as specified herein and as shown on the Contract Drawings.
- B. Precast cement concrete plugs that are used shall meet the requirements for 3,000 psi concrete and shall be free of cracks and spalls. Brick masonry plugs shall be made of brick meeting the requirements of ASTM C32, for grade SS, hard brick.
- C. Mortar shall be composed of portland cement, hydrated lime, and sand, and the volume of sand shall not exceed three times the sum of the volumes of cement and lime. The proportions of cement and lime shall be as directed and may vary from 1:1/4 for dense hard-burned brick to 1:3/4 for softer brick. In general, mortar for grade SS brick shall be mixed in the volume proportions of 1:1/2:4-1/2; portland cement to hydrated lime to sand. The cement concrete plug shall be covered with non-shrink grout to prevent leakage at the plug.

PART 3 - EXECUTION

3.01 GENERAL

- A. The Contractor shall determine the location of existing utilities to be abandoned from the Contract Drawings, field investigations, electronic utility detectors, coordination with applicable utility companies, and test pits.
- B. The Contractor shall contact DIGSAFE at least 72 hours, exclusive of Saturdays, Sundays and holidays, prior to excavation before working below ground and shall maintain the DIGSAFE numbers throughout the course of the project.
- C. Before backfilling any underground utility termination, the Contractor shall notify the Owner's Representative so the Owner's Representative can inspect and photograph the termination. If the area is covered prior to inspection/approval the work shall be uncovered for inspection at the Contractor's expense. Any and all costs associated with uncovering the work and damages resulting from such uncovering are the sole responsibility of the Contractor. Immediately following the Owner's Representative's inspection/approval, test pits and excavations for utility cutting/capping/abandonment shall be backfilled and the surface restored and maintained in a manner satisfactory to the Owner's Representative.

- D. The Contractor shall abandon, cut/cap/plug, terminate, and discontinue individual building utility services as designated on the Contract Drawings and described in these Specifications. Except where specifically noted otherwise, the Contractor shall protect sewer manholes, hydrants, and the existing stormwater collection system (catch basins, drain manholes, piping, and culverts) as designated on the Contract Drawings and described in these Specifications.
- E. All utility shut offs shall be coordinated with the Owner and applicable utility company. The Owner shall be responsible for any fees associated with the shut off of utilities. The Contractor shall obtain written authorization from the utility companies before shutting off or terminating any utility service, including terminating water and sewer service.
- F. The Contractor shall not remove underground piping except as necessary to terminate utilities.

3.02 CASTINGS

All frames, grates and covers on existing manholes that are specified to be abandoned shall remain the property of the Owner and shall be delivered to Owner.

3.03 CONCRETE PLACING DURING COLD WEATHER

- A. Concrete shall not be placed on frozen ground, and no frozen material or material containing ice shall be used. Materials for concrete shall be heated when temperature is below 40°F, or is expected to fall to below 40°F, within 73 hours, and the concrete after placing shall be protected by covering, heat, or both.
- B. All details of Contractor's handling and protecting of concrete during freezing weather shall be subject to the approval and direction of the Owner's Representative. All procedures shall be in accordance with provisions of ACI 306.

3.04 CONCRETE PLACING DURING HOT WEATHER

- A. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing, shall be sprinkled with cold water. The Contractor shall make every effort to minimize delays, which will result in excessive mixing of the concrete after arrival on the job.
- B. During periods of excessively hot weather (90°F or above), ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305. Any concrete with a temperature above 90°F, when ready for placement, will not be acceptable, and will be rejected.

END OF SECTION 02411

SECTION 02515

SERVICE CONNECTIONS (WATER SERVICES)

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section covers the furnishing and installation of new water service connections and the repair, replacement, and/or transfer of existing water service connections as shown on the drawings, as specified herein, and as required by the Engineer.

1.02 RELATED WORK:

- A. Not Used

1.03 REFERENCES:

- A. The following standards form a part of this specification:

American Society for Testing and Materials (ASTM)

ASTM	B88	Seamless Copper Water Tube
ASTM	B584	Copper Alloy Sand Castings for General Applications
ASTM	D2737	Polyethylene (PE) Plastic Tubing

American Water Works Association (AWWA)

AWWA	C800	Water-Service Line Fittings
AWWA	C651	Disinfecting Water Mains
AWWA	C901	Polyethylene Pressure Pipe & Tubing, 1/2-inch through 3-inch for Water Service

Federal Specifications (FS)

FS	WW-T-799C	Tube, Copper, Seamless
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1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF THE GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Digital or six sets of manufacturer's literature of the materials of this section for review.

PART 2 - PRODUCTS

2.01 SERVICE PIPING:

- A. Piping between the existing water main and the curb stop shall be buried continuous Type K annealed seamless copper water tubing conforming to ASTM B88 Standard Specification for Seamless Copper Water Tube or U.S. Federal Specification WW-T-799C for Tube, Copper, Seamless. Tubing shall be 1-inch diameter unless otherwise indicated.
- B. Piping for copper water service pipe for installation in air release valve manholes and backflow preventer cabinets shall be ASTM B88, Type K, hard copper tubing with diameter as indicated on the plans.
- C. Piping between the curb stop and the restroom facility shall be buried polyethylene (PE 4710) water services shall conform to ASTM D2737 and be as specified in AWWA C901. Polyethylene piping shall be designed for 200 psi minimum service and tested at 330 psi for 1,000 hours or greater. The tubing shall be copper O.D. size and be suitable for use with standard industry brass compression fittings without special adapters. Stainless steel insert stiffeners shall be provided for use with all compression joint connections.
- D. Couplings, if required, for existing to new service pipe connections shall have compression connections on the inlet and compression connections on the outlet. Couplings shall be made of brass as specified in AWWA C800. All brass components that come into contact with potable water shall be made from either CDA/UNS Brass Alloys C89520 or C89833 and shall not contain more than twenty five hundredths of one percent (0.25% or less) total lead content by weight. The lead leach limit of the coupling shall be 5 parts per billion (ppb). Couplings shall be NSF/ANSI 61 Annex F and Annex G and NSF/ANSI 372 certified by an ANSI accredited organization and shall be stamped or embossed with a mark or name indicating that the product is manufactured from a low-lead alloy, as specified above.
- E. Pipe joints inside air release manholes and backflow preventer cabinets shall be fittings conforming to ANSI B16.18 cast bronze solder fittings, or ANSI B16.22 wrought copper solder, lead free fittings and couplings. Solder shall be ASTM B32, Grade 95 TA, up to 250 degrees, and shall be lead-free; Silberbrite, Oatley, Harris, or equal. Solder flanged bronze fittings will be used for connections of pipe to valves, backflow preventers and pipe nipples.

2.02 PVC PIPE:

- A. PVC pipe shall be as sized on the drawings and details, Schedule 80, solvent weld PVC, ASTM No. D1785, NSF 61 approved, suitable for use with potable water, and as manufactured by IPEX or approved equal.
- B. Fittings for all PVC piping shall be Schedule 80 solvent weld PVC as manufactured by IPEX, or approved equal.

- C. PVC solvent shall conform to ASTM and shall be low VOC, NSF 61 approved. Solvent shall be appropriate for gluing of pipes and fittings up to 6 inches in size. Solvent shall be as manufactured by Weld-On or approved equal and shall be used in conjunction with an appropriate primer.

2.03 BACKFLOW PREVENTER:

- A. Backflow preventer for water spray area shall be a reduced pressure zone assembly (RPZ), as sized on the drawings and details. The RPZ shall consist of a lead free bronze body; two, inline check valves; replaceable check seats with an intermediate relief valve; and ball valve test cocks. RPZ shall be Watts #LS009 or approved equal.
- B. All Backflow preventers to be approved by the City's Plumbing Inspector prior to installation.

2.04 GATE VALVES:

- A. Gate valves 3-inches and smaller shall be standard, bronze, single wedge, rising stem type gate valves with screwed ends for 125 pound working steam pressure, conforming to Federal Specification WW V 54D, Int. and No. 1, Screwed and Flanged (for land use). They shall have silicon bronze stems and Composition 2 for other parts.

2.05 CURB STOPS:

- A. Curb stops shall be of brass as specified in AWWA C800. All brass components that come into contact with potable water shall be made from either CDA/UNS Brass Alloys C89520 or C89833 and shall not contain more than twenty five hundredths of one percent (0.25% or less) total lead content by weight. The lead leach limit of the curb stops shall be 5 ppb. Curb stops shall be NSF/ANSI 61 Annex F and Annex G and NSF/ANSI 372 certified by an ANSI accredited organization and shall be stamped or embossed with a mark or name indicating that the product is manufactured from a low-lead alloy, as specified above.
- B. Curb stops shall be inverted key style and the inlet and the outlet shall have compression connections.
- C. Curb stops shall be by Red Hed Manufacturing Co., Lincoln, RI; Ford Meter Box Co., Inc., Wabash, IN; Mueller Co., Decatur, IL; or approved equal.

2.06 CURB BOXES:

- A. Curb box shall be town standard as shown in the construction details, or approved equal.

2.07 WATER METER:

- A. Water meter shall be size as shown on the drawings and supplied by the OWNER.

2.08 PRESSURE REDUCING VALVE:

- A. Pressure reducing valves shall be installed where indicated on the drawings. The valves shall be self-contained, bronze body, single port valves with a spring loaded diaphragm.
- B. They shall be suitable for use with an inlet pressure of at least 150 psi and the outlet pressure shall be adjustable from 1 to 75 psi. The seat material shall be suitable for tight shut off.
- C. Pipeline strainers shall be placed ahead of each pressure-reducing valve, and shall contain 20-mesh stainless steel or Monel screens.
- D. The valves shall be manufactured by Fisher Governor Co., Marshaltown, IA; Watts Regulator Company, Lawrence, MA; Masoneilan International, Inc., Norwood, MA; or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Where new water mains are being installed and existing water services are to be transferred to the new main, the Contractor shall discontinue the existing water services by shutting down the corporation stop at the old water main, unless specifically otherwise required by the Engineer. The Contractor shall take special care to minimize the interruption of existing water service.
- B. The Contractor shall tap a new corporation stop, cut the existing service piping and connect the new service piping to the old service piping using an approved coupling at a point between the main and the existing curb stop and box.
- C. Where transfers are to be made and the existing curb stop and box cannot be utilized or a new curb stop and box is required, the Contractor shall connect the new service piping to the existing service piping using an approved coupling approximately 12-inches from the curb stop on the building side of the stop.
- D. Where transfers are being made and the existing service is of lead, galvanized steel, or iron, the service shall be replaced to the curb stop and box unless otherwise required. If required, the curb stop and box shall be replaced as specified above.
- E. Curb stops and boxes shall be set plumb, flush with the ground or paved surface, and centered with the box located directly over the stop. The box shall be set on a concrete block or flat stone. Earth fill shall be carefully tamped around the boxes to a distance of 4 feet on all sides of the box or to the undisturbed face of the trench, if less than 4 feet.
- F. Curb stops shall be operational and accessible at all times during construction and warranty period. The Contractor shall verify the proper operation of all curb stops in

the presence of the Engineer and/or Owner following completion of the project and prior to the acceptance of substantial completion.

- G. All services shall be installed at 5 feet 0 inches of cover unless otherwise required by the Engineer.
- H. Service connections shall be tested and disinfected in accordance with AWWA standards.

END OF SECTION 02515

SECTION 02516

CONNECTIONS TO EXISTING WATER MAINS

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This section covers connections to existing water mains, complete.
- B. The Contractor shall furnish all pipe, fittings, valves, tapping machines, if required, and appurtenances. The Contractor shall do all excavation and backfill as required.

1.02 RELATED WORK:

- A. Section 02515, SERVICE CONNECTIONS (WATER SERVICE)
- A. Section 02810, IRRIGATION SYSTEM.

PART 2 - PRODUCTS: NOT APPLICABLE

PART 3 - EXECUTION

3.01 CONTRACTOR OPERATIONS:

- A. The Contractor shall make all connections to the existing mains as indicated on the drawings and as herein specified.
- B. The Contractor shall develop a program for the construction and putting into service of the new work subject to the approval of the Engineer. All work involving cutting into and connecting to the existing work shall be planned so as to interfere with operation of the existing facilities for the shortest possible time and when the demands on the system best permit such interference even to the extent of working outside of normal working hours to meet these requirements.
- C. The Contractor shall have all possible preparatory work done prior to making the connection and shall provide all labor, tools, material, and equipment required to do the work in one continuous operation.
- D. The Contractor shall have no claim for additional compensation, by reason of delay or inconvenience, for adapting his operations to the needs of the Owner's water supply. No damages shall be claimed by the Contractor for delays in dewatering pipelines nor shall any damages be claimed because of water leaking through closed valves after dewatering is completed.

- E. Under no circumstances shall any residents be without water for a period of more than 4 hours without prior approval of the Owner.
- F. Existing pipeline that is not to be abandoned but is damaged by the Contractor during the work shall be replaced by him at his own expense in a manner approved by the Engineer.

3.02 TAPPING CONNECTION TO EXISTING MAINS:

- A. Tapping connections to the existing mains, where indicated on the drawings, shall be made with service pressure in the main, using tapping sleeves and valves and a suitable tapping machine.
- B. Other connections to existing mains shall be made with the main out of service, unless otherwise required by the Engineer. Such connections will not require tapping sleeves and valves but connections as indicated on the drawings.

END OF SECTION 02516

SECTION 02518

TRACER TAPE

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section covers the furnishing, handling and installation of tracer tape, as called for on the drawings.

1.02 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Six sets of manufacturer's literature on the materials, colors and printing specified herein, shall be submitted to the Engineer for review.
- B. Tape samples shall also be submitted to the Engineer for review.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

Tracer tape shall be by Reef Industries, Houston, TX; Empire Level, Mukwonago, WI; Pro-Line Safety Products Co., W. Chicago, IL; or approved equal.

2.02 TRACER TAPE:

- A. Tracer tape shall be at least 3-inches wide.
- B. Tracer tape for non-ferrous pipe or conduit shall be constructed of a metallic core bonded to plastic layers. The metallic tracer tape shall be a minimum 5-mil thick and must be locatable at a depth of 18 inches with ordinary pipe locaters.
- C. Tracer tape for ferrous pipe or conduit shall consist of multiple bonded plastic layers. The non-metallic tracer tape shall elongate at least 500% before breaking.
- D. The tape shall bear the wording: "BURIED DRAIN LINE BELOW" (with "DRAIN" replaced by "WATER", "SEWER", "ELECTRICAL", "GAS", "TELEPHONE", or "CHEMICAL" as appropriate), continuously repeated every 30 inches to identify the pipe.
- E. Tape colors shall be as follows, as recommended by the American Public Works Association (APWA):

Electric	Red
Gas & Oil	Yellow
Communications	Orange
Water	Blue
Sewer & Drain	Green
Chemical	Red (not APWA)

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Tracer tape shall be installed directly above the pipe or conduit it is to identify, approximately 12 inches below the proposed ground surface.
- B. The Contractor shall follow the manufacturer's recommendations for installation of the tape, as approved by the Engineer.

END OF SECTION 02518

SECTION 02533

CONNECTIONS TO EXISTING STRUCTURES

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. The Contractor shall furnish materials, tools, labor and equipment to cut suitable openings into the existing manholes, make connections to existing and all other work necessary to direct the existing flow as indicated on the drawings and as herein specified.

1.02 RELATED WORK:

- A. Section 02630, DRAINAGE STRUCTURES

1.03 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF THE GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Prior to start of work, submit details of the methods proposed for doing the work and for maintaining the sewage flow as herein specified.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. The Contractor shall provide temporary plugs or provide other suitable means for maintaining the new free of flow until such time as it can be inspected and tested for leakage.
- B. Connections to the new structure shall be made when required by the Engineer and only after the new pipeline has been inspected and has successfully passed the leakage test.
- C. The Contractor shall modify each existing structure for installation of the necessary piping, but in so doing shall confine the cutting to the smallest amount possible consistent with the work to be done.
- D. All new piping connected to existing structures shall be encased in concrete in a manner satisfactory to the Engineer.
- E. All work shall be done with the proper tools and by careful workmen competent to do work.

- F. The Contractor shall cut, reshape and fill the existing manhole tables and plug existing outlets as indicated on the drawings and as directed by the Engineer, to accommodate the new connections. Reshaped manhole invert channels shall be smoothly shaped to permit the flow of sewage. Manhole invert channels shall be reconstructed as specified under Section 02630, DRAINAGE STRUCTURES.

END OF SECTION 02533

SECTION 02625

CORRUGATED POLYETHYLENE [HDPE] DRAINAGE PIPE

PART 1 – GENERAL

1.01 WORK INCLUDED:

- A. This section includes furnishing all materials, labor and equipment and installing corrugated polyethylene [HDPE] drainage pipe and fittings as shown on the drawings and as specified herein.

1.02 RELATED WORK:

- A. Section 02300 – EARTHWORK
- B. Section 02252 – SUPPORT OF EXCAVATION
- C. SECTION 02630 – DRAINAGE STRUCTURES
- D. SECTION 02533 – CONNECTIONS TO EXISTING STRUCTURES

1.03 REFERENCES:

- A. The following standards form a part of this specification, as referenced:

American Society for Testing and Materials (ASTM)

ASTM D2321	Standard for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications
ASTM F405	Standard Specification for Corrugated Polyethylene Pipe and Fittings
ASTM F667	Standard Specification for Large Diameter Corrugated Polyethylene Pipe and fittings

American Association Of State Highway and Transportation Officials

AASHTO M294	Standard Specification for Corrugated Polyethylene Pipe
AASHTO MP6	Standard Specification for Corrugated Polyethylene Pipe 42” and 48” Diameter

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Six sets of manufacturer’s literature on the materials of this Section shall be submitted to the Engineer for review.

- B. Manufacturer's certification that the product was manufactured, tested, and supplied in accordance with this specification shall be furnished.

1.05 DELIVERY, STORAGE AND HANDLING:

- A. Pipe shall be packaged to withstand shipment without damage and handled carefully on the jobsite. Pipe shall be stored so that it is not exposed to sunlight.

PART 2 – PRODUCTS

2.01 MATERIALS:

- A. This Section applies to corrugated polyethylene pipe with an integrally formed smooth interior.
- B. The nominal size for the pipe and fittings is based on the nominal inside diameter of the pipe.
- C. The pipe and fittings shall be free of foreign inclusions and visible defects. Fittings may be either molded or fabricated. Fittings supplied by manufacturers other than the supplier of the pipe shall not be permitted without the approval of the Engineer. The ends of the pipe shall be cut squarely and cleanly so as not to adversely affect joining.

2.02 MANUFACTURERS:

- A. Pipe and fittings shall be manufactured by Ipex, Inc.; Plexco, Division of Chevron Chemical Co.; J-M Pipe Co.; Advanced Drainage Systems, Inc. (ADS) or approved equal.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Pipe interiors, fitting interiors, and joint surfaces shall be thoroughly cleaned before installation. Pipes and fittings shall be maintained clean.
- B. Pipes shall be installed in the locations and to the required lines and grades shown on the drawings and provided in these Specifications, using an approved method of control.
- C. Excavations shall be maintained free of water during the progress of the Work. No pipes shall be laid in water, nor shall there be any joints made up in water.
- D. If any defective pipe is discovered after being placed, removal and replacement with sound pipe will be required at no additional cost to the Owner.

END OF SECTION 02625

SECTION 02630

DRAINAGE STRUCTURES

PART 1 - GENERAL

1.01 SCOPE OF WORK:

- A. The work to be done under this section shall include the installation of standard drainage structures as shown on the plans and specified under this item. The Contractor shall provide all material, labor, tools, equipment and transportation to complete these items. A grate or cover shall be provided for each structure.
- B. Drainage structures shall be installed in the quantities and locations identified on the Contract Drawings. Contact the Project Representative if obstructions or conflicts are encountered.

1.02 REFERENCE STANDARDS AND SPECIFICATIONS:

- A. Reference to the standards, specifications and tests of technical societies, organizations, and governmental bodies is made in the Contract Documents.
 - 1. AASHTO - American Association of State Highway and Transportation Officials (tests or specifications).
 - 2. ASTM - American Society for Testing and Materials.
 - 3. MassDOT. - Latest edition of the Standard Specifications for Highways and Bridges, the Massachusetts Department of Transportation, hereinafter referred to as "the Massachusetts Standard Specifications", Sections 2.01, M2.01 and M4.05 AND Plate #203.1.0 of the MassDOT Construction standards.
 - 4. Municipal Standard Specifications and Procedures, as applicable.
 - 5. MAAB – Massachusetts Architectural Access Board
 - 6. ADA – Americans with Disabilities Act

1.03 CODES, ORDINANCES AND PERMITS:

- A. All work shall be performed in strict accordance with local and state codes and regulations.
 - 1. Site utility work shall be done in strict accordance with the

Commonwealth of Massachusetts State Plumbing Code, dated September 1976, and all revisions thereto.

2. The Contractor shall secure all permits deemed necessary in connection with the installation of this equipment and pay fees required for same. He shall include the cost and back charge of installing any portion of the work where performed by municipal departments or utility companies.

1.04 SUBMITTALS/SHOP DRAWINGS:

- A. Shop drawings shall be submitted to the engineer for all equipment. Copies shall be submitted and shall include cuts, scale drawings, installation details, manufacturer's specifications, certified performance characteristics and capacity ratings.
- B. No material or equipment may be purchased or installed before the submission and written approval of the shop drawings.

PART 2 - MATERIALS

2.01 CLAY SEWER BRICKS (FOR ADJUSTING FRAMES):

- A. Clay sewer brick shall conform to the requirements of AASHO Designation M91 with the following exceptions:
 1. The size of brick furnished shall be 8" x 3-3/4" x 2-1/4" nominal dimensions.
 2. The average of the absorption of five (5) representative samples shall not exceed fifteen percent (15%) and the individual absorption of any one sample shall not exceed seventeen and one-half percent (17-1/2%). The average compressive strength of the five (5) representative samples shall not be less than three thousand (3,000) pounds per square inch and the compressive strength of any one sample shall not be less than two thousand-five hundred (2,500) pounds per square inch.

2.02 CEMENT MORTAR (FOR ADJUSTING FRAMES):

- A. Mortar shall be composed of one (1) part of Portland cement and two (2) parts of sand by volume with sufficient water to form a workable mixture. Cement, sand and water shall conform to the applicable provisions of Mass. Standard Specifications, M4.02.15.

2.03 CEMENT CONCRETE:

- A. Material shall comply with Section 03300 of these Specifications.

2.04 CASTINGS:

- A. Iron castings (frames, grates and covers) shall conform to the MassDOT Construction Manual standard designs and to the requirements of AASHTO Designation M105, Class No. 30, Gray Iron Castings, unless otherwise specified. Test Bar B, 1.20 inches in diameter.
- B. Beehive Frames and Grates for installation with catch basins in planted stormwater swales shall be Model R-2564 as manufactured by Neenah Foundry Company, 2121 Brooks Ave., Neenah, WI 54956, Toll Free 800-558-5075

2.05 PVC DRAINAGE STRUCTURES AND DRAIN INLETS:

- A. PVC drain inlets, Manholes and catch basins shall conform to the following specification:
- B. PVC drainage structures shall be H-20 rated and of the inline drain type as indicated on the contract drawings and referenced within the contract specification. Ductile iron grates for each of these fittings are to be used. The surface drainage inlets shall be as manufactured by Nyloplast a division of Advanced Drainage Systems, Inc., or approved equal. The drainage manholes and catch basins required for this contract shall be manufactured from PVC pipe stock, utilizing a thermo-molding process to reform the pipe stock to the furnished configuration. The drainage pipe connection stubs shall be manufactured from PVC pipe stock and formed to provide a watertight connection with the specified pipe system. The joint tightness shall conform to ASTM D3212 for joints or drain and sewer plastic pipe using flexible elastomeric seals. The pipe bell spigot shall be joined to the inline drain body by use of the swage mechanical joint. The pipe stock used to manufacture the inline drain body and pipe bell spigot of the surface drainage inlets shall meet the mechanical property requirements for fabricated fittings as described by ASTM D3034, Standard for Sewer PVC Pipe and Fittings; ASTM F1336, Standard for PVC Gasketed Sewer Fittings.
- C. The grates furnished for all surface drainage inlets shall be ductile iron. Grates and covers for drains shall be capable of supporting H-25 wheel loading for heavy-duty traffic. Metal used in the manufacture of the castings shall conform to ASTM A536 grade 70-50-05 for ductile iron.

PART 3 - EXECUTION

- 3.01 Structures of various types and depths shall be constructed to the line, grades, dimensions and design shown on the plans and as directed and furnished with the necessary frames, grates, covers, aluminum steps, etc., in accordance with these Specifications. Verify inverts of all utilities to remain.

