

BID DOCUMENTS AND SPECIFICATIONS FOR:

Whittemore Park Improvements- Phase 1 Arlington,
Massachusetts

Bid # 21-07

January 28, 2021

Prepared for:

Department of Planning and Community
Development

Town of Arlington, Massachusetts

Prepared by: Crowley Cottrell, LLC

SEALED BIDS will be received:

Date: Wednesday February 17, 2021

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. 21-07 WHITTEMORE PARK IMPROVEMENTS-
PHASE 1**

Sealed bids for Whittemore Park Improvements- Phase 1 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 February 17 , 2021** 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. 21-07 WHITTEMORE PARK IMPROVEMENTS- PHASE 1.**

Phase 1 landscape improvements to Whittemore Park, located between the Cutter House and Massachusetts Avenue, include but are not limited to the following; demolition of existing brick walks, site furnishings, and lighting; temporary tree protection, tree trimming, and tree root invigoration; new exposed aggregate, tinted aggregate, and resin-bound aggregate paving; modifications to the existing granite pier fencing and existing historic railroad tracks; improvements to the site lighting and irrigation systems; and new furnishings and plantings throughout.

Pre-bid site visit Thursday February 4, 2021 at 10:00 AM, Whittemore Park, 611 Mass Ave, Arlington, MA

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 120 consecutive days.

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.

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

The conditions of employment as set forth in Federal Wage Determination MA20210021 dated January 1, 2021, issued by the U.S. Department of Labor, shall prevail in the execution of the work under this contract. Attention is called to the fact that minimum wage rates and health and welfare and pension fund contributions are established for this contract and are part of the specifications.

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, additional, alterations or erasures shall be made on the forms.

10. 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.

11. 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.

12. 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.

13. 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.

14. 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.

15. 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: Whittemore Park Improvements-Phase 1 (Bid #21-07)

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 September 1, 2021. 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 (\$ _____)

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. 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**. Contractor to refer to Specification Section 012200 UNIT PRICES and submit the from within this section as part of the bid.

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.

- 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.

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.

Date: _____

Name of General Bidder: _____

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

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 C

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 CERITIFCATION 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 D

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 dress if different
form business address.)

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

Federal Labor Standards Provisions

U.S. Department of Housing
and Urban Development
Office of Labor Relations

Applicability

The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

A. 1. (i) **Minimum Wages.** All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible, place where it can be easily seen by the workers.

(ii) (a) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where

appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB control number 1215-0140.)

(c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii)(b) or (c) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program. Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

2. **Withholding.** HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work, all or part

form HUD-4010 (07/2003)
ref. Handbook 1344.1

of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

3. (f) Payrolls and basic records. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5 (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)

(ii) (a) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i). This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, DC 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149.)

(b) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be maintained under 29 CFR 5.5 (a)(3)(i) and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll

period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(c) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph A.3.(ii)(b).

(d) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under subparagraph A.3.(i) available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the

journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under 29 CFR Part 6 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR Part 3 which are incorporated by reference in this contract

6. Subcontracts. The contractor or subcontractor will insert in any subcontracts the clauses contained in subparagraphs 1 through 11 of this paragraph A and such other clauses as HUD or its designee may by appropriate instructions require, and a copy of the applicable prevailing wage decision, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this paragraph.

7. Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

10. (i) Certification of Eligibility. By entering into this contract the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1010, Title 18, U.S.C., "Federal Housing Administration transactions", provides in part: "Whoever, for the purpose of . . . influencing in any way the action of such Administration . . . makes, utters or publishes any statement knowing the same to be false . . . shall be fined not more than \$5,000 or imprisoned not more than two years, or both."

11. Complaints, Proceedings, or Testimony by Employees. No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. Contract Work Hours and Safety Standards Act. The provisions of this paragraph B are applicable only where the amount of the prime contract exceeds \$100,000. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in subpara-

graph (1) of this paragraph, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in subparagraph (1) of this paragraph.

(3) Withholding for unpaid wages and liquidated damages. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (2) of this paragraph.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph (1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs (1) through (4) of this paragraph.

C. Health and Safety. The provisions of this paragraph C are applicable only where the amount of the prime contract exceeds \$100,000.