- 3.02 The bricks and blocks (if required) shall be wetted as necessary before laying. All joints in brick masonry shall be thoroughly flushed full of mortar and no joints on the inside face shall be greater than one-quarter (1/4) inch. After the bricks and blocks are laid, the joints shall be pointed on the inside. As bricks or blocks are laid up, the outside of the structure shall be plastered with one-half (1/2) inch thick mortar coat.
- 3.03 Connections will be carefully made to all existing and proposed lines to the grades and elevations shown on the contract drawing.
- 3.04 All catch basins shall have an oil trap outlet of an appropriate size and material consistent with specific project requirements for drainpipe.
- 3.05 Unless otherwise directed or specified, two (2) weep holes shall be built into the walls of all new structures. Each weep hole shall consist of a section of four (4) inch pipe or equivalent opening to carry water through the wall of the structure. The outside end of the pipe or opening shall be covered with a one-quarter (1/4) inch mesh galvanized wire screen 23 gauge satisfactorily fastened against the wall. The drain to the weep hole shall be excavated and backfilled with two (2) cubic feet of broken rock or crushed stone. The crushed stone shall be placed against and over the end of the pipe or opening with a section of filter cloth to prevent the entrance of fine material. Only one (1) type of weep hole shall be used consistently throughout the project.
- 3.06 Suitable materials obtained from the excavation or from borrow shall be placed between the outside of the structure and the limits of the excavation, uniformly distributed in successive layers not exceeding 6 inches in depth and thoroughly compacted by tamping with mechanical rammers or tampers. When required, the backfill material shall be moistened during the compacting. Compaction with iron hand tampers having a tamping face not exceeding twenty-five (25) square inches may be allowed, but only after permission has been given by the Engineer.
- 3.07 All materials removed in the excavation for catch basins, manholes, drop inlets, drywells, etc., and remaining after the filling about the finished structure has been made shall be used wherever possible within the project or removed and satisfactorily disposed of outside of the project limits without additional compensation.
- 3.08 Frame castings for structures shall be set in full mortar beds true to the lines and grades as directed.
- 3.09 Where directed, the castings shall be temporarily set at such grades as to provide drainage during the construction.
- 3.10 In general, all methods for installation of the catch basin and manhole units, brick adjustments, mortaring, and installation of frames, grates and covers, shall conform to Section 2.01 of the MassDOT Standard Specifications.
- 3.11 All manhole covers are to be painted black.

- 3.12 All exposed drains shall meet current MAAB and ADA regulations for materials and installations.

END OF SECTION 02630

SECTION 02755

BITUMINOUS CONCRETE PAVEMENT AND COLOR SEALCOAT

PART I - GENERAL

1.01 SCOPE OF WORK:

- A. Under this Section, the Contractor shall furnish all necessary labor, materials, equipment, and transportation necessary to construct the following:
 - 1. Bituminous concrete pavement shall be composed of materials as specified herein and shall be constructed on a prepared base course to the depth, grade and cross-section shown on the plans, as specified herein and as directed by the Engineer.
 - 2. Unless otherwise specified in the Contract Drawings, bituminous concrete walkway pavement shall be composed of a one and one-half (1.5) inch bituminous concrete binder course, and a one and one half (1.5) inch bituminous concrete dense mix top course. Bituminous concrete vehicular pavement shall be composed of a two and one half (2.5) inch bituminous concrete binder course, and a one and one half (1.5) inch bituminous concrete dense mix top course.
 - 3. Color sealcoating of bituminous concrete pavements as shown on the plans and as specified herein.

1.02 REFERENCE STANDARDS AND SPECIFICATIONS:

- A. Reference to the standards, specifications and tests of technical societies, organizations and governmental bodies are made in the Contract Documents.
 - 1. AASHTO - American Association of State Highway and Transportation Officials (tests or specifications).
 - 2. ASTM - American Society for Testing and Materials.
 - 3. MassDOT – Massachusetts Department of Transportation master specifications

1.03 SUBMITTALS:

- A. Asphalt emulsion Type SS-1 product and application specification.
- B. Color Sealcoat: The Contractor shall submit catalog cuts, manufacturer's specifications and color chips or charts.
- C. Field layout of color sealcoat must be approved by Engineer prior to installation.
- D. Submit catalog cuts and manufacturer's specifications for Airport Grade Asphalt Emulsion Mix and Aggregate.
- E. Compaction tests are required on all bituminous concrete base surfaces on a 5' grid interval or per Owner's direction. At the Contractor's expense, an independent testing agency must perform the work and submit the results directly to the Engineer.

1.04 QUALIFICATIONS/SPECIAL REQUIREMENTS – COLOR SEALCOAT APPLICATION (ONLY WHERE SHOWN IN PLAN):

- A. The Contractor shall engage the manufacturer's representative to inspect and monitor the application of the initial filler coat upon the prepared surfaces of all pavements to receive color sealcoat.
- B. If a latex-ite acrylic sealer/surfacer is to be utilized, the addition of silica by mechanical agitation on-site shall be inspected and monitored by the manufacturer's representative who is to be engaged by the Contractor at the Contractor's cost.
- C. Adequate means shall be provided to protect the color seal coating(s) from damage until such time that each layer has cured sufficiently and no seal will adhere to and be picked up by the tires of vehicles or by pedestrian traffic.
- D. No color seal coating shall be applied during any period within which rain or sub-application temperatures are predicted within forty-eight (48) hours, unless otherwise specified by the manufacturer.

PART II – MATERIALS:

2.01 BITUMINOUS CONCRETE PAVEMENT

- A. Bituminous Concrete Pavement shall consist of binder mix and dense mix courses constructed to the thicknesses shown on the plans and shall conform to the relevant provisions of Sections 460 and (M3.11.03) of the MassDOT Standard Specifications for Highways and Bridges, Latest Edition, unless specified otherwise hereinafter.

B. Base/Binder Courses

1. Base/Binder Courses shall be Bituminous Concrete Pavement, Dense Finish Course Type I-1.

C. Leveling/Overlay Courses

1. Leveling/Overlay Courses may conform to “Surface Treatment” dense mix, Table A, Section M3.11.03 of the MassDOT Standard Specifications, comprised of Class I Dense Bituminous Concrete, Type St or Dense Mix Type I-1, at the Contractor’s option.

2. The general composition of the bituminous concrete mixture (the proportion of asphalt cement to mineral aggregate) shall be in accordance with MHD requirements.

3. The mineral aggregate composition for Type St shall be as follows:

U.S. Standard Sieve No.	TYPE ST SIEVE ANALYSIS	MINERAL AGGREGATE	
		Percent Passing by Weight (per ASTM C-136)	
Size		Minimum	Maximum
1/2	100	-	
3/8	80	100	
4		55	80
8		48	63
16		36	49
30	24	38	
50	14	27	
100	6	18	
200	4	8	

2.02 ASPHALT EMULSION:

A. Asphalt emulsion tack coat shall be Type SS-1 or SS-1H as specified by the Asphalt Institute.

2.03 COLOR SEALCOAT:

A. The layout and design of color sealcoating shall be installed per contract drawings.

The two (2) filler coats shall be Plexipave as manufactured by California Products Corporation, 169 Waverly Street, Cambridge, Massachusetts, or approved equal. Colors shall be as indicated on the plans. The two (2) Plexipave filler coats shall be applied to the cleaned bituminous pavement as specified hereunder. It shall be non-flammable upon exposure to flame. The filler coats shall contain a minimum

of 9 lb./gal. of Silica, 100 percent (100%) passing a 100% mesh as pre-mixed at the manufacturer's plant. No sand or silica shall be added to the emulsion in the field. The bituminous pavement shall cure for fourteen (14) days prior to applying the Plexipave Acrylic Color System. Colors shall be as selected by Engineer.

- B. Water, if approved, may be added to the Plexipave emulsion mixes. In no case may the quantity of water in the filler coat emulsion mix exceed thirty-three percent (33%) of the emulsion volume. (One (1) part water: two (2) parts filler coat). In no case may the quantity of water in the finish coat emulsion mix exceed fifty percent (50%) of the emulsion volume. (One (1) part water: one (1) part finish coat). Water shall be potable and its temperature above forty degrees F (40°F) upon addition to the emulsions.
- C. The color emulsion coating shall be California Products Company's "Plexichrome" or an approved equal emulsion product. Colors shall match those of the Plexipave filler coats. The Plexichrome shall be applied lengthwise of the court with a wide type push broom.
- D. The base vehicle for the finish coat shall be an acrylic polymer dispersed in water and which has the ability to withstand extremes in temperature and general weathering. The film former shall provide a non-skid surface upon drying and under all weather conditions. Pigment dispersions in the color coating are to be of the best quality chrome oxides so as to obtain a permanent true color. The coating shall contain no material, which will cause cracking due to extremes in temperatures and is to be factory mixed and consistent in color. It shall be a one hundred percent (100%) acrylic emulsion containing no alkyds, butadiene styrene, or vinyls and shall be thinned with water. It shall not chalk or discolor any equipment.
- E. The finished surface shall be smooth and uniform, true to required grade and cross section, and free of depressions, ridges, or other irregularities.

PART III - EXECUTION

3.01 BITUMINOUS CONCRETE PAVEMENT:

- A. Bituminous concrete pavements shall be constructed on a prepared foundation of gravel in accordance with the Massachusetts Standard Specifications, Section 405, except where overlayment is over existing pavement.
- B. The bituminous mixtures shall be placed on the approved base only when, in the opinion of the Engineer, the course is sufficiently dry and weather conditions are suitable.
- C. Where walls, curbing, or other suitable permanent supports are not present, the Contractor shall secure proper alignment and adequate compaction of the binder

and surface courses as shown on the Contract Drawings and finish all edges with a neat tamped edge.

- D. The mixture shall be placed in two (2) courses as shown on the Contract Drawings. Each course shall be spread and finished as required in the MassDOT Standard Specifications for Highways and Bridges, Section 460.63, latest edition.
- E. After completion, the bituminous concrete courses shall conform to the thickness shown on the Contract Drawings, smooth and even and of a dense and uniform structure. When tested with a sixteen (16) foot straight edge placed parallel to the centerline of the pavement, there shall be no deviation from a true surface in excess of one-quarter (1/4) inch.

3.02 ASPHALT EMULSION TACK COAT:

- A. To all existing surfaces to be paved against or overlaid, apply a single very thin (0.05 to 0.15 gallons per square yard) application of diluted asphalt emulsion (Type SS-1) to cover the entire surface of existing pavement.
- B. Essential qualities of coverage are (1) it must be very thin and (2) uniformly cover entire surface of existing pavement.
- C. Place only that amount of tack coat which can be overlaid with new pavement by the end of each day, and; **IF RAIN IS ANTICIPATED DO NOT APPLY TACK COAT.**

3.03 COLOR SEALCOAT:

- A. The bituminous concrete pavement shall cure prior to applying the Color Sealcoat System in accordance with manufacturer recommendations.
- B. The Contractor shall furnish and apply to the approved bituminous pavements so designated on the plans: two (2) filler coats and one (1) finish coat of acrylic emulsion color coating.
- C. Prior to application of the filler coats, all dirt, sand, dust, and other loose material shall be cleaned from the paved areas to be covered, by sweeping and pressure washing with water. All surfaces shall be dry prior to starting any color seal coating process. The Contractor shall take special precautions to assure that existing pavements are thoroughly cleaned and that all cracks or joints in existing pavements are repaired in conformance with these specifications and to the satisfaction of the Owner. Limits or areas to be color coated shall be taped with minimum two (2) inch wide tape true as to alignment prior to application of the color coating material.
- D. The two (2) filler coats shall be applied so that both coats are of a total quantity and with a uniform spread at the rate of one (1) gallon per each one

hundred (100) square feet of surface area. Additional filler coating material is to be used if necessary to complete the court surfaces satisfactory to the Supervisor. The first coat shall be applied length-wise of the court or drive and the second coat cross-wise of the court or drive.

- E. After the filler coat applications have been completed and approved, apply one (1) acrylic color emulsion coating to the properly prepared surfaces with a uniform spread at the rate of one (1) gallon per each two hundred (200) square feet of surface area. The color emulsion coating shall be California Products Company's "Plexichrome" or an approved equal emulsion product. Colors shall match those of the Plexipave filler coats. The Plexichrome shall be applied lengthwise of the court with a wide type pushbroom.
- F. The entire system of two (2) filler and one (1) finish coat shall be applied with approved squeegees and hair-type pushbrooms, respectively. The material shall be thoroughly mixed by mechanical agitation and all work shall be done in a thorough and workmanlike manner. The emulsion shall be thoroughly stirred in its container as received, by stationery bucket power mixer, so that a creamy, smooth consistency of all the emulsion in the container is assured for ready application. The entire work of color coat surfacing shall be done in accordance with the recommendations of the manufacturer's representative. Special care shall be taken so as to allow none of the material to spatter or flow beyond the perimeter of areas to be covered. The filler coats and finish coat shall not be applied in foggy or rainy weather, or when ambient temperature is below forty-five degrees F (45°F), nor shall they be applied if such conditions are anticipated during the next forty-eight (48) hours.
- G. The finished surface shall be smooth and uniform, true to required grade and cross section, and free of depressions, ridges, or other irregularities.

PART IV - GUARANTEE/WARRANTY

- 4.01 The Contractor shall be solely responsible for protecting color sealcoated surfaces until final acceptance of the project by the Owner and shall take all necessary precautions to secure premises during the initial drying periods.
- 4.02 The pavement and coatings shall be guaranteed against defects in workmanship or quality for a period of one (1) year after final acceptance. The Contractor shall replace, repair, recoat or otherwise make satisfactory to the Owner any unacceptable pavement and or coating at no additional cost to the Owner.

END OF SECTION 02755

SECTION 02760

JOINT SEALANTS

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This section covers the sealing of joints designated on the drawings or specified herein, including but not limited to, concrete to concrete, masonry to concrete, structural steel to concrete, structural steel to masonry, and any other metal surfaces butting to another metal, concrete or masonry.
- B. The above-mentioned joints shall be sealed even if not called out on the drawings.
- C. Seal beneath threshold and other items required to be set in caulking compound shall be by the trade installing the item.

1.02 RELATED WORK:

- A. Section 03300, CAST-IN-PLACE CEMENT CONCRETE

1.03 REFERENCES:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

American Society for Testing and Materials (ASTM)

ASTM C920 Specification for Elastomeric Joint Sealant

ASTM C 1193 Standard Guide for Use of Joint Sealants

ASTM D1667 Specification for Flexible Cellular Materials – Vinyl Chloride Polymers and Copolymers (Closed-cell Foam)

United States of America Standards Institute (USA)

USA 116.1 Standard Specification for Polysulfide-Base Sealing Compounds for the Building Trade

- B. When reference is made to one of the above standards, the revisions in effect at the time of bid opening shall apply.

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Six sets of manufacturer's literature of the materials of this section shall be submitted to the Owner's Representative for review.

1.05 DELIVERY, STORAGE, AND HANDLING:

- A. Materials shall be delivered to the site in the original, unopened, factory-sealed containers, bearing the manufacturer's label fully identifying the material and the producing company.
- B. Handle materials with care. Do not dump from trucks or delivery vehicles nor handle in any manner likely to cause damage.

1.06 QUALITY ASSURANCE

- A. Materials shall not be applied in wet weather or to wet or damp surfaces. No work shall be performed when temperature is below 40 degrees Fahrenheit. Surfaces shall not be caulked until thirty days after completion of concrete, masonry work, or patching, whichever is later. At least three good drying days shall immediately precede application. Application shall in each case be in accordance with the instructions of the manufacturer of the material, except as modified herein.
- B. Surrounding areas which are not to be coated shall be completely protected from spray, spattering, or dripping, using drop cloths or other protective measures, as required. Spillage or dripping which occurs shall be immediately and completely removed, leaving no stain. Solvents or cleaning methods shall be those recommended by the manufacturer of the material being used.
- C. Furnish the service of a competent field representative of the approved manufacturer of the sealant. The field representative shall be present at the work site prior to any mixing of components to instruct on application and inspection of procedures and to inspect the finish or the prepared surfaces prior to application of the sealant. The representative shall make at least one additional visit to the site as the work progresses and shall report on each visit to the Contractor and the Owner's Representative, advising as to whether the application is being performed in accordance with this specification and the printed instructions of the manufacturers.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Sealants and primers for use with sealants shall be as manufactured by J.B. Fred Kuhls, Brooklyn, New York; Minwax Co., Inc., New York, New York; Dewey and Almy Chemical Division of W.R. Grace & Co., Cambridge, Massachusetts; Sonneborn Building Products, New York, New York; or an approved equal product.

2.02 MATERIALS

A. SEALANTS:

1. Sealants shall be non-staining materials conforming to the requirements of United States of America Standards Institute "Standard Specification for Polysulfide-Base Sealing Compounds for the Building Trade", USA 116.1. Compound shall be Class A (self-leveling), or Class B (non-sag), as applicable in each case for the joint to be caulked. Contractor shall confirm sealant is suitable for use in chlorinated conditions. Color of sealant shall match as closely as possible the color of the surrounding materials, and when used adjacent to masonry work the compound shall match the color of the mortar in the masonry joints. Precise color shall in all cases be subject to the approval of the Owner's Representative.
2. Sealant at joint of existing mow strip/ wall and proposed paving joint shall be Sikaflex 1C SL Self-Levelling sealant as manufactured by Sika Corporation, Lyndhurst NJ (800) 933-7452 or approved equal. Color to match adjacent concrete mow strip/wall. Refer to detail and plans for location.

B. JOINT CLEANER:

1. Non-corrosive and non-staining type, recommended by sealant manufacturer and compatible with joint forming materials.

C. PRIMER:

1. Primer shall be non-staining type as recommended by the manufacturer of the sealant.

D. BACK-UP MATERIAL:

1. Back-up material for sealer shall be a non-staining type oakum, treated to prevent rot, or shall be a non-staining, compressible, closed-cell joint filler of polyvinyl chloride, neoprene vinyl, or a similar inert and permanent back-up material approved in advance by the Owner's Representative. Back-up materials containing oil or grease and materials which are not compatible with the primers and caulking compound shall not be used. Tremco Joint Backing and Dow Corning "Ethafoam" are approved back-up materials.

E. BOND BREAKER

1. Bond breaker tape shall be an adhesive-backed glazed butyl or polyethylene tape which will satisfactorily adhere to the premolded joint filler or concrete surface as required. The tape shall be the same width as the joint.

2. Bond breaker for concrete other than where tape is specifically called for shall be either bond breaker tape or a nonstaining type bond prevention coating such as Williams Tilt-up Compound by Williams Distributors, Inc. Silcoseal 77 by Nox-Crete Incorporated or equal.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Verify that substrate surfaces and joint openings are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION:

- A. Where recommended by the manufacturer of the sealant, primer shall be used before sealant is applied. Copper to be in contact with sealant shall be primed with five-pound cut shellac or as recommended by the sealant manufacturer, before sealant material is applied. Aluminum, stainless steel, and other materials shall have any protective film removed using a cloth dampened with Toluol, Xylol, or other suitable solvent.

3.03 APPLICATION:

- A. Sealant shall be mixed and applied in accordance with the manufacturer's printed directions. No materials shall be added to the compound.
- B. Joints and spaces to be caulked shall be clean, dust-free, and dry. Mortar droppings, construction debris, and other foreign matter shall be removed from the joint before it is caulked. Raking out excess mortar in masonry and similar joints which are to be caulked shall be performed by the trade responsible for installing the mortar.
- C. The joint or space to be sealed shall be packed tight with oakum or other approved filler materials, leaving a space approximately square in cross-section, and in no case deeper than half of its width, to receive the caulking compound. Filler materials shall be sufficiently wider than the joint in which they are used to provide adequate resistance when sealant material is being gunned into the joint.
- D. Sealant shall be applied with a gun, using a nozzle of proper size to fit the joint width, and shall be forced into the joints with sufficient pressure to expel all air and fill the joint solid. Superficial pointing of joints with a skin bead will not be accepted. Sealant shall be uniformly smooth and free from wrinkles, and shall have a slightly concave joint profile when dry. Intersections of beads shall form neat miters. Sealant at edges of the joint shall be flush with the edges of the

adjacent surfaces. Excess sealant material shall be removed. Improperly filled or finished joints shall be raked out and resealed.

- E. Sealant depth shall not exceed one-half of joint width.
- F. Particular care shall be taken not to soil adjacent surfaces. Spillage or excess material shall be removed immediately, leaving no stain. Masking tape shall be used as required to protect surrounding surfaces and prevent staining. Masking tape shall be removed immediately after tooling of the sealant. Adjacent surfaces soiled by operations under this section shall be cleaned to equal their condition before the start of the caulking work.
- G. Spaces left between walls and elements of roof shall be filled with back-up material inserts and then caulked on both sides.

END OF SECTION 02760

SECTION 02800

SITE FURNISHINGS

PART 1 – GENERAL:

1.01 RELATED DOCUMENTS:

- A. The General Documents, as listed in the Table of Contents, and applicable parts of Division 1, General Requirements shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.02 SCOPE OF WORK:

- A. The work of this Section consist of all site improvements and related items as indicated on the Drawings and/or as specified herein and includes, but is not limited to, the following:
 - 1. Benches with Back
 - 2. Players Benches
 - 3. Baseball Bases, Home Plate, and Pitchers Rubber
 - 4. Basketball Posts and Goals

1.03 RELATED WORK UNDER OTHER SECTIONS:

- A. The following items of related work are specified and included in other Sections of the Specifications:
 - 1. Section 02300– EARTHWORK
 - 2. Section 03300– CAST-IN-PLACE CONCRETE

1.04 EXAMINATION OF CONDITIONS:

- A. The Contractor shall fully inform himself of existing conditions of the site before submitting his bid, and shall be fully responsible for carrying out all site work required to fully and properly execute the work of the Contract, regardless of the conditions encountered in the actual work. No claim for extra compensation or extension of time will be allowed on account of actual conditions inconsistent with those assumed.
- B. Plans, surveys, measurements and dimensions under which the work is to be performed are believed to be correct to the best of Engineer's knowledge, but the Contractor shall have examined them for himself during the bidding period,

as no allowance will be made for any errors or inaccuracies that may be found therein.

1.05 SCHEDULING:

- A. The Contractor shall submit to the Landscape Architect, for approval by the Owner, a progress schedule for all work as specified herein.

1.06 QUALITY ASSURANCE:

- A. Materials and methods of construction shall comply with the following standards:
 - 1. ASTM: American Society for Testing and Materials
 - 2. ANSI: American National Standards Institute
 - 3. FS: Federal Specifications
 - 4. IMI: International Masonry Institute
 - 5. PCA: Portland Cement Association
- B. Qualifications of Workers: Use adequate numbers of skilled workers who are trained in the necessary crafts and who are completely familiar with the specified requirements and methods needed for the proper performance of the work of this Section.
- C. Layout: After staking out the work, and before beginning final construction, obtain the Landscape Architect's approval for layout. Contractor shall make adjustments as determined by the Landscape Architect. Landscape Architect may make adjustments to layout as is required to meet existing and proposed conditions without additional cost to the contract price.

1.07 SUBMITTALS:

- A. Shop Drawings: Submit shop drawings in accordance with Division 1 requirements.
- B. Product Information: Provide manufacturer's data showing installation and limitations in use. Supply Certificates of Compliance for all materials required for fabrication and installation, certifying that each material item complies with, or exceeds, specific requirements.

PART 2 – PRODUCTS:

2.01 BENCHES WITH BACK:

- A. Benches with Back shall be Model C-96, as manufactured by Victor Stanley, Inc. 1.800.368.2574, Dunkirk, MD 20754 or approved equal. Benches shall be

surface mountable and six (6) feet in length with ductile iron end frames with armrests in the color green. The slats shall be 2nd Site Systems recycled slats with a nominal 2"x3" size in the color maple. All fabricated metal components shall be steel shotblasted, etched, phosphatized, preheated and electrostatically powder-coated with TGIC polyester powder coatings. All hardware shall be marine-grade steel conforming to AISI Type 304 and ASTM A193 latest requirements.

2.02 PLAYERS BENCHES:

- A. Player benches shall be the "Spartan Aluminum Bench" series suitable for a permanent surface mounted installation with a length of 21'-0" and seat depth of 10", Model SIA21 as manufactured by GT Grandstands, 2810 Sydney Road, Plant City FL, 33566, 1-866-550-5511, or approved equal.

All structural framework, angles, substructure, understructure, cross bracing shall be of aluminum alloy 6061-T6, mill finish welded angle, 3/16". Seatboard and end caps shall be of aluminum alloy, 6063-T6, 1.92 lb./ft., with webbing and flanging, with silver 204 R1 clear anodized finish.

2.03 BASEBALL BASES, HOME PLATE, AND PITCHER'S RUBBER

- A. Baseball Bases shall be model #BB-500, Pro-Style Original Jack Corbett Base as provided by Jaypro Sports, Incorporated of Waterford, CT (800-988-3363), or approved equal.
- B. Home Plate shall be model #HP-200, stanchion mounded with sleeve, as provided by Jaypro Sports, Incorporated of Waterford, CT (800-988-3363), or approved equal.
- C. Pitcher's Rubber shall be 6" x 18", model # PR-618 with interior PVC tube, as provided by Jaypro Sports, Incorporated of Waterford, CT (800-988-3363), or approved equal.

2.04 BASKETBALL POSTS AND GOALS

- A. Basketball posts shall be 5-9/16" schedule 40 steel, gooseneck style with 6' extension. Posts shall be model #656 as manufactured by Jaypro Sports, Incorporated of Waterford, CT (800-988-3363), or approved equal.
- B. Basketball goals shall 18" inside diameter, double ring goals constructed of two 5/8" O.D. steel rods with 3/16" steel brace mounting frame. Basketball goals shall be model UBG-500 as manufactured by Jaypro Sports, Incorporated of Waterford, CT (800-988-3363), or approved equal.

- C. Basketball backboard shall be 48" x 72" made of perforated ½" polycarbonate board with forest green border target. Backboard shall be model #4872CCB TrueBounce Backboard by Jaypro Sports, Incorporated of Waterford, CT (800-988-3363), or approved equal.

PART 3 – EXECUTION:

3.01 INSTALLATION:

- A. The installer shall examine previous work, related work, and conditions under which this work is to be performed and notify the Contractor in writing of all deficiencies and conditions detrimental to the proper completion of this work. Beginning work means installer accepts substrates, subgrades, previous work, and conditions.

3.02 SITE FURNISHINGS:

- A. Install each site furnishing in accordance with the Drawings and the manufacturer's instructions.
- B. The Contractor shall be responsible for timing the delivery of site furnishings so as to minimize on-site storage time prior to installation. All stored materials must be protected from weather, careless handling and vandalism.

END OF SECTION 02800

SECTION 02810
IRRIGATION SYSTEM

PART I – GENERAL:

1.01 GENERAL REQUIREMENTS

- A. Include GENERAL CONDITIONS and applicable parts of Division 1 as part of this Section.
- B. Coordinate work of this Section with new and existing underground utilities and with trades responsible for their installation. Refer to respective drawings pertaining to other work.

1.02 WORK TO BE DONE

- A. Work to be done includes furnishing labor, materials, equipment and services required to complete irrigation work indicated on the drawings, as specified herein, or both.
- B. The mechanical point of connection for the irrigation system shall be a new 2-inch tap of the domestic water supply. See plumbing and civil drawings.
- C. The electrical points of connection for the irrigation system shall be to a new 120-volt, 15-amp electrical circuit provided for the irrigation controller and a new 208-volt, 3-phase, 30-amp circuit provided for the new booster pump.
- D. The drawings and specifications must be interpreted and are intended to complement each other. Furnish and install all parts, which may be required by the drawings and omitted by the specifications, or vice versa, just as though required by both. Should there appear to be discrepancies or question of intent, the matter shall be referred to the Owner's Representative for decision, and his interpretation shall be final, conclusive and binding.
- E. Necessary changes to the drawings to avoid obstacles shall be made with the approval of the Owner's Representative.
- F. Trench excavation, backfilling and bedding materials, together with the testing of the completed installation shall be included in this work.

- G. The Work shall be constructed and finished in every respect in a good, workmanlike and substantial manner, to the full intent and meaning of the drawings and specifications. Parts necessary for the proper and complete execution of the Work, whether the same may have been specifically mentioned or not, or indicated on the drawings, shall be done or furnished in a manner corresponding with the rest of the work as if the same were specifically herein described.
- H. Record drawing as well as Operating & Maintenance Manual generation, in accordance to these specifications shall also be included in this work.

1.03 SCOPE

- A. The irrigation system shown on the drawings and described within these specifications represents a single controller, turf athletic field irrigation system supplied from potable water. The system is designed for 71 gallons per minute. Minimum 70-psi dynamic pressure at full system flow is required from the irrigation mainline point of connection downstream of the new booster pump.

1.04 RELATED WORK

- A. Carefully examine the Contract Documents for requirements that affect the Work of this Section.
 - 1. Earthwork - Section 02300
 - 2. Seeding - Section 02290
 - 3. Electrical - Division 16

1.05 ORDINANCES, PERMITS AND FEES

- A. The Work under this Section shall comply with ordinances and regulations of authorities having jurisdiction.
- B. Permits, tests, and certifications required for the execution of Work under this Section shall be obtained and paid for.
- C. Furnish copies of Permits, Certifications and Approval Notices to the Owner's Representative prior to requesting payment.
- D. Include in the bid charges by the Water Department, Utility Company, or other authorities for work done by them.

1.06 EXAMINATION OF CONDITIONS

- A. Be fully informed of existing conditions on the site before submitting bid, and shall be fully responsible for carrying out work required to fully and properly execute the work of the Contract, regardless of the conditions encountered in the actual Work. No claim for extra compensation or extension of time will be allowed on account of actual conditions inconsistent with those assumed, except those conditions described in the GENERAL CONDITIONS.

1.07 QUALITY ASSURANCE

- A. Installer: A firm which has at least five (5) years' experience in work of the type and size required by this Section and which is acceptable to the Owner's Representative.
- B. References: Supply three references for work of this type and size with the bid including names and phone numbers of contact person(s).
- C. Applicable requirements of accepted Standards and Codes shall apply to the Work of this Section and shall be so labeled or listed:
 - 1. American Society for Testing & Materials (ASTM)
 - a. ASTM: A536 Ductile Iron Castings
 - b. ASTM: D1784 Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
 - c. ASTM: D1785 Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and CI200.
 - d. ASTM: D2464 Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
 - e. ASTM: D2466 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
 - f. ASTM: D2564 Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
 - g. ASTM: B43-98 Brass pipe.
 - h. ASTM: B88-99 Seamless Copper Water Tube

- i. ASTM: B828-00 Soldered Copper Joints.
 - j. ASTM: F477 Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
 - k. ASTM: D2737-99 Polyethylene (PE) Pressure rated tube.
2. National Standard Plumbing Code (NSPC)
 3. National Electric Code (NEC)
 4. National Sanitary Foundation (NSF)
 5. American Society of Agricultural and Biological Engineers (ASABE)
 6. Underwriters Laboratories, Inc. (UL)
 7. Occupational Safety and Health Administration (OSHA)
 8. American Society of Irrigation Consultants (ASIC)

1.08 TESTS

- A. Observation: Owner's Representative will be on site at various times to insure the system is being installed according to the specifications and drawings.
- B. Coverage Test: After completion of the system, test the operation of entire system and adjust sprinklers as directed by the Owner's Representative. Demonstrate to the Owner's Representative that irrigated areas are being adequately covered. Furnish and install materials required to correct inadequacies of coverage due to deviations from the drawings or where the system is obviously inadequate or inappropriate. (See Part 3 - Execution).
- C. The Owner's Representative shall be notified 7 days in advance for observations.

1.09 SHOP DRAWINGS

- A. Provide copies of product specification sheets on proposed equipment to be installed to the Owner's Representative for approval prior to the start of work, in accordance with the parameters of Division-1. Work on the irrigation system may not commence until product sheets are submitted and approved. Submittals shall be marked up to show proper nozzles, sizes, flows, etc. Equipment to be included:

1. Sprinklers
2. Valves: Manual and Automatic
3. Controller/ Enclosure
4. Valve Boxes
5. Pipe and Fittings
6. Wire and Connectors
7. Quick Coupling Valves
8. Rain Sensor
9. Pump System and appurtenances
10. Backflow Preventer
11. Grounding Equipment

B. Project Record Documents:

1. Provide and keep up-to-date a complete redlined record set of drawings of the system as the project proceeds. Drawings shall be corrected daily, showing every change from the original drawings and specifications. Record drawings shall specify and exactly locate sprinkler type; pop up height and nozzle for each sprinkler installed. Each valve box location to be referenced by distance from a minimum of two permanent locations. Controller, isolation valves, rain sensor, quick coupling valve and other equipment shall be indicated on the drawings. Wire routing, wire size and splices shall be indicated. Mainline pipe and wire route shall have two (2) distinctly different graphic symbols (line types). This redlined record set of drawings shall be kept at job site and shall be used only as a record set.
2. Make neat and legible notations on this record set of drawings daily as the Work proceeds, showing the Work as actually installed. For example, should a piece of equipment be installed in a location that does not match the plan, indicate that equipment in a graphic manner in the location of installation and so as to match the original symbols as indicated in the irrigation legend. Should the equipment be different from that specified, indicate with a new graphic symbol both on the drawings and the

irrigation legend. The relocated equipment dimensions and northing and easting coordinates should then be transferred to the appropriate drawing in this record set of drawings at the proper time.

3. On or before the date of final field observation, deliver corrected and completed AutoCAD computer plots of "record drawings" on vellum and AutoCAD electronic files on disk to Owner's Representative as part of contract closeout. Delivery of plots will not relieve the responsibility of furnishing required information that may have been omitted from the prints.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Store and handle materials in compliance with manufacturer instructions and recommendations. Protect from possible damage. Minimize on-site storage.

1.11 GUARANTEE

- A. Obtain in the Owner's name the standard written manufacturer's guarantee of materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. Guarantees shall be in addition to, and not in lieu of, other liabilities that the Contractor performing the work under contract may have by law.
- B. In addition to the manufacturer's guarantees the entire irrigation system shall be warrantied, both parts and labor for a period of one (1) year from the date of acceptance by the Owner.
- C. As part of the one-year warranty the first year-end winterization and spring start-up for the irrigation system shall be performed.
- D. Should problems develop within the warranty period because of inferior or faulty materials or workmanship, they shall be corrected to the satisfaction of the Owner's Representative at no additional expense to the Owner.
- E. A written warranty showing date of completion and period of warranty shall be supplied upon completion of the project.

1.12 COORDINATION

- A. Work shall be coordinated closely with the Owner's Representative to avoid misunderstandings and to efficiently bring the project to completion. Owner's Representative shall be notified as to the start of work, progression and completion, as well as changes to the drawings before the change is made. Coordinate work with those of other trades.
- B. Be responsible and pay for damage to other work caused by work or workmen. Repairing of such damage shall be done by the Company who installed the work as directed by the Owner's Representative.

1.13 MAINTENANCE AND OPERATING INSTRUCTIONS

- A. Include in Bid an allowance for four (4) hours of instruction of Owner and/or Owner's personnel upon completion of check/test/start-up/adjust operations by a competent operator (Owner's Representative office shall be notified at least one (1) week in advance of check/test/start-up/adjust operations).
- B. Upon completion of work and prior to application for acceptance and final payment, a minimum of three (3) three ring, hard cover binders titled MAINTENANCE AND OPERATING INSTRUCTIONS FOR THE RENOVATIONS & UPGRADES TO ROBBINS FARM FIELD RRIGATION SYSTEM, shall be submitted to the Owner's Representative office. After review and approval, the copies will be forwarded to the Owner. Included in the Maintenance and Operating binders shall be:
 - 1. Table of Contents
 - 2. Written description of Irrigation System.
 - 3. System drawings:
 - a. One (1) copy of the original irrigation plan;
 - b. One (1) copy of the Record Drawing;
 - c. One (1) reproducible of the Record Drawing;
 - d. One (1) copy of the controller valve system wiring diagram
 - 4. Listing of Manufacturers.

5. Manufacturers' data where multiple model, type and size listings are included; clearly and conspicuously indicating those that are pertinent to this installation.
 - a. "APPROVED" submittals of irrigation equipment;
 - b. Operation:
 - c. Maintenance: including complete troubleshooting charts.
 - d. Parts list.
 - e. Names, addresses and telephone numbers of recommended repair and service companies.
6. A copy of the suggested "System Operating Schedule" which shall call out the controller program required (zone run time in minutes per day and days per week) in order to provide the desired amount of water to each area under "no-rain" conditions.
7. Winterization and spring start-up procedures.
8. Guarantee data.

1.14 PROCEDURE

- A. Notify city departments and/or public utility owners concerned, of the time and location of work that may affect them. Cooperate and coordinate with them in the protection and/or repairs of utilities.
- B. Provide and install temporary support, adequate protection and maintenance of structures, drains, sewers, and other obstructions encountered. Where grade or alignment is obstructed, the obstruction shall be permanently supported, relocated, removed or reconstructed as directed by the Owner's Representative.

PART 2 – MATERIALS:

2.01 GENERAL

- A. Materials to be incorporated in this system shall be new and without flaws or defects and of quality and performance as specified and meeting the requirements of the system. All material overages at the completion of the installation shall be removed from the site.

- B. No material substitutions from the irrigation products described in these specifications and shown on the drawings shall be made without prior approval and acceptance from the Owner's Representative.

2.02 PVC IRRIGATION PIPE

- A. Pipe shall bear the following markings: Manufacturer's name, nominal pipe size, schedule or class, pressure rating in psi, and date of extrusion.
- B. Pipe in sizes 2-1/2 inches and smaller shall be PVC, Class 200, Type 1120, SDR 21, Solvent-Weld PVC, conforming to ASTM No. D2241 as manufactured by Certainteed, Cresline, JM Eagle or equal.

2.03 COPPER PIPE AND FITTINGS

- A. Copper pipe shall be Type K, hard tempered ASTM B88.
- B. Copper fitting shall be wrought copper, solder joint type in accordance with ASTM B828-00.
- C. Joints shall be soldered with silver solder ASTM B32, Grade 95TA up to 250 degree using non-corrosive flux.
- D. Supply only pipes and fittings that are marked by the manufacturer with the appropriate ASTM designations and pressure ratings and are free from cracks, wrinkles, blisters, dents or other damage.

2.04 BRASS PIPE AND FITTINGS

- A. Brass pipe shall be 125lb., cast bronze, ground joint pattern, threaded, ASTM B43-98.

2.05 WIRE CONDUIT

- A. Conduit for wiring beneath controller pedestal shall be PVC, SCH-40 conduit with solvent-weld joints, as manufactured by Cresline, Carson, JMM or equal.
- B. Sweep ells shall be standard electrical type PVC schedule 40 long sweep elbows.
- C. Above ground wiring to rain sensor or controller shall be galvanized, rigid metallic conduit.

2.06 PVC IRRIGATION FITTINGS

- A. Fittings for solvent weld PVC pipe, 2-1/2 inch and smaller in size, shall be Schedule 40 solvent weld PVC fittings as manufactured by Dura, Lasco, Spears or equal.
- B. Fittings shall bear manufacturer's name or trademark, material designation, size, and applicable I.P.S. schedule.
- C. PVC threaded connections in and out of valves shall be made using Schedule 80 toe nipples and Schedule 40 couplers or socket fittings. Schedule 40 threads will not be approved for installation.
- D. PVC solvent shall be NSF approved, for Type I and Type II PVC pipe, and Schedule 40 and 80 fittings. Cement shall be medium not fast or hot, no wet and dry. Cement is to meet ASTM D2564 and FF493 for potable water pipes. PVC solvent cement shall be Rectorseal Gold, IPS Weld-ON 711, Oatey Heavy Duty Cement or equal, and shall be used in conjunction with the appropriate primer. Primer shall be NSF approved, and formulated for PVC and CPVC pipe applications. Primer is to meet ASTM F 656. Primer shall be Rectorseal Jim PR-2, IPS Weld-ON P-70, Oatey Primer for PVC and CPVC, or equal. Clear primers shall not be allowed.
- E. Nipples to be schedule 80 PVC.

2.07 SMALL ROTARY SPRINKLERS

- A. Small/medium rotary sprinklers shall be gear-driven, rotary type sprinklers, designed for in-ground installation with integral check valves and in-riser flow shut-off capability. Sprinkler shall be capable of covering a 25-44 foot radius and flow range of 0.9-7.0 gpm at 50-55 pounds per square inch of pressure. Sprinklers shall have a one hundred percent warranty for two years minimum against defects in workmanship.
- B. The nozzle assembly shall elevate minimum four inches when in operation and retraction shall be achieved by a stainless steel spring. Riser assembly shall be plastic. A nozzle wiper seal shall be included in the sprinkler for continuous operation under the presence of sand and other foreign material.
- C. Sprinkler parts shall be removable through the top of the unit through the removal of a heavy-duty threaded cap. The sprinkler shall have a three quarter-inch (3/4") IPS water connection on the bottom of the sprinkler.

D. Sprinklers shall be manufactured by Rain Bird model 5004-PL-SAM, Hunter Industries model I20-04 or approved equal.

E. Approved Performance Chart (25' Spacing):

Model	Pressure	Arc	Nozzle	Flow	Radius
Rain Bird 5004-PL-SAM-SS	45psi	180 Deg.	MPR 25H	1.98	25'
Hunter I20-04-SS	50psi	180 Deg.	1.5SR	1.5	25'

2.08 LARGE ROTARY SPRINKLERS

A. Large rotary sprinklers shall be gear-driven, rotary type with drain check valve and stainless steel riser designed for in-ground installation. The nozzle assembly shall elevate three inches when in operation and retraction shall be achieved by a stainless steel spring. Check valve shall be capable of holding up to 10 feet of elevation. Sprinkler shall be capable of covering a 49-61 foot radius and flow range of 7.5 to 15.7 gpm at 60 pounds per square inch of pressure.

B. Sprinkler parts shall be removable through the top of the unit by removing a heavy-duty threaded cap. The sprinkler shall have a one- inch (1") IPS water connection on the bottom of the sprinkler.

C. Sprinklers shall be manufactured by Hunter Industries model I25-04-SS, Rain Bird model 8005-SS or approved equal.

D. Approved Performance Chart (45' Spacing):

Model	Pressure	Arc	Nozzle	Flow	Radius
Rain Bird 8005-SS	60psi	180 Deg.	8	8.4	49'
Hunter I25-04-SS	60psi	180 Deg.	8	9.2	50'

E. Approved Performance Chart (50' Spacing):

Model	Pressure	Arc	Nozzle	Flow	Radius
Rain Bird 8005-SS	60psi	360 Deg.	10	10.1	53'
Hunter I25-04-SS	60psi	360 Deg.	13	12.3	54'

F. Approved Performance Chart (60' Spacing):

Model	Pressure	Arc	Nozzle	Flow	Radius
Rain Bird 8005-SS	60psi	90 Deg.	12	12.0	59'
Rain Bird 8005-SS	60psi	180/360 Deg.	16	15.9	65'
Hunter I25-04-SS	60psi	90 Deg.	15	14.3	57'
Hunter I25-04-SS	60psi	180/360 Deg.	25	23.5	66'

2.09 ELECTRIC CONTROL VALVES

- A. Electric control valves shall be one, one and one half and two-inch remote control, diaphragm type, fiberglass or reinforced nylon body plastic valves with manual flow control, manual bleed screw and 200 psi pressure rating.
- B. Valves shall be manufactured by Rain Bird model PEB, Hunter Industries model ICV or approved equal.

2.10 VALVE BOXES

- A. All valve boxes shall be manufactured from unformed resin with a tensile strength of 3,100-5,500 psi conforming to ASTM D638. All boxes shall be green or black in color.
- B. Valve boxes for single 1 inch and 1-1/2 inch electric valves, isolation valves and quick coupling valves shall be 10-inch round valve boxes with metal detection, t-tops, and bolt down covers
- C. Valve boxes for single 2 inch and multiple electric valves shall be 12-inch standard valve boxes with metal detection, t-tops, and bolt down covers. When multiple electric valves are installed in the same area, they are to be installed two (2) 1-1/2 inch valves or up to three (3) 1 inch valves in a 12-inch standard box
- D. Valve boxes for wire splices shall be 10 inch round valve boxes with metal detection, bolt down covers and t-top lids. All splices shall be in separate valve boxes and not included with isolation valves.

- E. Valve box extensions shall be provided and installed as required for proper box depth. Valve box extensions shall be made by the same manufacturer.
- F. Valve boxes shall be manufactured by Highline Products, Olde Castle Specifications Grade, NDS Pro Series or approved equal.

2.11 AUTOMATIC CONTROLLER

- A. Controller shall be electronic in construction with capability of up to 10 hour run times per zone in increments of 1 or 10 minutes. Controllers to have minimum four independent programs, auto/off switch and be capable of manual, semi-automatic and automatic operation. Controller shall have water budgeting feature, cycle and soak feature, sensor input terminal, locking, weather resistant cabinet and internal transformer. Terminal strip connection shall be easily accessible. The controller shall be U.L. listed, 120 volt, 60 Hertz, A.C. type.
- B. Controller shall be as manufactured by Rain Bird model ESP-8-LXME, Hunter Industries model IC-600-PL or approved equal. Expansion modules shall be added for 20 station controller.
- C. Station quantity shall be minimum of 20.

2.12 QUICK COUPLING VALVES

- A. The valve body shall be of cast brass construction with a working pressure of 125 psi. The valve seat disc plunger body shall be spring loaded so that the valve is normally closed under all conditions when the key is not inserted.
- B. The top of the valve body receiving the key shall be equipped with ACME threads and smooth face to allow the key to open and close the valve slowly. The quick coupling valve shall be equipped with a vinyl cover.
- C. The valve body construction shall be such that the coupler seal washer may be removed from the top for cleaning or replacement without disassembling other parts of the valve.
- D. Keys shall be ACME with 1-inch male thread and 3/4-inch female thread at the top.
- E. Quick coupling valves, keys and swivels shall be manufactured by Hunter Industries, model HQ-44RC-AW, HK-44A and HS-1 or approved equal.

2.13 WIRE

- A. All valve control wire shall be minimum #14-awg, common #12-awg, single strand, solid copper, UL- approved direct burial AWG-U.F. 600V and shall meet all state and local codes for this service. Individual wires must be used for each zone valve. Common wire shall be white in color, control wire for rotor zones shall be red in color and spare wires, installed where indicated on the drawings shall be blue. White color shall be used for common wire only.
- B. In ground wire connections shall be UL listed, manufactured by 3M, model DBR/Y-6 splice kits. All wire splices shall be made in valve boxes, at controller, or at valves.
- C. Wire type and method of installation shall be in accordance with local codes for NEC Class II circuits of 30-volt A.C. or less.

2.14 ISOLATION VALVES

- A. Isolation valves 2-1/2 inches and smaller in size shall be gate type, of bronze construction, US Manufacture, 200 WOG with steel cross handle and 200 psi rating. Gate valves to be as manufactured by Nibco, model T-113-K, or approved equal.

2.15 SWING JOINTS

- A. Small rotary sprinklers shall be installed on 3/4-inch prefabricated PVC unitized swing joint assemblies with double O-ring seals, minimum 315 psi rating and minimum length of 12 inches. Prefabricated PVC swing joints shall be as manufactured by Dura, Lasco, or Spears
- B. Large rotary sprinklers shall be installed on 1-inch prefabricated PVC unitized swing joint assemblies with double O-ring seals, minimum 315 psi rating and minimum length of 12 inches. Prefabricated PVC swing joints shall be as manufactured by Dura, Lasco, or Spears.
- C. Quick coupling valves to be installed on 1-inch prefabricated PVC unitized swing joint assemblies with double O-ring seals, minimum 315 psi rating and minimum length of 12 inches with brass insert and stabilizer (unless stabilizer is an integral part of the quick coupling valve). Prefabricated PVC swing joints shall be as manufactured by Dura, Lasco, or Spears.

2.16 AUTOMATIC RAIN SENSOR

- A. Rain sensor shall be plastic in construction with adjustable interruption point, 1/2-inch IPS threads and stainless steel vandal resistant guard. Rain sensor shall be manufactured by Hunter Industries, model Rain-Clik or approved equal with sensor guard.

2.17 CONTROLLER ENCLOSURE

- A. The enclosure shall be vandal and weather resistant in nature manufactured entirely of 304-grade stainless steel. The main housing door shall be louvered at the bottom and equipped with a hollow center thermoplastic door seal. The entry lip shall be louvered on the backside. Filter screens shall cover all louvers. The top entry lid shall have two gas springs, for easy access, a continuous stainless steel piano hinge, and a three point locking mechanism with provisions for padlock. Removable stainless steel tray shall be provided and installed for the mounting of electronics and other equipment.
- B. The enclosure shall be a NEMA 3R Rainproof Enclosure as listed by Underwriters Laboratories, Inc.
- C. Controller enclosure shall be 24 inches wide x 17 inches deep x 38 inches tall, as manufactured by Strong Box, model SB-22SS or approved equal.

2.18 GROUNDING EQUIPMENT

- A. The exterior field controller installed outside of a building shall include factory-installed and factory-recommended lightning protection and shall be connected to a 5/8-inch diameter x 10-foot long copper clad grounding rod with minimum #6 AWG, solid, bare copper wire and 4-inch x 96-inch x 0.0625-inch copper grounding plate as outlined below. Minimum 20-foot separation between rod and plate. Minimum 12-foot separation between controller and ground rod. The connection to rod shall be with Cadweld or approved equal connector as specified. The connection to plates shall be performed by the plate manufacturer (Paige #182199L) or approved equal with 25-feet of bare copper wire already attached. The grounding rod is to be covered by a 4-inch round, grated top, plastic valve cover with metal detection and six inches of 4-inch ADS or approved equal drainage pipe. Plate shall be installed in ground enhancement material. Plate shall be covered with 4-inch plastic grated cover with detection and minimum 36 inches of 4 inch ADS or approved equal drainage pipe. Ground rod and plate shall be UL listed.

- B. The controller shall be grounded to one rod and one plate. The 10-foot rod shall be installed penetrating into the soil to its full length. Plate shall be installed at a 36-inch depth with 50 lbs of Power Set or approved equal ground enhancement material spread evenly below the plate and 50 lbs spread evenly above the plate in accordance with manufacturer's requirements. The grounding electrodes shall be installed at least 10 feet from wires connected to the field controller.

2.19 BOOSTER PUMP SYSTEM

A. Construction

1. All nuts, bolts, washers, and fasteners shall be zinc or cadmium plated for corrosion resistance.
2. All piping within pump station shall be independently supported. Pumps and other equipment shall not be used to support pipe.
3. Pump station discharge header shall be constructed from Schedule 40 standard weight steel of suitable design flow so that velocity does not exceed 15 feet per second. Header shall be constructed with 150-lb cast iron flanged, Victaulic, or welded fittings as required for valve connections to pump discharge header.
4. Pump station shall be completely wired, piped, dynamically flow and pressure tested prior to shipment.

- B. The pump shall activate automatically upon detecting a drop in pressure in the irrigation main line. Operation shall be maintained at an adjustable minimum demand. The pump shall be automatically retired when the demand falls below the minimum adjustable set point for an adjustable time delay.

C. Variable Frequency Drive Controller

1. The variable frequency drive shall be IGBT based with selectable carrier frequency up to 15 KHZ. The VFD shall include terminals for incoming power, motor output power and control terminals. The VFD shall generate a sine-coded, variable voltage/frequency, three-phase output for optimum speed control. The VFD shall incorporate power loss ride-through. VFD protective features shall include current limit, short circuit protection, electronic motor overload protection and ground fault protection. The VFD shall have push button programming display for easy access to

operation parameters. VFD must be designed for operation in 50 degree C temperature condition.

D. Pressure Transducer

1. A solid state pressure transducer shall provide a noise free, linear output proportional to discharge pressure. Transducer shall be solid state, strain gauge type with integral voltage regulating and output accuracy not less than 0.5%. Transducer shall be constructed of stainless steel and rated for the maximum pump station discharge pressure.

E. Booster pump shall be capable of providing a minimum flow of 71 gallons per minute while producing a minimum of 80 feet of head (35 psi). Minimum pump efficiency at the specified duty point shall be 60%.

F. Pump inlet and outlet shall be threaded, 1-1/4" NPT.

G. Pump motor shall be Open Drip Proof (ODP), three phase, 208-volt, 60 Hz with a speed of 3500rpm. Motor shall be 3 hp and shall not be allowed to operate within its service factor across the operating range of the pump.