(1) No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

(2) The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, 40 USC 3701 et seq.

(3) The Contractor shall include the provisions of this paragraph in every subcontract so that such provisions will be binding on each subcontractor. The Contractor shall take such action with respect to any subcontract as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

Section 3 Clause

A. The work to be performed under this contract is subject to the requirements of section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (Section 3). The purpose of Section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by Section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

B. The parties to this contract agree to comply with HUD's regulations in 24 CFR part 135, which implement Section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 135 regulations.

C. The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this Section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the Section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

D. The contractor agrees to include this Section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this Section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 135.

E. The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 135.

F. Noncompliance with HUD's regulations in 24 CFR part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts.

G. With respect to work performed in connection with Section 3 covered Indian housing assistance, section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e) also applies to the work to be performed under this contract. Section 7(b) requires that to the greatest extent feasible (i) preference and opportunities for training and employment shall be given to Indians, and (ii) preference in the award of contracts and subcontracts shall be given to Indian organizations and Indian-owned Economic Enterprises. Parties to this contract that are subject to the provisions of Section 3 to the maximum extent feasible, but not in derogation of compliance with section 7(b).

"General Decision Number: MA20210021 01/01/2021

Superseded General Decision Number: MA20200021

State: Massachusetts

Construction Type: Highway

County: Middlesex County in Massachusetts.

HIGHWAY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number 0 Publication Date 01/01/2021

ELEC0103-007 03/01/2020

	Rates	Fringes
ELECTRICIAN.....	\$ 53.50	38.00

ENGI0004-026 06/01/2020

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Group 1.....	\$ 48.73	29.25+A
GROUP 1.....	\$ 49.33	29.75+a
Group 2.....	\$ 48.23	29.25+A
GROUP 2.....	\$ 48.41	29.75+a

FOOTNOTE FOR POWER EQUIPMENT OPERATORS:
A. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Labor Day, Memorial Day, Independence Day, Patriot's Day, Columbus Day, Veteran's Day, Thanksgiving Day, Christmas Day

POWER EQUIPMENT OPERATORS CLASSIFICATIONS
Group 1: Backhoe/Excavator/Trackhoe; Bobcat/Skid Steer/Skid Loader; Broom/Sweeper; Gradall; Loader; Paver (Asphalt, Aggregate, and Concrete)
Group 2: Bulldozer; Grader/Blade; Milling Machine; Roller

* IRON0007-031 03/16/2020

	Rates	Fringes
IRONWORKER (ORNAMENTAL, REINFORCING, AND STRUCTURAL).....	\$ 48.02	33.43

LABO0039-002 06/01/2018

	Rates	Fringes
LABORER		
Asphalt, Includes Raker, Shoveler, Spreader and		

Distributor.....	\$ 33.50	22.92
Landscape.....	\$ 33.25	22.92

PAIN0035-023 07/01/2019

	Rates	Fringes
PAINTER (Steel).....	\$ 50.66	30.90

SUMA2014-011 01/11/2017

	Rates	Fringes
CARPENTER, Includes Form Work....	\$ 47.93	19.46
CEMENT MASON/CONCRETE FINISHER...	\$ 56.70	21.08
LABORER: Common or General.....	\$ 36.58	19.40
LABORER: Concrete Saw (Hand Held/Walk Behind).....	\$ 41.78	18.37
LABORER: Guardrail Installation.....	\$ 37.70	15.37
OPERATOR: Crane.....	\$ 57.61	0.00
OPERATOR: Forklift.....	\$ 64.67	0.00
OPERATOR: Mechanic.....	\$ 48.14	17.02
OPERATOR: Piledriver.....	\$ 44.46	16.94
OPERATOR: Post Driver (Guardrail/Fences).....	\$ 41.49	23.07
PAINTER: Spray (Linestriping)....	\$ 40.87	13.86
PILEDRIVERMAN.....	\$ 45.65	23.33
TRAFFIC CONTROL: Flagger.....	\$ 23.00	20.44
TRAFFIC CONTROL: Laborer-Cones/ Barricades/Barrels - Setter/Mover/Sweeper.....	\$ 44.49	12.41
TRUCK DRIVER: Concrete Truck....	\$ 33.69	15.79
TRUCK DRIVER: Dump Truck.....	\$ 38.92	9.73
TRUCK DRIVER: Flatbed Truck....	\$ 48.53	0.00

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted

because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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.. END OF GENERAL DECISION

BY-LAWS OF THE TOWN OF ARLINGTON
TITLE I
ARTICLE 16

CONSTRUCTION PROJECTS

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:

- A. 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 each individual filed sub-bid contract, if applicable. The preceding sentence shall be included in all construction contracts whether entered into by 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:

- A. Before starting work, the contractors (includes the 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 possibly, 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

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.