H. Pump shall be manufactured by Goulds Pumps, model, eSV series or approved equal.

I. Booster Pump System Enclosure

1. Enclosure shall house pump, motor, valves, piping, controls, fan and all isolation valves.
2. Enclosure shall be made from composite material, marine grade aluminum 0.063 inch 5052 or 1/8-inch carbon metal and formed for rigidity and maximum structural strength. Panels shall be riveted or bolted together. Enclosure shall be firmly fixed to structural skid base for removal by Owner for access or repair. Enclosure frame shall be 1 inch 11 gauge square tube finished in powder coated paint.
3. Enclosure shall be primed with powder coat finish.
4. Final Color of Enclosure shall be as per Owner's Representative.
5. Enclosure doors shall also be lockable in open position to prevent doors from swinging shut during pump station servicing.

6. Enclosure doors shall be lockable in the closed position to prevent vandalism.

J. Pump System Wiring

1. All pump station wiring from pump start relay to motor shall be in liquid-tight conduit with copper conductors rated not less than 600 VAC and of proper size to carry the full load amperage of the motors without exceeding 67% capacity of the conductor. Grounding cable sized to current National Electric Code requirements shall be included in liquid-tight conduit. There shall be no splices between pump station motor starter and motor connection box.

K. Step-down transformer to 120-volt

1. Pump Station shall be equipped with a UL listed electrical transformer to convert voltage from 208-volt, 3-phase to 120-volt to power the irrigation controller. A 15-amp, 120-volt circuit breaker shall also be provided with all necessary branch circuitry from the transformer to the circuit breaker.

L. Steel Piping

1. All steel piping within pump system shall conform to ASTM specifications A53 for Grade B welded or seamless Schedule 40 pipe. All welded flanges shall be forged steel, slip-on, or weld neck type. All welded fittings shall be seamless, ASTM Specification A234, with pressure rating not less than 150 psi.

M. Pump By-Pass

1. A full flow bypass piping system is available for booster models. Pump bypass piping will have three isolation butterfly valves to allow city water pressure and flow to be directed around the pump. This allows isolation of the pump and motor for service without disrupting the irrigation system supply.

N. Check Valve

1. Check valves shall be flanged, 150-lb rated, center-pivot, spring-loaded, non-slam, silent type cast iron check valves. Sealing surfaces shall have resilient Buna-N-Rubber as manufactured by Val-Matic or equal. Pressure loss not to exceed 1 psi at full discharge capacity. Check valve shall be mounted directly to discharge headers.

2. Butterfly-type check valves shall not be approved for installation.

O. Pump Intake and Discharge Isolation Valves

1. Isolation valves shall be installed on station intake and discharge pipes as required. Valves shall have lever handle. Pressure rating shall be 200 psi. Trim shall include stainless steel stem, bronze or nickel coated iron-streamlined disc, and full faced resilient seats. Butterfly valves shall be as manufactured by Victaulic, Watts or equal.

P. Drain Valve

1. Drains are to be provided from any possible low point in the system and are to consist of 1/4-inch brass petcocks.
2. Drains shall be directed away from pump station concrete slab.

Q. Pressure Gauges

1. All pressure gages in system shall be of the same size and scale, 0-200 psi or as required. Gauges shall be glycerin filled with accuracy conforming to ANSI Grade B or greater. Gauge shall be provided on the main discharge pipe.
2. System shall include a pressure/vacuum gauge on suction side of pump station manifold. Gauge shall be glycerin filled with accuracy conforming to ANSI Grade B or greater.
3. Pressure gauges shall not be installed on pump volutes.

R. Reduced Pressure Zone Backflow Preventer

1. Backflow prevention device shall be 2-inch Reduced Pressure Assembly as per City of Arlington Water Department requirements. Backflow prevention device shall have maximum 14-psi pressure loss at full system flow and be located on the new booster pump skid and within its enclosure.
2. Backflow prevention device shall be as manufactured by Watts model LF009 or approved equal (pending approval from local water purveyor).

- S. Pump station shall be pre-fabricated and be complete with equipment required in this Section as manufactured by Watertronics (Model WaterMax 5000) or approved equal.

2.20 PUMP STATION ELECTRICAL DISCONNECT

- A. A three pole, electrical disconnect shall be mounted on the pump enclosure to completely isolate the pump from the incoming power. The disconnect shall LOCKABLE and conform to all NEC requirements and be NEMA 3R. Final location of disconnect shall be per the direction of the Owner's Representative.
- B. The switch shall have switch blades which are visible when the switch is OFF and the cover is open.
- C. Lugs shall be front removable and UL Listed for aluminum or copper conductors, 60 degree or 75 degree C conductors.
- D. All current carrying parts shall be plated to resist corrosion.
- E. Switches shall have removable arc suppressors to facilitate easy access to line side lugs.
- F. Switches shall have provisions for a field installable electrical interlock.
- G. Switch operating mechanism shall be quick-make, quick break such that, during normal operation of the switch, the operation of the contacts shall not be capable of being restrained by the operation handle after the closing or opening action of the contacts has started.
- H. The operating handle shall be an integral part of the box, not the cover.
- I. Provisions for padlocking the switch in the OFF position with at least three padlocks shall be provided.
- J. The handle position shall travel at least 90 degrees between OFF and ON positions to clearly distinguish and indicate handle position.
- K. All switches shall have a dual cover interlock mechanism to prevent unintentional opening of the switch cover when the switch is ON and prevent turning the switch ON when the cover is open. The cover interlock mechanism shall have an externally operated override but the override shall not permanently disable the interlock mechanism. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

- L. Switch covers shall be top hinged, attached with removable screws and securable in the open position.
- M. The enclosure shall be finished with gray baked enamel paint which is electrodeposited on cleaned, phosphate pre-treated galvanized steel.
- N. The enclosure shall have ON and OFF markings stamped into the cover.
- O. The operating handle shall be provided with a dual colored, red/black position indication.
- P. All switches shall have provisions to accept up to three 3/8" hasp padlocks to lock the operating handle in the OFF position.
- Q. Tangential knockouts shall be provided to facilitate ease of conduit entry.
- R. Switch shall be horsepower rated for the final approved pump and be manufactured by Square D Company or equal.

2.21 CONCRETE SLAB FOR BOOSTER PUMP

- A. Cement used shall be Portland Cement which conforms to "Standard Specifications for Portland Cement" of ASTM Designation C150, latest revision and shall be Type I or II.
- B. Sand used shall be clean, hard, strong and durable particles, free of chemicals, coatings or clay and other fine materials and shall meet requirements of ASTM C33.
- C. Stone used shall conform with above specifications for sand, size shall be ASTM C33 No. 57 (1 inch maximum) and in addition no particle shall be larger in size than three-fourths of minimum clear spacing between reinforcing bars.
- D. Water used shall be potable, fresh, clean and free from detrimental amounts of alkali, oil, acid, organic matter and other deleterious substances.
- E. Admixtures used shall conform to ASTM C260 for air entrainment and ASTM C494 for water reducers. Calcium chloride or salts shall not be used.
- F. Mix design shall meet following requirements:
 - 1. Compressive Strength: 4,000 psi @ 28 days

2. Maximum Slump: 4 inches
3. Maximum Water/Cement Ratio (by weight): 0.45
4. Minimum Cement Content: 564 pounds /cubic yard
5. Air Content: 6%, + 1-1/2%
6. Air entraining mixture required
7. All reinforcing bars shall be deformed type, new billet steel, conforming to ASTM A-615, Grade 60. Welded wire fabric shall conform to ASTM A-185 specifications for Welded Steel Wire Fabric.
8. Concrete slab dimension for booster pump enclosure shall be as indicted on the Drawing: (6 inches thick) as necessary to place pump enclosure on with 6" of space around the perimeter.

2.22 CRUSHED STONE

- A. Crushed stone shall be as specified in SECTION: EARTHWORK. Crushed stone shall be used under valve boxes.

2.23 SAND

- A. Sand used for backfilling of trenches; under, around and over PVC lines shall be as specified in SECTION: EARTHWORK.

2.24 CONCRETE BASE FOR CONTROLLER

- A. Standard concrete mix shall be in accordance with ASTM C150, ASTM C-33, and ASTM C-94 with a compressive strength (28 days) of 3,000 psi.
- B. The concrete base shall be standard concrete mix. Sizes shall be as indicated on the drawings and cited in the specifications.

2.25 SPARE PARTS

- A. Supply the following tools and equipment to the Owner's Representative before final observation:
 1. Two (2) wrenches or keys for disassembling and adjusting each type of sprinkler provided.

2. Two (2) quick coupler key assemblies.
 3. One (1) gate valve key.
 4. Five (5) of each type sprinkler and pattern (PC & FC) used in the project.
 5. Five (5) of each type nozzle used in the project.
- B. Before final observation can occur, written evidence that the Owner's Representative has received the tools and equipment must be shown.

PART 3 – EXECUTION

3.01 GENERAL

- A. Before work is commenced, hold a conference with the Owner's Representative to discuss general details of the work.
- B. Examine all contract documents applying to this Section noting discrepancies and bringing the same to the attention of the Owner's Representative for timely resolution.
- C. All works indicated on drawings shall be provided whether or not specifically mentioned in the specifications.
- D. If there are ambiguities between drawings and specifications, and specific interpretation or clarification is not issued prior to bidding, the interpretation or clarification will be made only by Owner's Representative, and compliance with the decisions shall be required. In the event the installation contradicts the directions given, the installation shall be corrected at no additional cost to Owner.
- E. Verify dimensions and grades at job site before work is commenced. Do not proceed with installation of the irrigation system when it is apparent that obstructions or grade differences exist or if conflicts in construction details, legend or specific notes are discovered. All such obstructions, conflicts, or discrepancies shall be brought to the attention of the Owner's Representative.
- F. Make all field measurements necessary for the work noting the relationship of the irrigation work to the other trades. Coordinate with other trades (landscaping and other site work trades). Project shall be laid out essentially as indicated on the Irrigation Plans, making minor adjustments for variations in the planting arrangement. Major changes shall be reviewed with the Owner's Representative prior to proceeding.

- G. Layout of sprinkler lines indicated on drawings is diagrammatic. Location of sprinkler equipment is contingent upon and subject to integration with all other underground utilities. Employ all data contained in the Contract Documents and verify this information at the construction site to confirm the manner by which it relates to the installation.
- H. During progress of work, a competent superintendent and all assistants necessary shall be on site. All shall be satisfactory to the Owner's Representative. The superintendent shall not be changed, except with the consent of the Owner's Representative, unless that person proves unsatisfactory and ceases to be employed. Directions given to the superintendent shall be binding.

3.02 PIPE AND FITTINGS INSTALLATION

- A. Using proper width trencher chain, excavate a straight (vertical) and true trench to a depth of 2-inch of pipe invert elevation.
- B. Loam or topsoil encountered within the limits of trench excavation for irrigation mains and branch lines shall be carefully removed to the lines and depths as shown on the drawings and stockpiled for subsequent replacement in the upper 6 inches of the trench from which it is excavated. Such removal and replacement of the quantities of loam shall be considered incidental to the irrigation system and no additional compensation will be allowed therefore.
- C. Pipe shall be laid on undisturbed trench bottom provided suitable base is available - no rock; if not, excavate to 2-inch below pipe invert and provide and install sand base or crushed stone upon which to lay pipe.
- D. Backfilling shall be accomplished as follows: backfill material shall contain no foreign matter and no rock. Carefully place material around pipe and wire and tamp in place. Remainder of backfill shall be laid-up in 6-inch (maximum) lifts and tamped to compaction with mechanical equipment. Compact backfill in trenches to dry density equal to the adjacent undisturbed soil, and conform to adjacent grades without dips, sunken area, humps, or other irregularities. Frozen material shall not be used for backfill.
- E. Make all solvent-weld joints in strict accordance with manufacturer's recommendations, making certain not to apply an excess of primer or solvent, and wiping off excess solvent from each connection. Allow welded joints at least 15 minutes set-up/curing time before moving or handling. When the temperature is above 80° F, allow connections to set minimum 24 hours before pulling or pressure is applied to the system. When temperature is below 80° F, follow

manufacturer's recommendations. Provide and install for expansion and contraction as recommended. Wire shall be laid in same trench as mainline and at pipe invert (see Wire Installation).

- F. Mainline pipe shall have minimum 22 inches of COVER (excavate to invert as required by pipe size). Lateral pipe shall have minimum 16 inches of COVER for PVC and 12 inches of cover for Polyethylene (excavate to invert as required by pipe size).
- G. Cut plastic pipe with handsaw or pipe-cutting tool, removing all burrs at cut ends. All pipe cuts are to be square and true. Bevel cut end as required to conform to Manufacturer's Specifications.
- H. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. At times, when installation of the piping is not in progress, the open end(s) of the pipe shall be closed by a watertight plug or other means. All piping, which cannot temporarily be joined, shall be sealed to make as watertight as possible. This provision shall apply during the lunch hour as well as overnight. Pipe not to be installed that day shall not be laid out. Should water enter the trench during or after installation of the piping, no additional piping may be installed or backfilled until all water is removed from the trench. Pipe shall not be installed when water is in the trench, when precipitation is occurring, or when the ambient temperature is at 40° F or below. Pipe installed at temperatures below 40° F shall be removed and replaced at no cost to the Owner. PVC pipe shall be snaked in the trench to accommodate for expansion and contraction due to changes in temperature.
- I. In installing irrigation pipe route the pipe as necessary to prevent damage to tree roots. Where trenching must occur near trees provide proper root pruning and sealing methods to all roots 1-inch and larger.
- J. Maintain 6-inch minimum clearance between sprinkler lines and lines of other trades. Do not install sprinkler lines directly above another line of any kind.
- K. Maintain 1-inch minimum between lines which cross at angles of 45 to 90 degrees.
- L. Throughout the guarantee period refill trenches that have settled due to incomplete compaction.
- M. Pulling of pipe will be allowed provided soil is suitable and specified depth of bury can be maintained.

3.03 ELECTRICAL WIRE CONDUIT INSTALLATION

- A. Electrical conduit shall be installed in all non-soil areas, as well as for all above ground wiring where wire passes under controller base and rain sensor.
- B. Conduit shall extend 18 inches beyond edge of controller base...

3.04 PIPE SLEEVING INSTALLATION

- A. Sleeving shall be installed wherever piping is going under hardscape areas where indicated on the drawings. Minimum cover over all sleeving pipe shall be 24 inches as shown on the detail.
- B. Sleeving shall extend 18 inches beyond edges of walls and pavement. Prior to the installation of irrigation piping and wiring, the ends of all sleeving shall be field marked with a vertical wood stake extending above grade to allow field location at the time of irrigation installation.
- C. Ensure all required sleeving is installed prior to starting pavement operations. Review all sleeve locations in the field to confirm that sleeves are properly located for the required irrigation pipe runs. In no case will sawcutting into newly installed pavements or jacking under new pavements be permitted to install sleeving which was not installed in proper sequence or in the required orientations or locations.

3.05 SOLDERING OF COPPER PIPE

- A. Conduct soldering work with clean metal pieces. The joints must be free from any rust, oxidation or grease. Clean the joints by soaking them in an isopropanol bath. If you are working with pipes that are newly cut, remove any remaining burrs to make a clean joint. Clean the inside of the pipes with a steel brush or any brush that can fit inside the pipe. A clean joint is important in making a clean and durable joint after it has been soldered together.
- B. Apply a coating of flux to both the inside and the outside of the pipes. Apply a coating of flux to the silver solder. Stick it to the side of the joint.
- C. Silver soldering does not close gaps. Metal pieces to be joined must have as little space between them as possible to make a clean joint. The melted silver solder will flow into the narrow gap through capillary action.
- D. The metal pieces must be heated first to remove the water from the flux. As the flux is being heated, it will turn white and bubble. The silver solder is melted enough when you see it flow inside the joints.

3.06 ISOLATION VALVE INSTALLATION

- A. Install isolation valves per detail where indicated on the drawings. Install all isolation valves on a level crushed stone base so that they can be easily opened or closed with the appropriate valve wrench. Install specified valve box over each isolation valve.
- B. Check and tighten valve bonnet packing before valve box and backfill installation.

3.07 VALVE BOX INSTALLATION

- A. Furnish and install a valve access box for each electric valve, quick coupling valve, isolation valve and wire splice.
- B. All valve access boxes shall be installed on a minimum 4-inch crushed stone base. Finish elevation of all boxes shall be at grade. Supply all crushed stone and install before valve box. Crushed stone shall not be poured into previously installed valve boxes.
- C. Valve boxes shall be installed neatly at all times. Boxes shall be parallel or perpendicular to hardscape edges and to other valve boxes installed in the same location. A sufficient amount of turf shall remain in place between each valve box and between valve boxes and hardscapes.
- D. Valve box extensions shall be provided as required on valve boxes in order to install valve box covers at grade.
- E. Bricks, stones, etc. shall not be used to support valve boxes.

3.08 24 VOLT CONTROL VALVE INSTALLATION

- A. Control valves shall be installed on a level crushed stone base. Grade of bases shall be consistent throughout the project so that finish grades fall within the limits of work. Valves shall be set plumb with adjusting handle and all bolts, screws and wiring accessible through the valve box opening. Valves shall be set in a plumb position with 24-inch minimum maintenance clearance from other equipment.
- B. Install at sufficient depth to provide more than 6-inch, nor less than 4-inch cover from top of valve to finish grade.
- C. Adjust zone valve operation after installation using flow control device on valve.

3.09 WIRING INSTALLATION

- A. Wiring shall be installed along with the mainline. Multiple wire bundles shall be cinched together at maximum 12-foot centers using plastic cable cinches and shall be laid beside, and at the same invert as, the irrigation lines. Sufficient slack for expansion and contraction shall be maintained and wiring shall at no point be installed tightly. Provide and install an additional 8 inches to 12 inches slack at all changes of direction. Wiring in valve boxes shall be a sufficient length to allow the valve solenoid, splice, and all connections to be brought above grade for servicing. This additional slack shall be coiled for neatness in the valve box. Each valve shall have a separate wire back to the controller.
- B. All wire shall be laid in trenches and shall be carefully back-filled to avoid \ damage to the wire insulation or wire conductors themselves. In areas of unsuitable material, the trench shall have a 2 inches layer of sand or stone dust on the bottom before the wires are laid into the trench and back-filled. The wires shall have a minimum of 22 inches of cover (See Detail). Wire not to be installed that day shall not be laid out.
- C. An expansion curl shall be provided and installed within 6 inches of each wire connection to a solenoid. Expansion curls can be formed by wrapping five (5) turns of wire around a 1-inch diameter or larger pipe and then withdrawing the pipe.
- D. Provide and install a common ground wire of white color. No white color shall be used for power wire. Control wire shall be red and spare wiring shall be blue in color.
- E. Service wiring in connection with drawings and local codes for low voltage service. All in-ground wire connections shall be waterproofed with 3M DBR/Y-6 splice kits. All splices shall be made in valve boxes (wire runs requiring splices between valve locations shall be provided and installed in splice box-valve box shall be used). Splice locations shall be shown on the record drawings.
- F. Provide a complete wiring diagram showing wire routing for the connections between the controller and valves. See section one for the inclusion of wiring diagram in operation and maintenance manuals.

3.10 CONTROLLER INSTALLATION

- A. Install controller inside of pedestal per detail. Wire valves and rain sensor into controller and set proper program.

- B. Wire controller to electrical supply furnished and installed to the controller location.
- C. Keys shall be turned over to Owner's Representative.

3.11 FLOW SENSOR INSTALLATION

- A. Flow sensor shall be installed where indicated on the drawings in a 12-inch rectangular valve box on a 4-inch crushed stone base. Flow sensor shall have sections of straight, uninterrupted pipe equal to ten times the pipe diameter upstream and five times the pipe diameter downstream of the sensor. Wire sensor to controller using minimum 18AWG wire. All wire connections shall be made using UL 98U1 Listed waterproof connectors with separate wire nut and sealant filled tube that includes a locking, wire strain relief cap. Splice shall only be made at the sensor and controller.

3.12 CONTROLLER GROUNDING INSTALLATION

- A. The grounding rod shall be driven into the ground its full length 12-feet from the controller and connected via a Cadweld or approved equal connection to #6 solid, bare copper wire. The copper wire is to be installed in as straight a line as possible, and if it is necessary to make a turn or bend, it shall be done in a sweeping curve with a minimum radius of 8 inches and a minimum included angle of 90 degrees. There shall be no splices in the bare copper wire. The top of the ground rod shall be driven below the ground surface. A 4-inch grated cover as specified, set a minimum of 1-inch below grade, shall be placed over the ground rod and Cadweld or approved equal connection for periodic maintenance. Cover shall be installed on a minimum of 6 inches of 4-inch ADS corrugated polyethylene, perforated drainage pipe. Plate shall be installed 36 inches below grade with 50 lbs of Power Set or approved equal ground enhancement material spread evenly below the plate and 50 lbs of Power Set or approved equal ground enhancement material spread evenly above the plate in accordance with the manufacturer's requirements. Plates shall also be covered with a 4 inch grated cover as specified, set a minimum of 1-inch below grade, to facilitate drainage onto the plate. Cover shall be installed on a minimum of 36 inches of 4-inch ADS or approved equal corrugated polyethylene, perforated drainage pipe.
- B. When tested, grounding grid shall have an earth resistance no greater than 10 ohms. If earth resistance is greater than 10 ohms, additional grounding rods and/or plates and enhancement material shall be added to system until desired test results have been met. The minimum requirements of the NEC shall be met, which are:

1. a resistance reading of no more than 25 ohms or
2. a two electrode ground grid.

3.13 RAIN SENSOR INSTALLATION

- A. Install rain sensor on exterior of controller, generally where indicated on the drawings. Coordinate final location of rain sensor with Owner's Representative. Rain sensor shall be in direct contact with the weather and not in contact with the irrigation spray.
- B. Install rain sensor wiring within 1/2-inch conduit where exposed. All above ground wires shall be installed in conduits.

3.14 SPRINKLER INSTALLATION

- A. Spray sprinklers shall be installed flush (perpendicular) to grade on swing pipe assemblies, minimum length 6 inches, maximum 18 inches.
- B. Small rotary sprinklers shall be installed flush to grade on 3/4-inch prefabricated PVC unitized swing joint assemblies with integral O-rings, minimum length 12 inches.
- C. Large rotary sprinklers shall be installed flush to grade on 1-inch prefabricated PVC unitized swing joint assemblies with integral O-rings, minimum length 12 inches.
- D. Sprinklers shall not exceed maximum spacing indicated
- E. Adjust sprinkler zone after installation using flow control device on valve.

3.15 QUICK COUPLING VALVE INSTALLATION

- A. Provide and install quick coupling valves where indicated on the drawings.
- B. Quick coupling valves to be mounted on 1-inch prefabricated PVC unitized swing joint assemblies with integral O-rings, minimum length 12 inches with brass insert and stabilizer as per details.

3.16 CONTROLLER ENCLOSURE INSTALLATION

- A. Install enclosure on concrete pad as indicated on the detail, generally where indicated on the drawings. Final location of enclosures shall be coordinated with

the Owner's Representative as to best screen the enclosure and deter vandalism. Final location shall also be coordinated with utility department to ensure proper placement of water supply line.

- B. Concrete pad for controller enclosure shall be 36 inches long by 29 inches wide by 6 inches deep.
- C. Install one (1) 1-inch sweep elbow (power), one (1) 1-1/2-inch sweep elbow (ground), and one (1) 2-inch sweep elbow (field wiring) through concrete pad into controller enclosure as per detail.

3.17 PUMP SYSTEM INSTALLATION

- A. New pump station shall be delivered and installed by Manufacturer. Coordinate installation schedule with Owner's Representative.
- B. Pump station shall be securely lagged to new concrete slab using 5/8 inch stainless steel bolts 6 inches long and eight (8) 4 inch x 8 inch, 1/4 inch thick steel plates painted same color as pump station pipe and shall be provided by Manufacturer.
- C. Inlet piping shall be connected without strain to inlet of pump station by pump system Manufacturer.
- D. Discharge pipe shall be connected without strain to outlet of pump station by pump station Manufacturer. Manufacturer shall connect discharge piping without strain to threaded outlet of pump station. Pump station shall not be used as a thrust block.
- E. Manufacturer/contractor shall install electrical to pump station motor from electrical supply at existing utility building. Coordinate with Owner's Representative.
- F. Manufacturer/contractor shall be responsible for connecting all pipe and electrical connections associated with the pump station installation as specified.
- G. Manufacturer/contractor shall be responsible for procuring, coordinating and paying for all cranes, rigging equipment and other equipment required for the safe and timely offload, set and installation of the pump station and its appurtenances on a predetermined schedule with the Owner's Representative.
- H. Whether or not specified, the Manufacturer/contractor shall be responsible for the complete installation of the pump station and its control panel including electrical.

- I. Pump station control panel shall be provided with the pump skid.
- J. Manufacturer shall be responsible for supplying materials for pump station equipment ground. Grounding shall be installed by the pump station installer. Grounding rod and plate shall be as specified. Coordinate with Owner's Representative.

3.18 PUMP STATION TESTING

- A. Technical start-up of the system
 - 1. When discharge piping and electrical connections have been completed for pump station, factory service representative from the Manufacturer shall be on hand at site for one-day visit. Manufacturer, at no further cost to Owner, shall perform the following services during this visit:
 - a. Start-up pump station and pressurize irrigation system
 - b. Manufacturer will conduct training (2 hours minimum) to familiarize the operator(s) with system operation, maintenance and adjustments
 - c. Adjust all valves and pumps on/off pressures and flows for optimum performance of irrigation system and to prevent frequent on/off cycling of pumps.
 - d. Adjust control panel for optimum pump station performance and efficiency.
 - e. Monitor a partial cycle of irrigation system if authorized by Owner's Representative to identify any problems with pump station.
- B. Testing:
 - 1. Pump shall operate without undue vibration throughout range of operating conditions. Pump station shall be given a running test of normal start, stop and ramping operations under load. During such tests, pump shall demonstrate its ability to operate without undue vibration and shall demonstrate without question their general fitness for service. All defects shall be corrected and adjustments made without expense to Owner. Tests shall be repeated until satisfactory results are obtained.

2. In addition, pump station shall show that safeties incorporated in system are also functioning.
3. Owner's Representative will notify Manufacturer in advance of final test.
4. Test all lines in pump station under pressure for leaks. Repair all leaks, retest and repaint.
5. Furnish all necessary equipment to perform tests.
6. Test all safety features to insure their proper operation.
7. Review all Maintenance and Operating Manuals section by section with Maintenance personnel. Turn manuals over to Owner's Representative.

3.19 CHECK/TEST/START-UP/ADJUST

A. Flushing:

1. After all piping, valves, sprinkler bodies, pipelines and risers are in place and connected, but prior to installation of sprinkler internals open the control valves and flush out the system under a full head of water.
2. Sprinkler internals and nozzles shall be installed only after flushing of the system has been accomplished to the full satisfaction of the Owner's Representative.
3. Flush the entire system after installation is complete and service clogged nozzles for thirty (30) days after substantial completion of this portion of the landscape irrigation system.

B. Testing:

1. Leakage test: test all lines for leaks under operating pressure. Repair all leaks and re-test.
2. Coverage test: perform a coverage test in the presence of the Owner's Representative (notify Owner's Representative at least seven (7) days in advance of scheduled coverage test). Representative will determine if the water coverage is complete and adequate. Readjust sprinklers and/or sprinkler locations as necessary or directed to achieve proper coverage.
3. All testing shall be at no additional expense to the Owner.

3.20 CLEANING AND ADJUSTING

- A. At the completion of the work, all parts of the installation shall be thoroughly cleaned. All equipment, pipe, valves and fittings shall be cleaned of grease, metal cuttings and sludge which may have accumulated by the operation of the system for testing.
- B. Adjust sprinklers, valve boxes, and quick coupling valves to grade as required, so that they will not be damaged by mowing operations.
- C. Continue sprinkler coverage adjustment as required by settlement, etc., throughout the guarantee period.
- D. Each control zone shall be operated for a minimum of 5 minutes and all sprinklers zones checked for consistency of delivering water. Adjustments shall be made to sprinklers that are not consistent to the point that they match the manufacturer's standards. All sprinklers, valves, timing devices, or other mechanical or electrical components, which fail to meet these standards, shall be rejected, replaced and tested until they meet the manufacturer's standards.

3.21 ACCEPTANCE AND OPERATION BY OWNER

- A. Upon completion of the work and acceptance by the Owner, train the Owner's Personnel in the operation of the system (provide minimum 7 day written notice in advance of test). Furnish, in addition to the record drawings and operational manuals, copies of all available specification sheets and catalog sheets to the Owner's personnel responsible for the operation of the irrigation system. Guarantee all parts and labor for a minimum period of one (1) year from date of acceptance.

3.22 CLEAN UP

- A. Upon completion of all installation work remove all leftover materials and equipment from the site in a safe and legal manner.
- B. Remove all debris resulting from work of this section.
- C. Regrade, lightly compact, and replant around sprinklers where necessary to maintain proper vertical positioning in relation to established grade.
- D. Fill all depressions and eroded channels with sufficient soil mix to adjust grade to ensure proper drainage. Compact lightly, and replant filled areas in accord with drawings requirements.

END OF SECTION 02810

SECTION 02820

BLACK VINYL CLAD CHAIN LINK FENCE AND GATES

PART I - GENERAL

1.01 SCOPE OF WORK

- A. The work under this Section consists of furnishing and installing vinyl coated chain link fence fabric and hardware and framework of various heights as shown on the Contract Drawings and as specified herein including all labor, materials and equipment necessary to finish the work complete in place.

1.02 REFERENCE STANDARDS

- B. References herein to any technical society, organization, group or body is made in accordance with the following abbreviations:

- 1. ASTM American Society for Testing Materials
- 2. AWS American Welding Society

1.03 QUALITY ASSURANCE

- A. All fencing shall conform to the specifications of the Chain Link Fence Manufacturer's Institute and as specified herein.

1.04 SUBMITTALS

Per Section SPECIAL CONDITIONS of these Specifications, submit:

- A. Three (3) samples, approximately 3" long or 6" square of fabric material, post sections and typical accessories.
- B. Shop drawings or catalog cuts including details illustrating fence height, fence post spacing, and sizes of posts, rails, braces, footings, gates and all accessories.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver material in manufacturer's original packaging with all tags and labels intact and legible. Handle and store material in such a manner as to avoid damage.

PART II - MATERIALS

2.01 VINYL CLAD STEEL POSTS, RAILS AND BRACES

A. General

1. All fence pipe for posts, rails, and all braces and appurtenances shall be vinyl clad, schedule 40 round, seamless hot dip galvanized pipe conforming to ASTM-A-120-1, or approved equal.
2. All structural shapes shall be vinyl clad, and galvanized in conformance with ASTM Designation A123.
3. All vinyl clad materials shall be fusion bonded in accordance with ASTM-F668 Class 2B.

B. End, Corner and Pull Posts

1. Fence up to and including 5'-0" in height: 2.375" O.D. pipe, 3.65 lbs. per linear foot.
2. Fence over 5'-0" in height: 2.875" O.D. pipe, 5.79 lbs. per linear foot.
3. Fence over 10'-0" in height: 4.00" O.D. pipe, 9.11 lbs. per linear foot.
4. Maximum Spacing 10'-0" on Center.

C. Line Posts (10'-0" Maximum Spacing)

1. Fence up to 5'-0" in height: 1.90" O.D. pipe, 2.28 lbs. per linear foot.
2. Fence over 5'-0" in height: 2.375" O.D. pipe, 3.12 lbs. per linear foot.
3. Fence over 10'-0" in height: 2.875" O.D. pipe, 5.79 lbs per linear foot.

D. Gate Posts

1. Gate posts for single leaf gates six (6) feet or less in width: 2.875" O.D. pipe, 4.64 lbs. per foot min.
2. Gate posts for single leaf gates six (6) to twelve (12) feet in width: 4.00" O.D. pipe, 6.56 lbs. per foot.

E. Rails

1. All rails shall be 1.66" O.D. pipe weighing 2.27 lbs. per linear foot furnished in manufacturer's standard lengths of approximately 21'-0" with

outside sleeve type couplings, at least six (6) inches long for each joint – one (1) coupling in each five (5) to have expansion spring. Provide means for attaching rails securely to each corner, pull and end post. Rails shall form continuous brace from end to end of each run of fence.

F. Post Bracing Assembly

1. 1.66" O.D. pipe weighing 2.27 lbs. per linear foot (for horizontal braces). Provide at each side of corner and pull posts and at end posts for fence six (6) feet or higher.

2.02 CHAIN LINK FABRIC (VINYL CLAD)

- A. Chain Link fence fabric shall be factory coated 6 gauge core wire (or 9 gauge in certain circumstances as indicated on the details) with a min .02 inch thick coating of plasticized polyvinyl-chloride applied by the fusion method over a thermoset plastic bonding agent. The bond shall exhibit equal or greater strength than the cohesive strength of the vinyl. All cut ends shall be coated with vinyl at the factory. Fabric shall be 1.75" mesh at tennis court installations and 2" mesh at all locations and black in color throughout.
- B. Top and bottom of fabric shall have knuckled selvage, both sides.

2.03 FITTINGS AND ACCESSORIES (VINYL CLAD)

- A. All accessories shall be vinyl clad in accordance with paragraph 2.01 above, and galvanized in conformance with ASTM Designation A153.

B. Post Caps

Furnish and install tight fitting pressed steel or malleable iron caps, designed as a weather tight closure cap. Provide one (1) pass-through looped cap for each line post, and one (1) acorn style cap for each end or corner post. Where top rail is used, provide looped cap tops to permit passage of top rail.

C. Tension Bars

1. One (1) piece lengths equal to full height of fabric with minimum cross section of 3/16" x 3/4", conforming to ASTM Designation A123. Provide one (1) stretcher bar for each end post and two (2) for each corner and pull post.
2. Tension bands and brace bands, if utilized, shall be 7/8" x 12 gauge beveled, galvanized, sized to fit pipe sizes and furnished with galvanized

fasteners. Galvanizing shall conform with ASTM Designations A123 or A153 as they pertain.

D. Rail Clamps

1. Rail clamps shall be standard clamps (boulevard clamps) furnished complete with fasteners with ASTM Designation A153.

E. Fabric Bands for Tying Fabric

1. Fabric shall be attached using a BAND-IT band and buckle system
2. Bands shall be 0.020" thickness, 200/300 series stainless steel ½" wide bands, with a minimum breaking strength of 850 lbs., ½" band capacity ear-loct design buckles to be manufactured with 0.050" thick material, 201/301 series stainless steel.

- F. Fittings, lugs, clamps and other accessories shall be steel conforming to ASTM Designation F626 and galvanized in conformance with ASTM Designation A153.

2.04 ANCHORING CEMENT

- A. Cement for anchoring posts in sleeves embedded in concrete walls shall be "POR-ROK", as manufactured by Hallemite (Lehn and Fink Industrial Products, Division of Sterling Drugs, Inc.), Montage, New Jersey, or approved equal.
- B. "Sika Cola-Due" by the Sika Co.
- C. "Five Star Grout" the Five Star Co.

2.05 CEMENT CONCRETE

- A. Cement concrete for post footings shall conform to Section 03300 of these Specifications.

PART III - EXECUTION

3.01 POST INSTALLATION

- A. Install new vinyl coated chain link fence in the location(s) shown on the Contract Drawings, and as approved by the Landscape Architect.
- B. Excavation for post footings as herein before specified in Section 02300 of these Specifications, shall be in firm undisturbed or compacted soil. Post footing diameters vary according to post sizes required and are in accordance with attached details. Excavate hole depths six (6) inches lower than post bottom with bottom of posts set not less than thirty-six (36) inches below surface when in firm,

undisturbed soil. Where ledge is encountered, the Contractor shall notify the Landscape Architect to determine method of installation. Payment for any additional work required when installations are in ledge shall be in accordance with methods described in SPECIAL CONDITIONS of these Specifications.

- C. Place concrete around posts in a continuous pour, tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operation. Crown the top of the concrete footings to pitch water away from posts.
- D. Under bituminous pavements, tops of footings are to be finished smooth and are to pitch one (1) inch from the posts to the outside edge of the foundation.
- E. In mower strip locations, form top twelve (12) inches square and finish to match mower strip with 1/4" pitch away from posts.
 - 1. If applicable, top of fence footings at players' benches and cement concrete mower strips shall terminate six (6) inches below pavement finish grade.

3.02 FENCE ERECTION

A. Top and Bottom Rails

- 1. Top and bottom rails shall form a continuous brace from end to end of each fence run. In addition, all end and corner posts shall be braced to the nearest line post with center brace rails. Outside sleeve type top rail coupling shall be placed a maximum of twelve (12) inches from line posts.

B. Middle Rails

- 1. All chain link fencing ten (10) feet or more in height shall have a continuous middle rail.

C. Brace Assemblies

- 1. Furnish and install braces and appurtenances so posts are plumb when diagonal rod is under proper tension. All "tension" assemblies shall conform to ASTM 567 and the MASS DPW Standard Specifications Section M.8.09

D. Fabric

- 1. The fabric shall be installed on the "public" or "sports field" side of the fence.

2. All fabric shall be aligned so that the top row of the fabric mesh is tied to the top rail, and so that the bottom selvage of fabric mesh stands one (1) inches above the finish grade of the lawns, pavements or concrete wall grade and that the bottom row of the fabric mesh is tied to the bottom rail.
3. Fabric shall be properly stretched and securely fastened to the posts and rails, and between posts the top and bottom of the fabric shall be fastened to the horizontal braces as herein specified, and approved by the Landscape Architect. Fabric shall be stretched uniformly taut and as tight as possible, true to line and grade and complete in all details. Install tension bars at corners.
4. The fabric shall be fastened to end and corner posts with tension bars and stretcher bar bands spaced at one (1) foot intervals.

E. Stretcher Bars

1. Thread through fabric and secure to posts with approved metal bands spaced not over twelve (12) inches O.C.

F. Fabric Bands

1. Fabric Bands shall be placed at the intervals indicated on the details and securely fastened to all fence posts.
2. All bands shall be pulled tight and raw ends of steel bands shall be secured in buckle by folding ear tabs around steel bands as per manufacturer's recommended installation procedure. No sharp edges shall protrude from band-it buckles. Band will be PVC coated, color to match fabric and framework.

G. Fasteners

1. Install nuts for tension band and hardware bolts on side of fence opposite fabric side unless directed otherwise by the Landscape Architect.

3.03 GATE FRAMES (WHERE APPLICABLE)

- A. Gate frames shall be galvanized steel 1.90" O.D. standard weight pipe, 2.72 pounds per linear foot. Gates shall be fabricated using welded construction with all welds ground smooth and coated with 3.0 mil. thickness of cold galvanizing compound. Gates must be properly braced to eliminate any possible sagging condition. For gates over eight (8) feet in height, provide additional horizontal and vertical interior members to ensure proper strength.
- B. Fabric shall be installed with hookbolts and tension bars on all four (4) sides and attached to gate frame at twelve (12) inches on center.

- C. Hardware materials shall be hot dipped galvanized steel. All moveable parts (e.g., hinges, latch, keeper, and drop bar) shall be field coated with PVC touch-up paint, provided by the manufacturer.
- D. Hinges shall be of sufficient structural strength and design to support gate leaf and to permit easy and trouble free operation. Non-lift-off type hinge design shall permit the gate to swing 180 degrees inward or outward in accordance with the Contract Drawings
- E. All gates shall be equipped with a positive type latching device capable of retaining the gate in a closed position and have provision for padlock. Latches shall permit operation from either side of gate and must be approved by the Landscape Architect prior to the installation. Refer to details for latch device.
- F. Gate keepers shall be provided for each gate leaf over five (5) feet wide. Gate keeper shall consist of mechanical device for securing free end of gate when in full open position.
- G. Double gates: Provide drop rod to hold inactive leaf. Provide gate stop pipe to engage center drop rod. Provide locking device and padlock eyes as an integral part of the latch, requiring one padlock for locking both gate leaves.
- H. Gate Installation
 - 1. Check gate posts for vertical alignment and maintain in position during placement and finishing operations.
 - 2. Set keeper, stops, sleeves into concrete.
 - 3. Install gates plumb, level and secure for full opening without interference.
 - 4. Attach hardware by means which will prevent unauthorized removal.
 - 5. Adjust hardware for smooth operation.

3.03 FINISH PROTECTION

- A. During the fence installation, care shall be taken to avoid damaging the vinyl clad or galvanized surfaces of the fence components. All scratches and abrasions shall be thoroughly corrected in a manner satisfactory to the Landscape Architect before final acceptance.

END OF SECTION

SECTION 02910

SCREENED LOAM BORROW AND TOPSOIL RE-USED

PART I - GENERAL

1.01 SCOPE OF WORK

- A. Under this Section, the Contractor shall furnish all labor, materials, equipment and transportation required to furnish and place ½” Screened Loam Borrow as shown on the drawings and as specified. Where proposed tree and shrub planting mix and/or sod or seed is noted on the drawings, it shall be composed of Loam Borrow, or Topsoil Reused in compliance with this specification.
- B. Prospective bidders are advised that significant quantities of topsoil are present at the property and presumably available for reuse if compatible with the requirements of this specification. The Contractor shall take careful consideration as to not compact the topsoil.

1.02 SAMPLES/TESTS

- A. Test results of the on-site loam are provided at the Appendix of Section 02911 Root Zone Mix.
- B. Contractor shall be responsible for amending the topsoil to meet the specification. All amendments shall be submitted prior to start of construction; the Town reserves the right to test amended soils to ensure uniformity.
- C. To assure that materials fulfill specified requirements regarding textural analysis, organic matter content, pH, and fertility testing may be undertaken:
 - 1. Prior to site delivery; at source;
 - 2. At time of delivery; on-site; and/or
 - 3. Immediately following spreading on site. Soil sampling shall also indicate if specified soil was supplied uniformly to the minimum specified depth.

1.03 STANDARDS

- A. ASTM - American Society for Testing and Materials.

1.04 NOTIFICATION

- A. The Contractor shall notify the Owner in writing at least four (4) days in advance of the time he intends spread Screened Loam Borrow.

1.05 QAULITY CONTROL

- A. The Contractor or Sub-contractor must have a minimum of five (5) years of experience installing athletic fields of similar size and quality of this project.
- B. The Town and the Engineer will determine whether the contractor or sub-contractor is qualified for this work.

PART II - MATERIALS

2.01 LOAM BORROW

- A. In accordance with the specific requirements of this project, existing on-site soil may be re-used as Loam Borrow only if it meets this Specification. Existing topsoil that does not meet this Specification may be re-used only up to the subgrade elevation within the limits of areas to receive new Loam Borrow.
- B. Screened Loam shall be “fine sandy loam” or “sandy loam” determined by mechanical analysis (ASTM D-422) and based on the “USDA” Classification System”. Screened Loam has the following mechanical analysis:

<u>Textural Class</u>	<u>Percentage of Total Weight</u>	<u>Average Percentage</u>
Sand (0.05 – 2.0mm)	50 – 80	70
Silt (0.002 – 0.05mm)	15 – 25	20
Clay (Less than 0.002mm)	5 – 10	10

- C. Screened Loam shall be a natural product consisting primarily of natural topsoil, free from subsoil, and obtained from an area that has never been stripped. Screened Loam shall not contain less than five percent (5%) nor more than ten percent (8%) organic matter as determined by the loss on ignition of oven-dried samples, at 100°C ± 5°C. To adjust organic matter content, the soil may be amended on site by the addition of composted bio-solids. Use of organic amendments is accepted only if random soil sampling indicates a thorough incorporation of these materials. The Loam (or) Compost shall not be delivered when in a wet or frozen condition.
- D. Screened Loam shall consist of fertile, friable, natural loam capable of sustaining vigorous plant growth. Loam shall be without admixture of subsoil, and refuse, resulting in a homogeneous material free of stones greater than ½” in

the longest dimension, be free of lumps, plants, glass, roots, sticks, excessive stone content, debris, and extraneous matter as determined by the Engineer. Screened Loam shall be within the pH range of 6.0 to 6.5 except as where noted on plans and details. It shall be uncontaminated by salt water, foreign matter and substances harmful to plant growth. The maximum soluble salt index shall be 100. Screened Loam shall not have levels of aluminum greater than 200 parts per million.

- E. If limestone is required to amend the screened loam to bring it within a pH range of 6.0 to 6.5 no more than 200 pounds of limestone per 1,000 square feet of loam, incorporated into the soil, or 50 pounds of limestone per 1,000 square feet of loam, surface application, within a single season.
- F. The Engineer will reject any material delivered to the site that does not meet these Specifications after post-delivery testing. If the delivered screened loam does not meet the specifications stated in this document, the delivered screened loam will be removed by the Contractor at the Contractor's expense and at the time of rejection.
- G. The topsoil shall not be handled or moved when in a wet or frozen condition.
- H. Topsoil structure shall not be destroyed through excessive and unnecessary handling or compaction. Inappropriate handling leading to the compaction or deterioration of soil structure will result in rejection of topsoil for use.
- I. At no time should equipment or material rest on the soil.
- J. Under no circumstance shall any equipment exceeding 5 PSI ground pressure be allowed on the field, assuming there is no landfill.
- J. Loam Borrow shall be free of plants and their roots, glass, brick, construction debris and other extraneous matter. It shall be uncontaminated by salt water, foreign matter and substances harmful to plant growth. The electrical conductivity (EC2) of a 1:2 soil-water suspension shall be equal to, or less than, 1.0 millimhos/cm. (test material passing #4 sieve).

2.02 REUSE OF EXISTING TOPSOIL

- A. The reuse of topsoil that does not meet the specifications for use as loam borrow may not be permitted for use as a general fill material to subgrade elevations at the limits of lawn and planting areas.

2.02 PEAT OR ORGANIC MATERIAL

- a. Peat moss shall be of a standard brand free of sticks, stones, hay or any other deleterious matter and meet the following requirements:

<u>Parameter</u>	<u>Specification</u>
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Total Ash	15% or less
PH	6.5 to 7.5
% Moisture	30% to 50%

<u>Sieve Criteria</u>	
2.0 mm sieve	0-5% retained
1.0 mm sieve	Less than 20% retained

- b. Compost - Compost shall be derived from organic wastes including sawdust, clean ground wood, leaf and yard residues, and biosolids that meet all State Environmental Agency requirements. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth. Leaf litter compost will not be allowed.

Compost shall have the following properties:

<u>Parameters</u>	<u>Range</u>
Total Ash	15% or less
PH	6.5 – 7.5
Moisture content	35% - 55%
Soluble Salts	< 4.0 mmhos (dS)
C:N ratio	15 - 30:1
Particle Size	< 1/2"
Organic Matter Content	> 40%
Bulk Density	< 1000 lbs./cubic yard
Foreign Matter	< 1% (dry weight)

Compost generator shall also provide minimum available nitrogen and other macro and micro nutrients to determine fertilizer requirements. Generator shall supply documentation showing state approval for intended use.

- B. Care shall be taken not to overwork the soil, causing it to break down, utilizing only agricultural equipment such as plows, discs, or harrows and portable quarry sieves, screens, or blenders.

PART III - EXECUTION

3.01 PLACEMENT

- A. The Contractor shall furnish and spread Loam Borrow to the depths shown on the contract drawings, which depth shall be the minimum required depth after settlement. No compaction shall be required beyond that extent necessary to place seed or to plant trees and shrubs to ensure against unevenness or settling below accepted growth lines.

3.02 ADDITIVES

- A. The Contractor shall apply all necessary fertilizer and lime to the soil in accordance with the manufacturer and laboratory's recommendations and as required by the sodding, seeding and/or planting specifications referenced elsewhere.

END OF SECTION

SECTION 02911

ROOT ZONE MIX PREPARATION & BLECAVATION

PART I - GENERAL

1.01 SCOPE OF WORK

- A. Under this Section, the Contractor shall furnish all labor, materials, equipment (including low ground pressure, LGP, equipment) and transportation required to furnish and place, or prepare Root Zone Mix for the field and to perform 'blecavation' operations. Refer to Appendix A for acceptable equipment.
- B. Prospective bidders are advised that significant quantities of topsoil are present at the property and presumably available for reuse if compatible with the requirements of this specification. The Contractor shall be responsible for amending topsoil, as required to comply with this specification and SECTION 02910 SCREENED LOAM BORROW AND TOPSOIL RE-USED.
- C. This work shall consist of preparing a root zone mixture consisting of screened native on site loam, sand and compost and performing blecavation as described in item 'd' below. The root zone mix will be evaluated by using the ASTM test methods for High Performance Sand-based Root Zones for Sports Fields, ASTM F 2396-04 as shown in Appendix A. A sand sample and compost sample shall be submitted to a testing agent for adherence to specifications prior to blending operations. Through the blecavation process that uses the blecavator machine set to varying height controls, the compost and sand can also be blended with top soil on-site to a desired depth of 8" at the construction site.
- D. The contractor shall perform blecavation operations within the areas delineated on the plans. The contractor shall prepare the soil using the blecavator, which is a heavy duty contra-rotating rotor with blades that dig into the ground throwing soil, debris, and rocks against a sorting screen mounted behind the rotor for separating rocks and debris. The fine soil is deposited over the top and leveled off. The rear packer roll on the blecavator firms up the finished areas ready for seeding. Within the area delineated on plans, the contractor shall be directed by the owner or Engineer, to perform blecavation for 8" depths of spread topsoil, in order to achieve a homogeneous blend of top soil composition over the entire field within the limits of the full depth renovation areas.
- E. The contractor shall have the option, at their discretion, to remove all existing loam from the field or stockpile and either mix on site or bring in Root Zone Mix that adheres to this specification.
- F. No heavy duty equipment and vehicular traffic shall be allowed on the prepared

areas.

1.02 SAMPLES/TESTS

- A. The Contractor shall furnish an outline of their approach to the project no less than ten (5) days prior to the start of construction.
- B. The Contractor shall furnish a Certified Laboratory Report showing the soils classification and nutrient analysis of representative samples of the Loam, sand and compost that is proposed to be used, including the extent of lime and fertilizer required. Samples submitted for approval must be representative of the total volume to be furnished, taken in the presence of the Engineer, and delivered to a certified laboratory by the Contractor; all costs for such shall be borne by the Contractor.
- C. If the material does not conform to the above requirements it shall be rejected and additional sources shall be found. Sampling and testing shall be accomplished as specified herein until an approved material is found, all at the Contractor's expense.
- D. To assure that materials fulfill specified requirements regarding textural analysis, organic matter content, pH, and fertility, depending on the approach, testing may be undertaken:
 - 1. Prior to site delivery; at source;
 - 2. At time of delivery; on-site
- E. For quality control, immediately following spreading on site, soil may be tested at the owner's discretion. Soil sampling shall also indicate if specified soil was supplied uniformly to the minimum specified depth.

1.03 RELATED WORK:

- A. Section 02910, SCREENED LOAM BORROW AND TOPSOIL RE-USED
- B. Section 02290 SEEDING
- C. Section 02810, IRRIGATION

1.04 STANDARDS

- A. ASTM - American Society for Testing and Materials.

1.05 NOTIFICATION

- A. The Contractor shall notify the Owner in writing at least ten (10) days in advance of the time he intends furnishing Root Zone Mix or amendments stating the location and amount of such deposit, the name and address of the supplier and also shall furnish such facilities, transportation and assistance as the Owner may require for collecting and forwarding samples.