TOWN OF ARLINGTON EQUAL OPPORTUNITY ADVISORY COMMITTEE

730 MASSACHUSETTS AVENUE, ARLINGTON, MA 02476
PHONE (781) 316-3120 FAX: (781) 316-3129

TRICIA O'DONOGHUE, CHAIR
BARBARA BOLTZ
AUGUSTA HAYDOCK
JACK JONES

CARYN COVE MALLOY
EQUAL OPPORTUNITY OFFICER

CONTRACTOR CERTIFICATION

During the performance of the Contract, the Contractor and all subcontractors (hereafter collectively referred to as "the Contractor") for a town construction contract or town assisted construction contract, for him/herself, his/her assignees and successors in interest, agree to comply with all applicable equal employment opportunity, non-discrimination and affirmative action requirements, including but not limited to the following:

The Contractor shall comply with the provisions of Town of Arlington Bylaws, Anti-Discrimination policies and Chapter 151B of the Massachusetts General Laws, as amended, and all other applicable anti-discrimination and equal opportunity laws, all of which are herein incorporated by reference and made a part of this contract.

In connection with the performance of work under this contract, the Contractor shall undertake, in good faith, affirmative action measures to eliminate any discriminatory barrier in the terms and conditions of employment on the grounds of race, color, religious creed, national origin, sex, gender identity, sexual orientation, age, genetic information, ancestry, children, marital status, veteran status or membership in the armed service, the receiving of public assistance, and handicap. Such affirmative action measures shall entail a list of positive and aggressive measures which shall include but not be limited to, advertising employment opportunities in minority and other community news media; notifying minority women and other community-based organizations of employment opportunities; maintaining a file of names and addresses of each worker referred to the Contractor and what action was taken concerning such worker; and notifying this Committee in writing when a union with whom the Contractor has a collective bargaining agreement has failed to refer a minority or woman worker.

The Contractor shall submit to the Equal Opportunity Advisory Committee, through the Purchasing Director Domenic Lanzillotti, the following Contractor's Certification with all attachments. The Contractor's Certification will be reviewed by the Committee and will inform the Contractor of any deficiencies to be corrected.

CONTRACTOR CERTIFICATION

_____ certifies that they:

(Contractor Name)

1. Will not discriminate in their employment practices.
2. Intend to use, if General Contractor, the following listed construction trades in the work under the contract:

3. If Trade Subcontractor, will provide the following work under the contract:

4. Will make good faith efforts to comply with the minority employee and women employee workforce participation ratio goals of the Town of Arlington and the Commonwealth of Massachusetts and specific affirmative steps contained herein; and to provide evidence of its good faith efforts. Attached hereto, please find:

- A. Employment Opportunities advertised in:

- B. Notification to Minority/Women/Community based Organizations such as:

C. List of workers referred to Contractor and note on what action was taken:

D. Written notification that Union/Local No. _____ failed to refer a Minority or
Female worker during the week of: _____

Signature of Officer

Date

Printed Name of Officer and Title

SECTION 011000

GENERAL REQUIREMENTS

1.1	Related Documents	1.11	Submittals
1.2	Project Requirements	1.12	Warranties
1.3	Specification Information	1.13	Cutting and Patching
1.4	Definitions	1.14	Temporary Facilities and Utilities
1.5	Industry Standards	1.15	Products and Substitutions
1.6	Codes and Regulations	1.16	Delivery, Storage and Handling
1.7	Progress Schedule	1.17	Record Documents
1.8	Schedule of Values	1.18	Project Close Out
1.9	Payment Requests	1.19	Final Cleaning and Repair
1.10	Procedures and Controls		

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.