1.06 QUALITY CONTROL

- A. Root zone mix: A one gallon sample for every 2,000 cubic yards of root zone mix shall be tested by the Owner's Testing Agent for approval. All costs shall be borne by the Contractor.
- B. Following installation of irrigation system and prior to seeding, contractor shall notify the Engineer or owner and provide the owner with compaction tests along the center line of the field as well as along the side lines to ensure that the root zone mix has not been heavily compacted. Compaction test shall fall within the industry standards for fields and any areas of the field that exceed these standards shall be corrected at the contractor's expense prior to seeding.
- C. The Contractor or Sub-contractor must have a minimum of five (5) years of experience installing root zone mix based athletic fields of similar size and quality of this project.

PART II - MATERIALS

2.01 LOAM BORROW

- A. Refer to Section 02910, SCREENED LOAM BORROW & TOPSOIL RE-USED.

2.02 SAND

- A. Sand for Root Zone Mix shall conform to ASTM standard F 2396-04 Sand for High Performance Sand-based root zones for Sports Fields or 2mm USGA specification sand for golf course fairway top dressing.

1. The following definitions shall apply to the work of this Section.

2. The following size distributions of mineral particles by diameter and sieve size shall apply to the following conventional names of soil types:

<u>Conventional Name</u>	<u>Retained on U.S. Sieve No.</u>	<u>Diameter (mm)</u>
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Very coarse sand	#18	1 - 2
Coarse sand	#35	0.5 - 1
Medium sand	#60	0.25 - 0.5
Fine sand	#140	0.10 - 0.25
Very fine sand	#270	0.05 - 0.10
Silt	by hydrometer	0.002 - 0.05
Clay	by hydrometer	Less than 0.002

2.03 PEAT OR ORGANIC MATERIAL

- A. Peat moss shall be of a standard brand free of sticks, stones, hay or any other deleterious Matt and meet the following requirements:

<u>Parameter</u>	<u>Specification</u>
Total Ash	15% or less
PH	6.5 to 7.5
% Moisture	30% to 50%
 <u>Sieve Criteria</u>	
2.0 mm sieve	0-5% retained
1.0 mm sieve	Less than 20% retained

- B. Compost - Compost shall be derived from organic wastes including sawdust, clean ground wood and biosolids that meet all State Environmental Agency requirements. The product shall be well composted, free of viable weed seeds and contain material of a generally humus nature capable of sustaining growth of vegetation, with no materials toxic to plant growth. Leaf compost shall not be accepted.

Compost shall have the following properties:

<u>Parameters</u>	<u>Range</u>
pH	6.5 – 7.5
Moisture content	35% - 55%
Soluble Salts	< 4.0 mmhos (dS)
C:N ratio	15 - 30:1
Particle Size	< 1/2"
Organic Matter Content	> 40%
Bulk Density	< 1000 lbs./cubic yard
Foreign Matter	< 1% (dry weight)
Total Ash	15% or less

Compost generator shall also provide minimum available nitrogen and other macro and micro nutrients to determine fertilizer requirements. Generator shall supply documentation showing state approval for intended use.

- C. Fertilizer - Renovate Plus, 3-3-3. Refer to Appendix A.

2.04 ROOT ZONE MIX

- A. Mixing Materials: Mixing of the sand, peat and soil mixture for the root zone mix must be blended by an experienced blending operator.
- B. Physical performance Evaluation of the root zone mix will be in accordance with the guidelines set forth in ASTM standard F 2396-04.

PART III EXECUTION

3.01 ROOT ZONE MIX RATIOS

- A. Upon approval of the processed loam, sand and compost components, the owners testing agents shall blend the components to determine the correct ratio of sand and compost to create the root zone mix. This ratio of sand and compost will be based on laboratory testing and performance guidelines established by these specifications.

Based on previous testing and for bidding purposes, the field root zone mix ratio will contain approximately 80% sand, 20% Native Screened Loam.

- B. The root zone mix developed by the owners testing agent will establish the required mix ratio and specifications for approval or rejections of all quality control submittals during construction.

Performance Testing: ASTM testing procedures for sand based athletic fields shall be used for performance testing.

3.02 PLACEMENT

Root zone Mix Established by the Blecavation method:

- A. After re-spreading the screened loam from stockpile, the Contractor shall furnish and spread the required depth ASTM spec sand distributed by a top-dresser for uniformity.
- B. All sport turf areas are to be tilled to a depth of 8” with a blecavator, conventional tilling is unacceptable. This depth includes the ASTM spec sand as indicated above.
- C. Fine grading shall be accomplished with a fully automated dual plain LGP laser grader.
- D. Under no circumstances will loaded rubber tired vehicles in excess of 1 ton be allowed on the gravel base or root zone mix prior to, during or after the spreading of the root zone mix.

- E. Finish grades shall be verified by the Contractor using laser operation survey instruments with a tolerance of +/- ¼ inch.

New or Blended Root zone Mix:

- F. The Contractor shall furnish and spread Root Zone Mix to the depths shown on the contract drawings, which depth shall be the minimum required depth after settlement. No compaction shall be required beyond that extent necessary to place sod or for the establishment of seed.
- G. Root Zone Mix shall be spread in such a manner as to establish a loose, friable seedbed.
- H. Under no circumstances will loaded rubber tired vehicles in excess of 1 ton be allowed on the gravel base prior to or during the spreading of the root zone mix.
- I. Finish grades shall be verified by the Contractor using laser operation survey instruments with a tolerance of +/- ¼ inch.

3.03 SUBGRADE

- A. After the areas to receive loam borrow have been brought to subgrade, and immediately prior to placing and spreading such material, the subgrade shall be loosened by discing to a depth of at least three inches to permit bonding of the finished material to the subgrade material. Upon completion of loosening/discing the subgrade the contractor shall remove and dispose of all stones/boulders encountered greater than 2 ½” in size from the subgrade prior to spreading the loam borrow. Then place and spread the loam borrow to the depths required by the Drawings to establish finish grades. Refer to Loam Borrow Specifications.
- B. All backfill to subgrade, shall be compacted to not less than eighty-five percent (85%) and not more than ninety percent (90%) of the maximum dry density of the material as determined by the Standard AASHTO Test Designation T-180-86, Modified Proctor Test.
- C. Low Ground Pressure (LGP) Equipment must be used for final grading of subgrade in order to minimize the compaction on the backfill and subgrade.
- D. Confirm that the subgrade is at the proper elevation and that no further earthwork is required to bring the subgrade to proper elevations. Subgrade elevations shall slope parallel to the finished grade and or toward any subsurface drain lines as shown on the Contract Documents. Provide an As-Built survey to the Owner that the subgrade has been placed to the required elevations. The As-Built survey shall consist of a minimum 300 spot elevations evenly spaces across the entire baseball field area. Perform no work of placing and spreading loam borrow until elevations have been confirmed and the As-Built survey has been accepted by the

Owner/Engineer.

3.04 ADDITIVES

- A. The Contractor shall apply all necessary fertilizer and lime to the soil in accordance with the manufacturer's and laboratory's recommendations and as required by the sodding, seeding specifications referenced elsewhere.

END OF SECTION

**City of Arlington/Robbins Farm Park
Rootzone Physical - Particle Shape/Size Parameters - pH/Cu (Initial Testing)**

Testing Lab	American Society for Testing and Materials	Turf Diagnostic
Submitted By	Weston & Sampson	Tom Irwin Advisors/NESS
Date Received	N/A	April 7th
Report Date	N/A	April 18th
Lab ID #	N/A	42518-1B
Sample Description	High Performance Sand - Based Root Zone For Sports Fields	80% Sand 20% Native Soil
Sample Origin	ASTM F2396 Specification	Native Soil Mix (Sand was supplied)
Test Report Submittal Purpose	Athletic Field Rootzone Design	Athletic Field Rootzone Design
Test Report Submittal Date	N/A	April 1st
Test Report Date Approved	N/A	N/A
Bulk Sample Delivered	N/A	1 Gallon of each component
Bulk Sample Installed	N/A	1 Gallon Mixed
USDA Soil Classification	Sand	Sand
Particle Density (g/cc)	Unspecified	Unspecified
Bulk Density (g/cc)	1.5 - 1.7%	1.67
% Water Holding	Unspecified	N/A
% Total Porosity	35 - 45%	Not Reported
% Capillary (water)	15 - 25%	Not Reported
% Non Capillary (air)	15 - 25%	Not Reported
pH (Ca Cl ₂ solution)	5.0 - 7.5	6.40
Cu (Coefficient of Uniformity)	2.5 - 4.5	6.90
Particle Shape (Sphericity)	Avoid Extremely High/Low	Not Reported
Particle Shape (Angularity)	Avoid Extremely Angular/Round	Not Reported
Infiltration Rate (In/Hr)	≥ 10	3.3"
USDA Soil Classification	Sand	Sand
% Sand .05 - 2.0 mm	N/A	N/A
% Silt .002 - .05 mm	< 5%	6.1
% Clay < 0.002 mm	< 3%	2.3
% Organic Matter	0.5 - 2.5%	1.07
#4 Gravel 3.4 - 4.75 mm	< 5%	0
#5 Fine Gravel 2.0 - 3.4 mm	< 20%	0.2
#10 Very Coarse Sand 1.0 - 2.0 mm	< 20%	0.2
#18 Coarse Sand 0.5 - 1.0 mm	< 20%	9.4
#35 Coarse 0.5 mm	25 - 50%	33.8
#60 Medium 0.25 - 0.5 mm	> 25%	33.3
#80 Fine 0.18 - 0.25 mm	< 10%	Not Reported
#100 Fine 0.15 - 0.18 mm	< 10%	Not Reported
#140 Very Fine 0.10 - 0.18 mm	< 5%	12.2
#270 Very Fine 0.05 - 0.10 mm	< 5%	2
	≤ 30% #5 + #10 + #18	9.8
	≥ 60% #35 + #60	67.1
	< 10% #80 + #100	Not Reported
	< 5% #140 + #270	14.2
	< 15% #100 + #140 + #270 + Silt and Clay	Not Reported
	< 2 to 1/Silt to Clay Ratio	3 to 1
	< 3 to 1/Silt + #80 + #100 + #140 + #270 to Clay Ratio	Not Reported
Material Approved		Not Approved

SECTION 03100

CONCRETE FORMWORK

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section of the specifications covers the furnishing and installation of forms for cast-in-place concrete.

1.02 RELATED WORK:

A. Section 03200, CONCRETE REINFORCEMENT

B. Section 03300, CAST-IN-PLACE CONCRETE

1.03 REFERENCES:

The following standards form a part of this specification:

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 301 Standard Specifications for Structural Concrete

ACI 347 Recommended Practices for Concrete Formwork

U.S. ARMY CORPS OF ENGINEERS (CE)

CE 03300 Cast-in-Place Concrete

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Forms for exterior and interior surfaces which will be exposed to view after the work is completed, whether such surfaces are painted or unpainted, shall be new plywood stock, steel, tempered masonite, or other materials which will provide smooth concrete surfaces without subsequent surface plastering. Plastic or plastic-faced forms shall not be used, except with the prior approval of the Engineer.

B. Form Ties

1. Provide factory-fabricated, adjustable length, removable or snap off metal form ties, designed to prevent form deflection and to prevent spalling of concrete surfaces upon removal.

2. Provide ties so that the portion remaining within concrete after removal of exterior parts is at least 1-1/2 inches from the outer concrete surface. Provide form ties, which will not leave a hole larger than one inch diameter in the concrete surface.
- C. Form release agent shall be a non-staining, non-yellowing, non-toxic liquid free from kerosene and resins of the type recommended by the manufacturer of the forming system being used such as EZ strip by L&M Construction Chemicals, Omaha, NB and "Magic Kote" by Symons Corp., Des Plaines, IL or approved equal.
- D. Where steel adjacent to vertical faces of forms cannot be otherwise secured, mortar doughnuts shall be used to prevent steel from lying too close to the finish vertical faces of the concrete.

PART 3 - EXECUTION

3.01 PREPARATION:

Surfaces of forms to be in contact with concrete shall be greased with non-staining form release compound. Wetting will not be accepted as a substitute. Approval of the Engineer shall be obtained before use of coated materials or liners in lieu of form release compound, except as modified herein.

3.02 CONSTRUCTION:

- A. For concrete surfaces which will be visible after completion of the structure, painted or unpainted, the type and the precise location of form ties, nails joints between form members, and any other features which will leave a visible trace in the finished concrete, will be subject to the approval of the Engineer.
- B. Formwork shall be so constructed, braced, or tied that the formed surfaces of the concrete will be perfectly true, smooth, and to the dimensions shown on the drawings. All forms used for circular sections shall be true arcs as indicated on the drawings. Short chords will not be acceptable. Form line shall present an uninterrupted surface conforming to radii indicated on the drawings.
- C. Forms shall be sufficiently tight to prevent leakage of mortar, and when necessary shall have temporary openings as required for thorough cleaning, and as required for introduction of concrete to avoid excessive free fall. Panels damaged in stripping or otherwise shall not be reused.
- D. Unless otherwise noted on the design drawings, forms shall be filleted and chamfered at all sharp corners, and exposed edges with a 3/4-inch chamfer. Chamfer shall not be used where masonry or other material will subsequently be installed flush with one of the adjacent surfaces of the concrete. Where a wash or slope is indicated on the drawings no additional chamfer is required.

3.03 REMOVAL OF FORMS

A. REMOVING FORMS AND SUPPORTS:

1. Removal of forms shall take place in accordance with ACI 347, Section 3.6. Except as otherwise specifically authorized by the Engineer, forms shall not be removed until the concrete has aged for the following number of day-degrees or attained 50 percent strength. (Day-degrees equals the total of number of days times the average daily air temperature at the surface of concrete. For example, 5 days at a daily average temperature of 60°F. equals 300 day-degrees.)

<u>Location</u>	<u>Day-Degrees</u>
Beams and Slabs	500
Walls and Vertical Surfaces	200

- B. Where columns, footings and similar vertical forms are adequately supported on shores, the side forms may be removed after 24 hours of cumulative curing time provided the side forms support no loads other than the lateral pressure of the plastic concrete. Cumulative curing time represents the sum of time intervals, not necessarily consecutive, during which the temperature of the air surrounding the concrete is above 50 deg. F in accordance with American Concrete Institute standards.
- C. Shoring shall not be removed until the concrete has attained at least 70 percent of the specified strength and sufficient strength to support safely its own weight and the construction live loads upon it.
- D. Forms shall be removed in such a manner as not to impair safety and serviceability of the structure. Concrete exposed by form removal shall have sufficient strength not to be damaged by the removal operation.

END OF SECTION 03100

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section of the specification covers the furnishing and installation of reinforcement for cast-in-place concrete.

1.02 RELATED WORK:

- A. Section 03100, CONCRETE FORMWORK
- B. Section 03300, CAST-IN-PLACE CONCRETE

1.03 SYSTEM DESCRIPTION:

Materials and construction shall conform to ACI 318 and ACI 350 unless otherwise noted on the design drawings or modified herein.

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. The Contractor shall furnish the Owner's Representative with complete checked, reinforcing steel shop drawings and bar lists. Shop drawing shall include grade of steel used as well as splice lengths.
- B. Mill test reports shall accompany drawings. Fabrication shall not commence until the drawings and mill test reports have been released by the Engineer.

1.05 REFERENCES:

- A. The following standards form a part of these specifications:

American Concrete Institute (ACI)

ACI 318	Building Code Requirements for Structural Concrete
ACI 347	Recommended Practice for Concrete Formwork
ACI 350	Code Requirements for Environmental Engineering Concrete Structures
ACI SP-66	ACI Detailing Manual

American Society for Testing and Materials (ASTM)

ASTM	A185	Standard Specification for Welded Steel Wire Fabric for Concrete Reinforcement
ASTM	A497	Specification for Welded Deformed Steel Wire Fabric for Concrete Reinforcement
ASTM	A615	Deformed Billet-Steel Bars for Concrete Reinforcement
ASTM	A775	Epoxy-coated Reinforcing Steel Bars
ASTM	A884	Epoxy-coated Welded Wire Fabric
<u>American Welding Society (AWS)</u>		
AWS	12.1	Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Steel reinforcing bars shall conform to ASTM A615, Grade 60, and A775 if epoxy-coated bars are specified.
- B. Welded steel wire fabric shall conform to ASTM A185 or ASTM A497 and ASTM A884 if epoxy-coated fabric is specified. Gauge and spacing of wires shall be as indicated on the drawings.
- C. Reinforcing steel shall be detailed in accordance with ACI SP-66 modified as applicable to conform to ACI 350.
- D. Reinforcement shall be accurately formed to the dimensions indicated on the drawings. Bars shall be shipped to the site with bars of the same size and shape, fastened in bundles with securely wired-on metal identification tags listing both size and mark.
- E. Any bar showing cracks after bending shall be discarded.
- F. Steel failing to meet the requirements of this specification or the drawings will be rejected and shall be removed from the site immediately.

PART 3 - EXECUTION

3.01 STEEL INSTALLATION:

- A. Before being placed in position, reinforcement shall be thoroughly cleaned of loose mill and rust scale, dirt, and other coatings (including ice), that reduce or destroy bond. When there is a delay in depositing concrete after reinforcement is in place, bars shall be reinspected and cleaned as necessary.
- B. After forms have been oiled, but before concrete is placed, all steel shall be securely wired in the exact position called for, and shall be maintained in that position until all concrete is placed and compacted. Chair bars and supports shall be provided in a number and arrangement satisfactory to the Engineer.
- C. Concrete blocks having a minimum bearing area of 2-inches by 2-inches and equal in quality to that specified for the slab, shall be used for supporting reinforcing bars for slabs on grade. Wood blocks, stones, brick chips, etc., shall not be used to support reinforcement.
- D. Metal supports shall be of types that will not penetrate the surface of formwork or slab and which will not show through or stain surfaces that are to be exposed to view, painted or unpainted.
- E. Welding of reinforcing bars will be permitted only where permission of the Engineer has been obtained in advance. Such welding shall be performed only under conditions established by the Engineer, and in accordance with AWS 12.1.
- F. Reinforcement, which is to be exposed for a considerable length of time after having been placed, shall be painted with a heavy coat of cement grout, if required by the Engineer.

END OF SECTION 03200

SECTION 03300

CAST-IN-PLACE CONCRETE FOR PAVEMENT

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers all concrete and all related items necessary to place and finish the concrete work.

1.02 RELATED WORK:

- A. Section 02300, EARTHWORK
- B. Section 03100, CONCRETE FORMWORK
- C. Section 03200, CONCRETE REINFORCEMENT

1.03 REFERENCES:

- A. The following standards form a part of these specifications:

American Concrete Institute (ACI)

- ACI 301 Structural Concrete for Buildings
- ACI 302 Recommended Practice for Concrete Floor and Slab Construction
- ACI 304 Recommended Practice for Measuring, Mixing, Transporting, and Replacing Concrete
- ACI 305 Recommended Practice for Hot Weather Concreting
- ACI 306 Recommended Practice for Cold Weather Concreting
- ACI 318 Building Code Requirements for Reinforced Concrete
- ACI 347 Recommended Practice for Concrete Formwork

American Society for Testing and Materials (ASTM)

- ASTM C33 Concrete Aggregates
- ASTM C39 Compressive Strength of Cylindrical Concrete Specimens
- ASTM C42 Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

ASTM	C87	Effect of Organic Impurities in Fine Aggregate on Strength of Mortar
ASTM	C94	Ready-Mixed Concrete
ASTM	C143	Standard Method for Slumps of Portland Cement Concrete
ASTM	C150	Portland Cement
ASTM	C171	Sheet Materials for Curing Concrete
ASTM	C231	Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM	C260	Air-Entraining Admixtures for Concrete
ASTM	C309	Liquid Membrane-Forming Compounds for Curing Concrete
ASTM	C494	Chemical Admixtures for Concrete
ASTM	D1751	Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
ASTM	D1752	Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. Six sets of shop drawings of the materials specified herein shall be submitted to the Engineer for review.
- B. Six copies of the statement of materials constituting the design of mixes which satisfy the specified strength for each size aggregate as required by ASTM C94 shall be submitted to the Engineer within one week following award of the contract.
- C. Provide one copy of the "Certificate of Delivery" for each load of concrete as it arrives on the site, under the provisions of ASTM C94.

PART 2 - PRODUCTS

2.01 CONCRETE:

- A. Concrete conforming to the requirements listed below shall be used where indicated on the drawings. Unless otherwise indicated, concrete used as fill under foundations, and elsewhere approved by the Engineer, shall be the 4,000 psi mix.

TABLE

Minimum Comp. Strength at 28 days (psi)	Maximum Water/Cement ratio (gallons per bag of cement)*	Cement Factor: 94 lb. Bags per cubic yard minimum**
3000	0.59 (6.9)	5.5
4000	0.48 (5.6)	6.5
5000	0.40 (4.7)	7.4

* Based on air-entrained concrete. If non-air-entrained concrete is called for, the listed maximum water/cement ratios may be increased slightly, as approved by the Engineer. The water is the total water in the mix, including free water on the aggregate.

** These are minimum amounts; increase as necessary to meet mix requirements.

- B. Concrete shall conform to ASTM C94. One copy of the Certificate of Delivery required by ASTM C94 shall be delivered to the Engineer immediately upon arrival of each load of concrete at the site. The Contractor shall be responsible for the design of the concrete mixtures.
- C. Standard compression tests of all proposed mixes shall be made by the testing laboratory or other satisfactory evidence shall be presented that the design mixes will attain the minimum strengths listed on the design drawings or called for herein, within the limitations of the ACI Code. No concrete shall be delivered to the job site until the Engineer has approved the design mixes.
- D. All concrete (unless otherwise directed) shall contain an air-entraining agent. Air entrained concrete shall have an air content by volume of 3 to 6 percent for 1-1/2-inch aggregate and 4 to 8 percent for 3/4-inch aggregate. The air content shall be the responsibility of the testing laboratory and in accordance with ASTM C231.
- E. All concrete shall contain a mid-range water reducer to minimize cement and water content of the mix, at the specified slump, in accordance with ASTM C494.
- F. Slump for all concrete shall be from 3-inch to 4-inch, except for concrete using a superplasticizer, when the maximum slump shall be 8 inches. Any concrete having a slump greater than 4 inches (8 inches with superplasticizer) shall be promptly removed from the site.
- G. No calcium chloride or admixtures containing calcium chloride shall be added to the concrete. No admixture other than those specified shall be used in concrete without the specific written permission of the Engineer in each case.
- H. No additional water, except for the amount indicated by the design mix shall be added to the concrete without the prior permission of the Engineer.

2.02 CEMENT:

A. The cement shall be an approved brand of American manufactured Portland Cement, Type II conforming to ASTM C150. The brand name and type of cement proposed for use shall be submitted to the Engineer for approval immediately following award of Contract. Compound shall be placed at a rate of 200 square feet per gallon, in two applications perpendicular to each other.

3. Curing procedure shall be continued for at least 7 days.

A. Moisture loss from surface placed against metal or wood forms shall be minimized by keeping forms wet until removal.

B. Curing shall be continued for at least 7 days. When forms are removed during the curing period, surfaces shall be cured by spraying or by the use of a curing compound as previously specified.

C. Surfaces shall be protected from traffic or damage until surfaces have hardened sufficiently. If necessary, 1/2-inch thick plywood sheets shall be used to protect the exposed surface.

2.03 BRACING AND SUPPORTS:

A. All concrete members shall be adequately and safely supported and braced until the permanent supports and braces are installed.

B. Backfilling against exterior walls shall not be done until supporting slabs are in place and have attained 70 percent of design strength, otherwise walls shall be braced against earth lateral pressure, using a system approved by the Engineer.

C. Backfilling against retaining walls shall not commence until the wall concrete has reached its 28 day strength.

2.04 REMOVING FORMS AND SUPPORTS:

A. Removal of forms shall take place in accordance with ACI 347, Section 3.6. Except as otherwise specifically authorized by the Engineer, forms shall not be removed until the concrete has aged for the following number of day-degrees or attained 50 percent strength. (Day-degrees equals the total of number of days times the average contract. Only one color of cement, all of the same manufacture, shall be used for the work.

B. When the use of high-early-strength Portland cement (Type III) is permitted by the Engineer the same strength requirements shall apply, but the indicated strengths shall be attained in 7 days instead of 28 days.

2.05 ADMIXTURES:

A. Air entraining agent shall be in accordance with ASTM C260.

- B. Water reducing agent shall be a mid-range water reducer meeting ASTM C494, Type A.
- C. Water reducing agent-retarder shall be in accordance with ASTM C494, Type D.
- D. Superplasticizer agent shall be in accordance with ASTM C494, Type F or Type G and contain no more than 0.1% chloride ions. Product may be plant added or field added based on the best application considering distance, temperature and time.

2.06 AGGREGATES:

- A. Except as otherwise noted, aggregate shall conform to the requirements of ASTM C33.
- B. Fine aggregate shall consist of washed inert natural sand conforming to the requirements of ASTM C33.
- C. Coarse aggregate shall consist of well-graded crushed stone or washed gravel conforming to the requirements of ASTM C33.
- D. The following designated sizes of aggregate shall be the maximum employed in concrete.

2-inch for mass concrete

1½-inch for reinforced sections 18-inch and over in thickness

¾-inch for reinforced and un-reinforced sections less than 18-inch thickness.

2.07 WATER:

- A. Water for concrete shall be potable, free from injurious amounts of oil, acid, alkali, organic matter and other deleterious substances.

2.08 NON-METALLIC SHRINKAGE RESISTANT GROUT

- A. Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time. The minimum ultimate compressive strength of the grout shall be 5000 psi at 7 days and 7500 psi at 28 days.

2.09 CURING MATERIALS:

- A. Curing compound shall be a curing/hardener compound such as Acurion by AntiHydro, Sikaguard Cure/Hard by Sika, Super Diamond Clear by Euclid or approved equal.
- B. Curing paper shall be a fiber-reinforced laminated Kraft bituminous product conforming to the requirements of ASTM C171.

2.10 JOINT FILLER:

- A. Preformed joint filler strip shall conform to ASTM D1751 or D1752, having a thickness as indicated on the drawings.
- B. Fillers shall be provided in pieces of the full thickness required. Use of multiple layers of thin pieces to make-up the full thickness will not be permitted.

2.11 JOINT SEALANT:

- A. Joint sealant for construction and control joints shall conform to SECTION 02760 of these specifications.

PART 3 - EXECUTION

3.01 GENERAL:

- A. Under no circumstances shall concrete that has set or partially set before placing be used; and no re-tampering of concrete or grout will be permitted.

3.02 PREPARATION:

- A. Before placing concrete, forms and the space to be occupied by the concrete shall be thoroughly cleaned, and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint or other material which would tend to reduce the bond.
- B. Unless otherwise indicated, a moisture barrier shall be used under all slabs placed on the ground. The moisture barrier shall be fungi-resistant and shall have a vapor permeance rating not exceeding 0.5 perm. The moisture barrier shall be asphalt-saturated waterproof reinforced Kraft paper, clear polyethylene sheeting 0.006-inch thick, polyethylene coated asphalt-saturated reinforced Kraft paper, two layers of 30-pound asphalt-saturated felt solidly mopped with hot bitumen, or other similar material meeting the requirements for fungi-resistance and vapor permeance. Sheets shall be lapped 6-inches at joints and sealed with 2-inch wide tape.
- C. When no moisture barrier is used, the earth, concrete, masonry, or other water-permeable material against which concrete is to be placed shall be thoroughly saturated with water immediately before concrete is placed. No concrete shall be placed until the consolidation of the ground and the arrangement and details of forms and reinforcing have been inspected and approved by the Engineer.
- D. When joining fresh concrete to concrete which has attained full set, the latter shall be cleaned by chipping and washing off all dirt and scum and laitance. It then shall be moistened prior to placing new concrete.
- E. Concrete surfaces that act as a seat for structural members (other than those

resting on grout) shall be troweled to an extremely flat and level surface. If necessary, such surfaces shall be ground off to achieve the required flatness and level.

- F. Fill concrete on top of concrete shall be placed in the locations indicated on the drawings or designated by the Engineer. Before fill concrete is placed, the following procedures shall be used to prepare surfaces; all dirt, scum and laitance shall be removed by chipping and washing. The clean, roughened base surface shall be saturated with water, but shall have no free water on the surface. A coat of 1:2 cement-sand grout, approximately 1/8-inch thick, shall be well scrubbed into the thoroughly dampened concrete base. The concrete fill shall be placed immediately, before grout has dried or set. Fill concrete shall be brought to the lines and grades shown on the drawings or approved by the Engineer.
- G. Concrete for thrust and anchor blocks shall be placed against undisturbed earth and wooden side forms shall be used to provide satisfactory lines and dimensions. Felt roofing paper shall be placed to protect joints. No concrete shall be placed so as to cover joints, bolts or nuts, or to interfere with the removal of the joints. Minimum bearing areas and dimensions shall be as shown on the drawings.

3.03 MIXING:

- A. Concrete shall be ready-mixed, or transit-mixed, as produced by equipment acceptable to the Engineer. No hand-mixing will be permitted. Adding water in controlled amounts during the mixing cycle shall be done only with the express approval of, and under the direction of, the Engineer.
- B. Ready-mix or transit-mixed concrete shall be transported to the site in watertight agitator or mixer trucks loaded not in excess of rated capacities for the respective conditions as stated on the nameplate. Discharge at the site shall be within 1-1/2 hours after cement was first introduced into the mix. Central mixed concrete shall be plant-mixed a minimum of 1-1/2 minutes per batch and then shall be truck-mixed or agitated a minimum of 8 minutes. Agitation shall begin immediately after the pre-mixed concrete is placed in the truck and shall continue without interruption until discharge. Transit-mixed concrete shall be mixed at mixing speed for at least 10 minutes immediately after charging the truck, followed by agitation without interruption until discharged.
- C. All central plant and rolling stock equipment and methods shall conform to the latest Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers' Bureau of the National Ready-Mixed Concrete Association, as well as ACI 304 and ASTM C94.
- D. Attention is called to the importance of dispatching trucks from the batching plant so that they shall arrive at the site of the work just before the concrete is required, thus avoiding excessive mixing of concrete while waiting or delays in placing successive layers of concrete in the forms.

3.04 INSTALLATION/APPLICATION/ERECTION:

A. PLACING:

1. No concrete shall be placed by pumping methods without the prior written approval of the Engineer. Should the Contractor be allowed to place concrete by pumping methods, procedures, mix design of concrete, and all other precautions shall be in accordance with ACI 304.2R and as approved by the Engineer.
2. Concrete shall be placed in alternate areas, as defined by the construction and control joints indicated on the design drawings. A minimum of 3 days shall elapse between placement of adjacent sections.
3. Segregation of the concrete shall be prevented during handling; should any segregation occur, the concrete should be remixed before it is placed. Concrete shall be placed in the forms in horizontal layers not over 1 to 2 feet thick. Concrete shall not be allowed to drop freely more than 4 feet. If the free drop to the point of placement must exceed 4 feet, the Contractor shall obtain the approval of the Engineer for the proposed method of depositing the concrete. The concrete shall not be required to flow over distances greater than 3 feet in any direction in the forms or on the ground, unless otherwise permitted by the Engineer.
4. Unless otherwise noted, the work begun on any day shall be completed in daylight of the same day.
5. "Cold Joints" are to be avoided, but if they occur, they are to be treated as bonded construction joints.
6. Chutes for conveying concrete shall be of U-shaped design and sized to insure a continuous flow of concrete. Flat (coal) chutes shall not be employed. Chutes shall be metal or metal-lined, and each section shall have approximately the same slope. The slope shall not be less than 25 nor more than 45 degrees and shall be such as to prevent segregation of the ingredients. The discharge end of the chute shall be provided with a baffle plate or spout to prevent segregation. If the discharge end of the chute is more than 5 feet above the surface of the concrete in the forms, a spout shall be used and the lower end maintained as near the surface of deposit as practicable. When the operation is intermittent, the chute shall discharge into a hopper. Chutes shall be thoroughly cleaned before and after each run, and the debris and any water shall be discharged outside the forms. Concrete shall not be allowed to flow horizontally more than 5 feet.
7. Concrete during and immediately after depositing shall be thoroughly compacted by means of suitable tools. Internal type mechanical vibrators shall be employed to produce the required quality of finish. Vibration shall be done by experienced operators under close supervision and shall be carried on long enough to produce homogeneity and optimum consolidation without permitting segregation of the solid constituents or "pumping" or

migration of air. All vibrators shall be supplemented by proper wooden spade puddling adjacent to forms to remove included bubbles and honeycomb. This is essential for the top lifts of walls. All vibrators shall travel at least 10,000 rpm and be of adequate capacity. At least one vibrator shall be used for every 10 cubic yards of concrete per hour. In addition, one spare vibrator in operating condition shall be on the site.

8. Concrete slabs on the ground shall be well-tamped into place and foundation material shall be wet, tamped, and rolled until thoroughly compacted prior to placing concrete.
9. Concrete shall be deposited continuously in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness within the section. If a section cannot be placed continuously, construction joints may be located at points as provided for in the drawings or approved by the Engineer.
10. Chutes, hoppers, spouts, adjacent work, etc., shall be thoroughly cleaned before and after each run, and the water and debris shall not be discharged inside the form.

B. CONCRETE PLACING DURING COLD WEATHER:

1. Concrete shall not be placed on frozen ground, and no frozen material or material containing ice shall be used. Materials for concrete shall be heated when concrete is mixed, placed, or cured when the mean daily temperature is below 40°F, or is expected to fall to below 40°F, within 72 hours, and the concrete after placing shall be protected by covering, heat, or both. No accelerant shall be used to prevent freezing.
2. The temperature of concrete surfaces shall not be permitted to drop below 50°F. for at least 7 days after placement of the concrete.
3. All details of Contractor's handling and protecting of concrete during freezing weather shall be subject to the approval and direction of the Engineer. All procedures shall be in accordance with provisions of ACI 306.

C. CONCRETE PLACING DURING HOT WEATHER:

1. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing shall be sprinkled with cold water. The Contractor shall make every effort to minimize delays which will result in excessive mixing of the concrete after arrival on the job.
2. During periods of excessively hot weather (90°F, or above) ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305. Any concrete with a temperature above 90°F, when ready for placement will not be acceptable,

and will be rejected.

3. Temperature records shall be maintained throughout the period of hot weather 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 should be correlated with the progress of the work so that conditions surrounding the construction of any part of the structure can be ascertained.

D. PIPES AND EMBEDDED METALS:

1. Special care shall be taken to bring the concrete into solid contact with pipes and iron work embedded in the walls and floors, particularly underneath and around all pipes where a head of water exists, making watertight joints.
2. In general, such embedded items are not shown on the structural design drawings. Design drawings of the other trades shall be consulted for their location and details.
3. Anchor bolt location, size and details shall be verified with the equipment manufacturers certified drawings before installation.
4. Anchor bolts, reglets, sleeves, edge angles and similar embedded items will be provided, delivered to the site under other Sections of the specification, for installation under this Section.
5. Where edge angles, etc., have nuts welded on to receive machine screws, the threads of the nuts shall be protected from concrete, and the concrete shall be excluded from the space to be occupied by the screw, by the use of wood plugs or other effective means.
6. Inserts required for hanging mechanical and electrical items will be provided and installed in the forms under the mechanical and electrical Sections of the specification.
7. Should the Contractor be allowed to leave openings in the concrete for pipes or ironwork, to await the arrival of items that would delay the prosecution of the work, the openings shall be subject to the approval of the Engineer. Appropriate construction joints shall be provided. In filling any such openings with concrete, a mixture of 1: 1-1/2: 3 shall be used and a watertight bond shall be secured between the old and new concrete.
8. In bolting miscellaneous items to concrete after the concrete has set, expansion bolts of an approved pattern and type shall be used. The Contractor shall submit to the Engineer, for approval, the types of expansion bolts. Expansion bolts shall not be used until they are approved.

E. CURING:

1. Concrete curing shall be performed as specified in ACI 301 and as stated herein. All curing procedures shall have prior approval of the Engineer.

2. Concrete Floors

Concrete floors which are to receive paint, concrete fill, mortar setting beds, grout fill, or any other subsequent finish shall be cured by one of the following procedures immediately after completion of placement and finishing:

- a. Ponding or continuous sprinkling.
- b. Application of absorptive mats or fabric kept continuously wet.
- c. Application of sand kept continuously wet.
- d. Application of waterproof sheet materials conforming to ASTM C171.
- e. Application of curing compounds conforming to ASTM C309, if it can be demonstrated to the Engineer's satisfaction that the compound is applicable and that it will not prevent bonding of the subsequent finish to be received. (Daily air temperature at the surface of concrete. For example, 5 days at a daily average temperature of 60°F. equals 300 day-degrees.)

<u>Location</u>	<u>Day-Degrees</u>
Beams and Slabs	500
Walls and Vertical Surfaces	200

3. Shores under beams and slabs shall not be removed until the concrete has attained at least 70 percent of the specified cylinder strength and also sufficient strength to support safely its own weight and the construction loads upon it.

H. PATCHING:

1. Defective concrete and honeycombed areas as determined by the Engineer shall be chipped down reasonably square and at least one-inch deep to sound concrete by means of hand chisels or pneumatic chipping hammers. Irregular voids or surface stones need not be removed if they are sound, free of laitance, and firmly imbedded in the parent concrete, subject to Engineer's final inspection. If honeycomb exists around reinforcement, chip to provide a clear space at least 1-inch wide all around the steel. For areas less than 1-1/2 inches deep, the patch may be made following the procedure for filling form tie holes, described in the subsection below, using adequately dry (non-trowelable) mixtures to avoid sagging. Thicker repairs will require build-up in 1-inch layers on successive days. Unless otherwise

indicated, thicker repairs shall be made with Vertipatch mortar mixture blended with Acryl-Set, both by Master Builders, Inc., Cleveland, Ohio, or approved equal.

2. For concrete areas exposed to serious abrasion and/or impact forces, the Engineer may order the use of grout with a non-shrink metallic aggregate (Embecco by Master Builders, Inc.; Ironite by Fox Industries, Madison, IL; or approved equal) as an additive in the proportions listed below:

Material	Small Patches		Large Formed Patches	
	Volumes	Weights	Volum	Weights
Cement	1.0	1.0	1.0	1.0
Metal	0.15	0.25	0.2	0.33
Sand	1.5	1.5	1.5	1.0
Pea Gravel	--	--	1.5	1.5

I. FINISHING OF FORMED SURFACES:

1. All concrete which is to be left exposed to view shall be scraped to remove projecting imperfections left by voids in the forms.
2. In addition to scraping, exterior exposed concrete shall be covered with a cement-base plaster mix. The mix shall consist of Thoroseal Plastic Mix and Acryl 60, as manufactured by Standard Drywall Products, Miami, FL, or approved equal. It shall be mixed and applied in accordance with the manufacturer's recommendations.
3. To permit satisfactory finishing, forms shall be removed from the vertical faces of the concrete as early as is possible without damaging the surface. Immediately after stripping forms, any fins or projections left by the forms shall be chipped off, and the surfaces rubbed smooth.
4. Form tie holes and other voids and faults shall be patched. Voids shall be cleaned out, roughened, thoroughly wetted, coated with neat cement paste, and filled with mortar of cement and sand in the same proportions, materials, and color as used in the concrete. The surface of the patch shall be flush with the surrounding surface after finishing operations are complete. Surface shall be kept continuously damp until patches are firm enough to be rubbed without damage.
5. Rubbing shall be performed while the surface is wet using a carborundum or cement sand brick, to achieve a smooth uniform, even textured finish. Patched and chipped areas shall be blended to match as closely as possible the appearance of the rest of the surface. No cement wash or plastering will be permitted, and no mortar shall be used except as required above.

6. Where finishing is performed before the end of the curing period, concrete shall under no circumstances be permitted to dry out, and shall be kept continuously moist from time of placing until end of curing period, or until curing membrane is applied.

J. CONCRETE FLOOR FINISHING REQUIREMENTS:

Unless designated otherwise, concrete floors shall have a troweled finish as specified in Section 11.7 of ACI 301. Troweled finishes shall conform to the requirements of "Class A Tolerances," Section 11.9 as specified in ACI 301.

L. TESTING:

1. The Contractor shall provide all field testing and inspection services, and shall pay for all such services. The Engineer shall approve the testing laboratory and shall inform the Contractor when samples are to be taken for testing. The Contractor shall forward all test results to the Engineer as soon as they are available.
 - a. The Testing Laboratory shall conform to the requirements of ASTM E-329 as modified in 780 CMR R1 in the State Building Code. They shall be licensed by the State Board of Building Regulations and Standards.
2. At least one slump test shall be performed from each truck load of concrete. The sample for slump shall be taken from the middle third of a truck load. Air content tests shall be made at the discretion of the Owner's Representative. If the measured slump or air content falls outside the specified limits, a check test shall be made immediately on another portion of the same sample. In the event of a second failure, the concrete shall be considered to have failed the requirements of the specification and shall be immediately removed from the jobsite to be discarded.
3. The Contractor shall advise the Owner's Representative of his readiness to proceed with concrete placement at least one working day prior to each placement. The Engineer will inspect the preparations for concrete, including the preparation of previously placed concrete, the reinforcing, and the alignment and tightness of formwork. No placement shall be made without the prior approval of the Owner's Representative.
4. A minimum of four standard compression test cylinders shall be made and tested for each 100 cubic yards or fraction thereof for each type and design strength of concrete from each day's placement of concrete. One cylinder shall be tested at 7 days and two cylinders at 28 days. The fourth cylinder from each set shall be kept until the 28 day test report on the second and third cylinders in the same set has been received. The Engineer reserves the right to require test cylinders to be made for each truckload of concrete if the nature of the project or project experience indicates such additional tests are required for proper control of concrete quality; such tests will be at the Owner's expense.

5. The strength level shall be considered satisfactory so long as the averages of all sets of three consecutive strength test results equal or exceed the specified strength f'_c , and no individual strength test (average of two cylinders) result falls below the specified strength f'_c by more than 500 psi.
6. In the event the average compressive strength of the two 28 day cylinders do not achieve the required level, the Engineer may elect to test the fourth cylinder immediately or test it after 56 days.

M. FAILURE TO MEET REQUIREMENTS:

1. The Engineer shall have the right to reject concrete represented by low strength tests or to agree to further testing of the concrete. Rejected concrete shall be promptly removed and replaced with concrete conforming to the specification. The decision of the Engineer as to whether substandard concrete is to be accepted or rejected or additional tests shall be conducted shall be final. All direct and indirect costs associated with further curing and testing of the concrete shall be at the Contractor's expense. All costs associated with removing rejected concrete, placing new concrete, and conducting tests on new concrete shall be at the Contractor's expense.
2. If the Engineer agrees to consider further curing and/or testing of the concrete before making a final decision, the Contractor shall submit a detailed plan to the Engineer, including proposed criteria for acceptance of the concrete. The plan may include additional curing of the concrete, drilling and testing of cores, load testing of the structure, or a combination.
3. If additional curing is permitted before further inspection and testing, the Contractor shall provide any necessary materials and labor to further cure the suspect concrete.
4. If drilling and testing of cores is permitted, the Contractor shall be responsible for obtaining the cores, including provision of ladders, scaffolding, and such incidental equipment as may be required. If additional curing is permitted, cores shall be drilled after the curing period, and shall be in accordance with ASTM Methods C39 and C42. The Contractor shall repair all core holes to the satisfaction of the Engineer.
5. The burden of proof, including, but not limited to the work of cutting and testing the cores, inspection, evaluation, engineering, repair of the holes, or removal and replacement of the concrete in question, and all associated costs therefor, shall be at the expense of the Contractor.
6. If load testing of the concrete is permitted, and if not otherwise indicated, slabs or beams under load test shall be loaded with their own weights plus a superimposed load of 2 times the design live load. The load shall be applied uniformly over the portion being tested in the approved manner and left in position for 24 hours. The structure shall be considered satisfactory if deflection "D" in feet, at end of 24-hour period, does not exceed the

following value:

$$D \text{ equals } 0.001 (L \times L)/t$$

in which "L" is span in feet, "t" is depth of slab, or beam in inches. If deflection exceeds "D" in the above formula, the concrete shall be considered faulty unless within 24 hours after removal of the load, the slab, or beam under test recovers at least 75 percent of the observed deflection.

7. If the suspect concrete still fails to meet specification requirements, the Engineer shall have the right to reject the concrete, have it removed and replaced, in accordance with paragraph 5 above, or to require mechanical strengthening of the concrete to satisfy project requirements. The Contractor shall submit a removal and replacement plan for review by the Engineer.

END OF SECTION 03300

SECTION 04410

GRANITE

PART 1 - GENERAL

1.01 SCOPE OF WORK

The work to be performed under this Section consists of the furnishing of all labor, materials, equipment and transportation required to install reclaimed granite features as shown on the drawings, detailed and as specified under this item, including granite block seating and flush granite block at the Farmhouse Footprint location on the plans.

1.02 DEFECTIVE WORK OR DAMAGED REFURBISHED GRANITE

Any piece of granite showing manufacturing flaws upon receipt at the project site shall be referred to the Engineer for determination as to whether it shall be rejected, patched or redressed for use.

1.03 REFERENCE STANDARDS AND SPECIFICATIONS

- A. Reference to the standards, specifications, and test of technical laboratories, societies, organizations, and/or governmental bodies shall be considered to be a part of these specifications and contract.
 - 1. ASTM - American Society for Testing Materials.
 - 2. National Building Granite Quarries Association, Inc.

1.04 SUPPLIER CERTIFICATION AND SAMPLES

- A. The Contractor shall have the granite supplier provide certification to the Engineer that an adequate supply of the approved material selected for the project is available and that said material complies with these specifications. No substitution of suppliers or material shall be made after certification of supplier and supply is approved.
- B. Prior to ordering and delivering materials to the site, three (3) representative samples of the granite finish and color shall be sent to the Engineer for approval. The material shall be certified by the supplier as a by-product of a naturally occurring material from a stone quarry operation.

1.05 SUBMITTALS

- A. Provide complete shop drawings from the granite quarry and/or fabricator for the work described in this section which identifies minimum and maximum lengths,

thickness of materials, finishes (i.e., thermal, sawn, split, etc.).

- B. Submittals shall be reviewed for design intent, and the appropriate application of the materials. Approval shall be based upon the completeness of shop drawings as they depict the granite work to be constructed.

1.06 QUALIFICATIONS

- A. Only an interest or concern possessing specific experience in the quarrying, manufacturing, engraving, transporting and installing of major granite features shall provide the work of this section. The City of Boston retains final approval relative to this matter.

PART 2 - MATERIALS

2.01 RECLAIMED GRANITE

- A. All material reclaimed granite shall be hard and durable granite of a quality approved by the landscape architect, free from seams, depressions or other structural or aesthetic imperfections, and shall appear to be from the same stock. Granite shall be per ASTM C615. Granite side surfaces shall be smooth, free from drill holes and with no projection of more than 3/4".
 - 1. GRANITE BLOCK SEATING
 - a. Granite block seating shall be reasonably uniform in shape and size with a nominal dimension of 4 feet in length, 2 feet wide and 2 feet in depth.
 - 2. FLUSH GRANITE BLOCK
 - a. Flush granite block shall be reasonably uniform in shape and size with a nominal dimension of 1.5 feet in length, 1.5 feet in depth and 6 inches in depth.
- B. Whenever granite is sawed, all surfaces that are to be exposed shall be thoroughly cleaned, with any iron rust or iron particles removed by sand blasting or other approved methods satisfactory to the owner.
- C. Saw-cuts shall be sawn through the full thickness of the granite piece. Scoring and breaking (split face/rock face) will not be permitted.
- D. Granite shall be supplied by Olde New England Granite of Wakefield, MA; Swenson Granite Works of Amherst, NH or approved equal.

PART 3 - EXECUTION

3.01 RECLAIMED GRANITE

- A. Packing and Loading – Finished granite shall be carefully packed and loaded for shipment using all reasonable and customary precautions against damage in transit. No material which may cause staining 3.4(h) or discoloration shall be used for blocking or packing. Granite is highly resistant to staining, but should be protected from certain elements, such as wet (green) wood, oils, mud, rust, construction waste, and asphalt compounds. Contact supplier for proper remedies to staining problems that occur.
- B. Site Storage - upon receipt at the project site or storage yard, the granite shall be stacked on timber or platforms at least 3" above the ground, and extreme care shall be taken to prevent staining 3.4(h) during storage. If storage is to be for a prolonged period, polyethylene or other suitable plastic film shall be placed between any wood and finished surfaces, and shall be used also as an overall protective covering. All holes shall be plugged during freezing weather to prevent the accumulation of water. Salt shall not be used for melting of ice formed in Lewis holes or on pieces, or for any purpose involving its contact with the granite.
- C. Proceed with the installation of the stonework in accordance with Drawings and using skilled mechanics capable of proper handling of the setting of the stone and able to field cut where necessary with sharp and true edges.
- D. Set stone with joints uniform in appearance and stone edges and faces aligned to tolerances indicated.
- E. Granite shall be cleaned of all loose or foreign materials upon installation. Clean surfaces that are dirty or stained. Scrub with fiber brushes, and then rinse with clear water.
- F. Provide expansion, control, and pressure-relieving joints of widths and at locations shown on Drawings.
- G. The granite shall be laid true and plumb at the approved locations and as detailed.
- H. Cleaning and protection
 - 1. Cleaning - granite shall be shop cleaned at the time of final fabrication. After installation, the contractor shall carefully clean the granite, removing all dirt, excess mortar, weld splatter, stains, and/or other site incident defacements. Stainless steel wire brushes or wool may be used, but the use of other wire brushes or of acid or other solutions which may cause discoloration is expressly prohibited. Fabricator should be contacted before cleaners other than detergents are used.
 - 2. Protection of Finished Work - After the granite work is installed, the granite

shall be properly and adequately protected from damage. Boxing or other suitable protection shall be provided wherever required, but no lumber which may stain or deface the granite shall be used. All nails used shall be non-corrosive. All granite work in progress shall be protected at all times during construction by use of a suitable strong, impervious film or fabric securely held in place.

END OF SECTION 04410

SECTION 16010

ELECTRICAL WORK - GENERAL PROVISIONS

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. The work covered by this section of the specifications consists of furnishing all labor, equipment, appliances, materials and incidentals in connection with the installation of the complete electrical systems as herein specified and as shown on the drawings.
- B. It is not the intent that the drawings shall show every junction box, conduit, wire, fitting, device, accessory, etc., but the Contractor shall be required to furnish without additional expense all transportation, labor and materials necessary to complete the electrical systems in accordance with the best practice of the trade.
- C. Unless otherwise specified, materials of the same classifications, used for the same purpose shall be the product of the same manufacturer.
- D. The work shall include furnishing and installing the following items:
 - 1. Underground Secondary Services
 - 2. Lighting Fixtures
 - 3. Grounding System
 - 4. Cabinets
 - 5. Panelboards
 - 6. Raceways
 - 7. Feeder and Branch Circuit Conductors
 - 8. Hangers and Supports
 - 9. Solderless Lugs and Connectors
 - 10. Conduit and wire for equipment and controls furnished under other divisions of the specifications, when shown on the electrical plans, with the exception of the instrumentation low voltage signal wiring.
- E. Electric Service and Metering

The power company serving this project is Eversource.

1. Secondary metering will be by the Contractor.
2. Arrangements shall be made with the power company for obtaining service. All cost for overhead line extensions and work required for these services including metering cost shall be obtained from the power company. The Contractor shall include in his bid and shall pay this money to the power company. All work involving the service and metering shall be as approved by the power company.