1.2 PROJECT REQUIREMENTS

- A. Project Identification: Whittemore Park Improvements- Phase 1, Arlington, Massachusetts.
- B. Project Requirements for Temporary Utilities and Facilities:
- Utility Costs: The Contractor shall meter and pay for cost of utility services consumed, including electricity, water, gas and temporary heat.
 - Temporary Offices: A separate field office for the Architect and the Owner's Representative is not required.
 - Toilet Facilities: The Contractor shall provide and maintain temporary toilets outside the building.
- C. Permits and Fees: Apply for, obtain, and pay for permits, fees, and utility company backcharges required to perform the work. Submit copies to Architect.
- D. Codes: Comply with applicable codes and regulations of authorities having jurisdiction. Submit copies of inspection reports, notices and similar communications to Architect.
- E. Dimensions: Verify dimensions indicated on drawings with field dimensions before fabrication or ordering of materials. Do not scale drawings.
- F. Existing Conditions: Notify Architect of existing conditions differing from those indicated on the drawings.

- G. Contractor's Conduct on Premises: The Contractor and their employees shall behave in a respectful, courteous and safe manner. Abusive, harassing, and lewd behavior is prohibited. Music playing is prohibited. Alcohol, tobacco, and drug use is prohibited.

1.3 SPECIFICATION INFORMATION

- A. These specifications are a specialized form of technical writing edited from master specifications and contain deviations from traditional writing formats. Capitalization, underlining and bold print is only used to assist reader in finding information and no other meaning is implied.
- B. Except where specifically indicated otherwise, the subject of all imperative statements is the Contractor.
- C. Sections are generally numbered in conformance with Construction Specifications Institute Masterformat System. Numbering sequence is not consecutive. Refer to the table of contents for names and numbers of sections included in this Project.
- D. Pages are numbered separately for each section. Each section is noted with "End of Section" to indicate the last page of a section.

1.4 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "approved," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.5 INDUSTRY STANDARDS

- A. Referenced standards are part of the Contract Documents and have the same force and effect as if bound with these specifications.
- B. Except where specifically indicated otherwise, comply with the current standard in effect as of the date of the Owner/Contractor Agreement. Obtain copies of industry standards directly from publisher.
- C. The titles of industry standard organizations are commonly abbreviated; full titles may be found in Encyclopedia of Associations or consult Architect.

1.6 CODES AND REGULATIONS

- A. Comply with all applicable codes, ordinances, regulations and requirements of authorities having jurisdiction.
- B. Submit copies of all permits, licenses, certifications, inspection reports, releases, notices, judgments, and communications from authorities having jurisdiction to the Architect.

1.7 PROGRESS SCHEDULE

- A. Provide comprehensive bar chart schedule showing all major and critical minor portions of the work, sequence of work and duration of each activity. Update and reissue regularly, but not less than monthly.

1.8 SCHEDULE OF VALUES

- A. Prepare Schedule of Values to coordinate with application for payment breakdown. Submit at least 10 days before first payment application. Update and reissue regularly, but not less than monthly.

1.9 PAYMENT REQUESTS

- A. Provide three copies of each request on completely filled out copies of AIA G702 and continuation sheet G703. Substantiate requests with complete documentation; include change orders to date. Provide partial lien waivers for work in progress and full lien waivers for completed work.
- B. Record Drawing Certification: Certify as a part of each application for payment that the project record documents are current at the time of application is submitted. The Contractor shall require such drawings to be current as a condition of approving any payment to the trade Contractor and Subcontractor.
- C. Before first payment application, provide the following:
 - 1. List of subcontractors, suppliers and fabricators.
 - 2. Schedule of values.
 - 3. Progress schedule.
 - 4. Submittal schedule keyed to project schedule.
 - 5. List of Contractor's key project personnel.
 - 6. Copies of permits and other communications from authorities.
 - 7. Contractor's certificate of insurance.

8. Performance and payment bonds if required.
9. Unit price schedule.

D. Before final payment application, provide and complete the following:

1. Complete closeout requirements.
2. Complete punch list items.
3. Settle all claims.
4. Transmit record documents to Architect.
5. Prove that all taxes, fees and similar obligations have been paid.
6. Remove temporary facilities and surplus materials.
7. Change lock cylinders or cores.