F. Interpretation of Drawings

1. The Drawings are diagrammatic only and are not intended to show exact locations of outlets and conduit runs.
2. All three-phase circuits shall be run in separate conduits unless otherwise shown on the Drawings.
3. The Contractor shall verify with the Engineer the exact locations and mounting heights of lighting fixtures, switches and receptacles prior to installation.
4. Any work installed contrary to Contract Documents, or without approval by the Engineer, shall be changed or replaced as required by the Engineer and no extra compensation will be allowed the Contractor for making these changes.
5. The locations of equipment, fixtures, and similar devices shown on the Drawings are approximate only. Exact locations shall be as approved by the Engineer during construction. The Contractor shall obtain in the field all information relevant to the placing of electrical work and in case of any interference with other work, shall proceed as required by the Engineer and shall furnish all labor and materials necessary to complete the work in an approved manner.
6. Surface mounted panel boxes, junction boxes, conduit, etc., shall be supported by spacers to provide a clearance between wall and equipment.
7. The number of conductors shown on the Drawings are not necessarily the correct number required. As many conductors as are required in each case shall be installed.
8. The ratings of motors and other electrically operated devices together with the size shown for their branch circuit conductors and conduits are

approximate only and are indicative of the probable power requirements insofar as can be determined in advance of the purchase of equipment. The ratings shown for motor branch circuit protective devices are the maximum ratings permitted. Lower ratings may be used where approved as being proper for the dynamic characteristics of the motor and its connected load.

9. Unless otherwise specified, all conduits, wires, and cables and the support systems for the conduits and cables that are required to make the electrical connections to equipment shall be furnished and installed. All connections to equipment shall be made as shown, specified, and required and in accordance with the approved shop and setting drawings.
10. The Contractor shall verify, in the field, all measurements necessary for his work and shall assume responsibility for their accuracy.

1.02 LOCAL CONDITIONS:

- A. The Contractor shall provide and place all sleeves for conduits penetrating floors, walls, slabs, etc. The Contractor shall locate all necessary slots for his work and these shall be formed before concrete is poured.
- B. All cutting and patching shall be done in a thoroughly workmanlike manner.
- C. Before submitting proposals, the Contractor is expected to inspect the site and survey the conditions to be encountered in the performance of the work. Failure to familiarize himself with the conditions shall not relieve the Contractor's responsibility for full completion of the work in accordance with the provisions of the Contract.

1.03 PERMITS AND INSPECTION:

- A. Permits, fees and notices shall be in accordance with the General Conditions.
- B. All work shall meet or exceed the latest requirements of all national, state, county, municipal and other authorities exercising jurisdiction over electrical construction at this project.
- C. All required permit and inspection certificates shall be obtained, paid for, and given to the Owner at the completion of the work.

1.04 CODES AND STANDARDS:

A. Unless indicated or specified otherwise, materials and workmanship shall conform with the latest editions of the following codes, standards and specifications.

1. Massachusetts Electrical Code
2. National Bureau of Standards Handbook H-30 National Electrical Safety Code
3. State and Local Codes, and all other authorities having jurisdiction
4. Underwriter's Laboratories, Inc. (UL)
5. American National Standards Institute, Inc.
6. Institute of Electrical and Electronic Engineers (IEEE)
7. National Electrical Manufacturers Association (NEMA)
8. National Board of Fire Underwriters
9. International Municipal Signal Association (IMSA)
10. Insulated Power Cable Engineers Associated Specifications
11. American Society for Testing Materials Specifications

1.05 REVIEW OF MATERIALS:

- A. Material and Equipment Schedules. As soon as practicable and within thirty days after the date of notice to proceed and before commencement of installation of any materials or equipment, the Contractor shall submit to the Engineer six (6) complete Brochures for approval of materials, fixtures, and equipment to be incorporated in the work. The list shall include manufacturer's name, catalog numbers, cuts, diagrams, drawings, and such other descriptive data as may be required. No consideration will be given to a partial submittal from time to time. Approval of materials will be based on manufacturer's published ratings. Any materials, fixtures and equipment listed that are not in accordance with the specification requirements will be rejected.
- B. Substitutions: Substitution of material or equipment shall be in accordance with the General Conditions.

C. Shop Drawings. Shop drawings shall be submitted to the Engineer for review in accordance with the Division 1. Shop drawings shall be submitted for, but not limited to the following:

1. Panelboards
2. Lighting fixtures
3. Wire and Cable
4. Metering equipment
5. Hangers and Supports
6. Raceways

D. Submit the following information with all equipment shop drawings.

1. Manufacturer's certified scale drawings, cuts, or catalogs, including installation details and manufacturer's name.
2. Manufacturer's specifications, including certified performance characteristics and capacity ratings.
3. Electrical wiring diagrams and controls, where applicable.
4. Certificate of compliance with Code, where applicable.

E. Equipment shop drawings and wiring diagrams must be prepared specifically for this installation. Standard factory wiring diagrams with a revision marked in ink for this installation will be accepted.

F. All control and wiring diagrams shall be complete with the following description:

1. Sequence of operation
2. Sequence of interlocking
3. Operation of alarms
4. Legend
5. Wiring Numbers

- G. All equipment shop drawings shall be properly identified and indicate the Article number of the specifications or the Drawing number which applies to the submitted item.
- H. Shop drawings for the items listed above shall be submitted for approval in accordance with the preceding paragraphs. The Engineer, however, reserves the right to require submittal of shop drawings on any other material or equipment to be installed under this Section not specifically listed above.

1.06 MINOR DEVIATIONS:

- A. The work as shown on the drawings is diagrammatic and is intended to show the work included and the arrangement of the various systems.
- B. It is not intended that the accompanying plans and specifications cover every detail of the required installation. Furnish and install equipment, materials and labor as shown or specified, as are usually furnished, or as are needed to make a complete and satisfactory operating installation, whether mentioned or not, omitting only those items which are specifically excluded.
- C. Locations and mounting heights of equipment and/or devices as shown are approximately correct. The Engineer reserves the right to relocate any equipment or device prior to actual installation at no extra cost to the Owner.
- D. No deviation from layout shall be made without written approval from the Engineer.

1.07 TEMPORARY LIGHT AND POWER:

- A. The Contractor shall provide temporary light and power and pay all energy charges as described in Division 1.

1.08 ELECTRICAL REFERENCE SYMBOLS:

- A. Symbols shown on the drawings shall approximate location of fixtures, outlet boxes, and conduit runs, and other equipment, unless otherwise detailed. The exact location shall be governed by field conditions and obstructions. This is not to be construed to permit redesigning systems. All outlets shall be interconnected as shown on the drawings. Locate and install all boxes and equipment where they will be readily accessible.

1.09 PHASE IDENTIFICATION:

- A. The entire system of wiring shall be phased by color code as follows:

1. Wires No. 6 AWG and smaller shall have a continuous colored outer covering.
2. Wires larger than No. 6 AWG shall be identified at all points of termination by gummed tape, plastic tape, etc., applied to the wire.
3. Bus bars in motor control centers and panelboards shall be properly identified by color as herein specified.
4. Code colors for 120/240 volt systems shall be:
 - a. Phase A - Black
 - b. Phase B - Red
5. Neutral wires shall be white or grey.
6. Equipment ground wires shall be green.
7. The same colors shall be used for the same phases throughout the entire project.

1.10 PROTECTION AND CLEANING OF EQUIPMENT:

- A. All electrical equipment, upon receipt, shall be adequately stored and protected from damage.
- B. After installation, all electrical equipment shall be protected to prevent damage during the construction period. Openings in conduits and boxes shall be closed to prevent entrance of foreign materials.
- C. The interior of boxes and cabinets shall be left clean. Exposed surfaces shall be cleaned and plate surfaces polished.

1.11 OPERATION AND MAINTENANCE MANUALS:

- A. The Contractor shall furnish the Owner with three (3) copies of complete operating and maintenance manuals. Manuals shall include all equipment, maintenance instruction, parts list, warranties, schematic diagrams of control systems, and lubrication charts.
- B. Manuals shall contain only that information which specifically applies to this project, and all unrelated material shall be deleted. During the instruction period, herein specified, this manual shall be used and explained. Each copy of manual shall be clearly indexed and include a directory of all subcontractors and

maintenance contractors, indicate the area of their responsibility, and list the name and telephone numbers of the responsible member of each organization. This material shall have a clear plastic protective shield over each sheet of data.

- C. Each manual shall be bound in an expandable plastic covered hard bound binder. The manual's front cover and side cover shall be stamped "Operation and Maintenance Manual -- Electrical Systems" along with the project title.

1.12 OPERATING AND MAINTENANCE INSTRUCTIONS:

- A. A competent Engineer shall be provided by the Contractor to instruct operating personnel in the operation and maintenance of equipment and systems.

1.13 SPARE PARTS DATA:

- A. The Contractor shall furnish a complete list of recommended spare parts and supplies for the equipment furnished with current unit prices and source of supply.

1.14 TESTS:

- A. The Electrical Subcontractor shall perform all tests at the completion of the work and the results furnished to the Owner and Engineer in writing. Tests shall include, but not be limited to: all systems test free of shorts or grounds, proper neutral connections, ground system resistance, secondary voltages at main distribution panel, power panels and lighting panels, all lighting fixtures with lamps in place for 10 hours.
- B. Upon completion of all work, the Electrical Subcontractor shall furnish, in duplicate, certificates of inspections from all inspectors and authorities having jurisdiction, notarized letters from the manufacturers stating that authorized Factory Engineers or agents have inspected and tested the installation of their respective systems and found same to be in satisfactory operating condition.
- C. Furnish all labor, material, instruments, supplies and services and bear all costs for the accomplishment of the tests.

1.15 GUARANTEE:

- A. The Contractor shall guarantee equipment and performance of the installation and equipment in accordance with the GENERAL CONDITIONS.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. The materials used in all systems shall be new, unused and as hereinafter specified. All materials where not specified shall be of the very best of their respective kinds. Samples of materials or manufacturer's specification shall be submitted for approval as required by the Engineer.
- B. Materials and equipment used shall be U.L. listed wherever such approved materials and equipment is available.
- C. Electrical equipment shall at all times during construction be adequately protected against mechanical injury or damage by water. If any apparatus has been damaged, such damage shall be repaired by the Contractor at his cost and expense. If any apparatus has been subject to possible damage by water, it shall be thoroughly dried out and put through such special tests as required by the Engineer, at the cost and expense of the Contractor, or shall be replaced by the Contractor at his own expense.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All work shall be executed in full accordance with the Massachusetts Electrical Code and local rulings. Should any work be performed contrary to said rulings, ordinances and regulations, this Contractor shall bear full responsibility for such violations and assume all costs arising therefrom.
- B. Load Balance. Check the load balance on the phases of the various systems and reconnect where necessary as approved by the Engineer to provide equal division of the loads between the phases of the various systems.
- C. Before starting the work, confer with all other trades relative to the location of pipes, and apparatus or fixtures to be installed by them and select locations for the work which will avoid possible conflicts with the work of other trades involved. All differences or conflicting conditions concerning the work shall be called to the attention of the Engineer for adjustment before starting work. For such work performed or materials installed in violation of the above clause the work shall be readjusted to the complete satisfaction of the Engineer at the sole expense of the Electrical Subcontractor.
- D. Cleanup
 - 1. This Contractor shall cooperate with other workmen and with the General Contractor in the daily removal of debris from the work site.
 - 2. This Contractor shall leave "broom clean" all areas where he has interrupted or completed his work.

3. He shall cooperate with the General Contractor in good housekeeping procedures.
4. At the completion of his work, prior to the final inspection, this Contractor shall clean all devices, plates, fixtures, glassware, switches, cabinets, exposed conduits, fittings, etc. and shall have the premises in a thoroughly clean condition.

END OF SECTION

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Raceways.
 - 2. Building wire and connectors.
 - 3. Supporting devices for electrical components.
 - 4. Electrical identification.
 - 5. Electricity-metering components.
 - 6. Concrete equipment bases.
 - 7. Cutting and patching for electrical construction.
 - 8. Touchup painting.

1.03 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. FMC: Flexible metal conduit.
- C. IMC: Intermediate metal conduit.
- D. LFMC: Liquidtight flexible metal conduit.
- E. RNC: Rigid nonmetallic conduit.
- F. RSC: Rigid Steel Conduit.

1.04 SUBMITTALS

- A. Product Data: For electricity-metering equipment.
- B. Shop Drawings: Dimensioned plans and sections or elevation layouts of electricity-metering equipment.

- C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.05 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

1.06 COORDINATION

- A. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work.
- B. Coordinate electrical service connections to components furnished by utility companies.
 - 1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electricity-metering components.
 - 2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.
- C. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.

PART 2 - PRODUCTS

2.01 RACEWAYS

- A. EMT: ANSI C80.3, zinc-coated steel, with set-screw or compression fittings.
- B. FMC: Zinc-coated steel.
- C. IMC: ANSI C80.6, zinc-coated steel, with threaded fittings.
- D. LFMC: Zinc-coated steel with sunlight-resistant and mineral-oil-resistant plastic jacket.
- E. RNC: NEMA TC 2, Schedule 40 PVC, with NEMA TC3 fittings.
- F. Raceway Fittings: Specifically designed for the raceway type with which used.

2.02 CONDUCTORS

- A. Conductors, No. 10 AWG and Smaller: Solid or stranded copper.

- B. Conductors, Larger than No. 10 AWG: Stranded copper.
- C. Insulation: Thermoplastic, rated at 75 deg C minimum.
- D. Wire Connectors and Splices: Units of size, ampacity rating, material, type, and class suitable for service indicated.

2.03 SUPPORTING DEVICES

- A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.
- B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.
- C. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.
- D. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.
- E. Expansion Anchors: Carbon-steel wedge or sleeve type.
- F. Toggle Bolts: All-steel springhead type.
- G. Powder-Driven Threaded Studs: Heat-treated steel.

2.04 ELECTRICAL IDENTIFICATION

- A. Identification Devices: A single type of identification product for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.
- B. Raceway and Cable Labels: Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each raceway and cable size.
 - 1. Type: Pre-tensioned, wraparound plastic sleeves. Flexible, preprinted, color-coded, acrylic band sized to suit the diameter of the item it identifies.
 - 2. Type: Preprinted, flexible, self-adhesive, vinyl. Legend is over laminated with a clear, weather- and chemical-resistant coating.
 - 3. Color: Black letters on orange background.
 - 4. Legend: Indicates voltage.
- C. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape, not less than 1 inch wide by 3 mils thick.
- D. Underground Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape with the following features:

1. Not less than 6 inches wide by 4 mils thick.
 2. Compounded for permanent direct-burial service.
 3. Embedded continuous metallic strip or core.
 4. Printed legend that indicates type of underground line.
- E. Tape Markers for Wire: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.
- F. Color-Coding Cable Ties: Type 6/6 nylon, self-locking type. Colors to suit coding scheme.
- G. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16-inch minimum thickness for signs up to 20 sq. in. and 1/8-inch minimum thickness for larger sizes. Engraved legend in black letters on white background.
- H. Exterior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch, galvanized-steel backing, with colors, legend, and size appropriate to the application. 1/4-inch grommets in corners for mounting.
- I. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.
- 2.05 EQUIPMENT FOR UTILITY COMPANY'S ELECTRICITY METERING
- A. Comply with requirements of electrical power utility company.
- B. Meter Sockets: Comply with requirements of electrical power utility company.
- 2.06 CONCRETE BASES
- A. Concrete Forms and Reinforcement Materials: As specified in Division 3 Section "Cast-in-Place Concrete."
- B. Concrete: 3000-psi, 28-day compressive strength as specified in Division 3 Section "Cast-in-Place Concrete."
- 2.07 TOUCHUP PAINT
- A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
- B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.01 ELECTRICAL EQUIPMENT INSTALLATION

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.
- B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.02 RACEWAY APPLICATION

- A. Use the following raceways for outdoor installations:
 - 1. Exposed: IMC.
 - 2. Concealed: IMC.
 - 3. Underground, Single Run: RNC.
 - 4. Underground, Grouped: RNC.
 - 5. Connection to Vibrating Equipment: LFMC.
 - 6. Boxes and Enclosures: NEMA 250, Type 3R or Type 4.
- B. Use the following raceways for indoor installations:
 - 1. Exposed: EMT.
 - 2. Concealed: EMT.
 - 3. Connection to Vibrating Equipment: FMC; except in wet or damp locations, use LFMC.
 - 4. Damp or Wet Locations: IMC.
 - 5. Boxes and Enclosures: NEMA 250, Type 1, unless otherwise indicated.

3.03 RACEWAY AND CABLE INSTALLATION

- A. Use temporary raceway caps to prevent foreign matter from entering.
- B. Make conduit bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.
- C. Use raceway and cable fittings compatible with raceways and cables and suitable for use and location.

- D. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of the pull wire.
- E. Connect motors and equipment subject to vibration, noise transmission, or movement with a maximum of 72-inch flexible conduit. Install LFMC in wet or damp locations. Install separate ground conductor across flexible connections.

3.04 WIRING METHODS FOR POWER, LIGHTING, AND CONTROL CIRCUITS

- A. Feeders: Type THHN/THWN insulated conductors in raceway.
- B. Underground Feeders and Branch Circuits: Type THWN or single-wire, Type UF insulated conductors in raceway.
- C. Branch Circuits: Type THHN/THWN insulated conductors in raceway.
- D. Remote-Control Signaling and Power-Limited Circuits: Type THHN/THWN insulated conductors in raceway for Classes 1, 2, and 3, unless otherwise indicated.

3.05 WIRING INSTALLATION

- A. Install splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un-spliced conductors.
- B. Install wiring at outlets with at least 12 inches of slack conductor at each outlet.
- C. Connect outlet and component connections to wiring systems and to ground. Tighten electrical connectors and terminals, according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.06 ELECTRICAL SUPPORTING DEVICE APPLICATION

- A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.
- B. Dry Locations: Steel materials.
- C. Support Clamps for PVC Raceways: Click-type clamp system.
- D. Selection of Supports: Comply with manufacturer's written instructions.
- E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb design load.

3.07 SUPPORT INSTALLATION

- A. Install support devices to securely and permanently fasten and support electrical components.
- B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
- C. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.
- D. Simultaneously install vertical conductor supports with conductors.
- E. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.
- F. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves during erection of concrete and masonry walls.
- G. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:
 - 1. New Concrete: Concrete inserts with machine screws and bolts.
 - 2. Instead of expansion bolts, threaded studs driven by a powder charge and provided with lock washers may be used in existing concrete.
 - 3. Steel: Welded threaded studs or spring-tension clamps on steel.
 - a. Field Welding: Comply with AWS D1.1.
 - 4. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
 - 5. Light Steel: Sheet-metal screws.
 - 6. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.08 IDENTIFICATION MATERIALS AND DEVICES

- A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.

- C. Self-Adhesive Identification Products: Clean surfaces before applying.
- D. Identify raceways and cables with color banding as follows:
 - 1. Bands: Pre-tensioned, snap-around, colored plastic sleeves or colored adhesive marking tape. Make each color band 2 inches wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side.
 - 2. Band Locations: At changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
 - 3. Colors: As follows:
 - a. Telecommunication System: Green and yellow.
- E. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.
- F. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches, overall, use a single line marker.
- G. Color-code 240/120-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:
 - 1. Phase A: Black.
 - 2. Phase B: Red.
- H. Install warning, caution, and instruction signs where required to comply with 29 CFR, Chapter XVII, Part 1910.145, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

3.09 UTILITY COMPANY ELECTRICITY-METERING EQUIPMENT

- A. Install equipment according to utility company's written requirements. Provide grounding and empty conduits as required by utility company.

3.10 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger, in both directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations,

unless otherwise indicated. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

3.11 FIELD QUALITY CONTROL

- A. Inspect installed components for damage and faulty work, including the following:
 - 1. Raceways.
 - 2. Building wire and connectors.
 - 3. Supporting devices for electrical components.
 - 4. Electrical identification.
 - 5. Electricity-metering components.
 - 6. Concrete bases.
 - 7. Cutting and patching for electrical construction.
 - 8. Touchup painting.

3.12 REFINISHING AND TOUCHUP PAINTING

- A. Refinish and touch up paint. Paint materials and application requirements are specified by manufacturer.
 - 1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
 - 2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
 - 3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.13 CLEANING AND PROTECTION

- A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.
- B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 16123
CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For testing agency.

1.04 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.02 CONDUCTORS AND CABLES

- A. Available Manufacturers:
 - 1. Alcan Aluminum Corporation; Alcan Cable Div.
 - 2. American Insulated Wire Corp.; a Leviton Company.
 - 3. General Cable Corporation.
 - 4. Senator Wire & Cable Company.
 - 5. Southwire Company.
- B. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.
- C. Conductor Material: Copper.
- D. Conductor Insulation Types: THHN-THWN complying with NEMA WC 5 or 7.
- E. Multi-conductor Cable: Type USE with ground wire.

2.03 CONNECTORS AND SPLICES

- A. Available Manufacturers:
 - 1. AFC Cable Systems, Inc.
 - 2. AMP Incorporated/Tyco International.
 - 3. Hubbell/Anderson.
 - 4. O-Z/Gedney; EGS Electrical Group LLC.
 - 5. 3M Company; Electrical Products Division.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.01 CONDUCTOR AND INSULATION APPLICATIONS

- A. Service Entrance: Type XHHW, USE single conductors in raceway.
- B. Exposed Feeders: Type THHN-THWN, single conductors in raceway
- C. Exposed Branch Circuit: Type THHN-THWN, single conductors in raceway.
- D. Underground Feeders and Branch Circuits: Type UF multiconductor cable.

3.02 INSTALLATION

- A. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- B. Use pulling means; including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
- C. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- D. Support cables according to Division 16 Section "Basic Electrical Materials and Methods."
- E. Identify and color-code conductors and cables according to Division 16 Section Basic Electrical Materials and Methods.

3.03 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.

3.04 FIELD QUALITY CONTROL

- A. Testing: Perform the following field quality-control testing:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.
 - 2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.
- B. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION

SECTION 16442

PANELBOARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes load centers and panelboards, overcurrent protective devices, and associated auxiliary equipment rated 600 V and less for the following types:
 - 1. Lighting and appliance branch-circuit panelboards.

1.03 DEFINITIONS

- A. GFCI: Ground-fault circuit interrupter.
- B. TVSS: Transient voltage surge suppressor.

1.04 SUBMITTALS

- A. Product Data: For each type of panelboard, overcurrent protective device, TVSS device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:
 - a. Enclosure types and details for types other than NEMA 250, Type 1.
 - b. Bus configuration, current, and voltage ratings.
 - c. Short-circuit current rating of panelboards and overcurrent protective devices.
 - d. UL listing for series rating of installed devices.
 - e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

2. Wiring Diagrams: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.
- C. Qualification Data: Submit data for testing agencies indicating that they comply with qualifications specified in "Quality Assurance" Article.
- D. Field Test Reports: Submit written test reports and include the following:
 1. Test procedures used.
 2. Test results that comply with requirements.
 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- E. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.
- F. Maintenance Data: For panelboards and components to include in maintenance manuals specified in Division 1. In addition to requirements specified in Division 1 Section "Contract Closeout," include the following:
 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

1.05 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NEMA PB 1.
- C. Comply with NFPA 70.

1.06 COORDINATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encumbrances to workspace clearance requirements.

1.07 EXTRA MATERIALS

- A. Keys: Six spares of each type of panelboard cabinet lock.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Panelboards, Overcurrent Protective Devices, Controllers, Contactors, and Accessories:
 - a. Eaton Corp.; Cutler-Hammer Products.
 - b. General Electric Co.; Electrical Distribution & Control Div.
 - c. Siemens Energy & Automation, Inc.
 - d. Square D Co.
 - 2. TVSS Panelboards:
 - a. Current Technology, Inc.
 - b. Liebert Corporation.

2.02 FABRICATION AND FEATURES

- A. Enclosures: Surface mounted cabinets. NEMA PB 1, Type 1, to meet environmental conditions at installed location.
 - 1. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
- B. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
- C. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
- D. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.
- E. Directory Card: With transparent protective cover, mounted inside metal frame, inside panelboard door.
- F. Bus: Hard-drawn copper, 98 percent conductivity.
- G. Main and Neutral Lugs: Compression type suitable for use with conductor material.
- H. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.
- I. Service Equipment Label: UL labeled for use as service equipment for panelboards with main service disconnect switches.

- J. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices.
- K. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
- L. Gutter Barrier: Arrange to isolate individual panel sections.

2.03 PANELBOARD SHORT-CIRCUIT RATING

- A. Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.04 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- B. Doors: Front mounted with concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.05 OVERCURRENT PROTECTIVE DEVICES

- C. Molded-Case Circuit-Breaker Features and Accessories. Standard frame sizes, trip ratings, and number of poles.
 - 1. Lugs: Mechanical or Compression style, suitable for number, size, trip ratings, and material of conductors.
 - 2. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.

2.06 ACCESSORY COMPONENTS ACCESSORY COMPONENTS AND FEATURES

- A. Fungus Proofing: Permanent fungicidal treatment for panelboard interior, including overcurrent protective devices and other components.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Mounting Heights: Top of trim 74 inches above finished floor, unless otherwise indicated.

- C. Mounting: Plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.
- D. Circuit Directory: Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- E. Install filler plates in unused spaces.
- F. Wiring in Panelboard Gutters: Arrange conductors into groups and bundle and wrap with wire ties after completing load balancing.

3.02 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section Basic Electrical Materials and Methods.
- B. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.03 CONNECTIONS

- A. Install equipment grounding connections for panelboards with ground continuity to main electrical ground bus.
- B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.04 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:
 - 1. Test continuity of each circuit.
- B. Testing: After installing panelboards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
 - 1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

- C. Balancing Loads: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes as follows:
 - 1. Measure as directed during period of normal system loading.
 - 2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data-processing, computing, transmitting, and receiving equipment.
 - 3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
 - 4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.05 ADJUSTING

- A. Set field-adjustable switches and circuit-breaker trip ranges.

3.06 CLEANING

- A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION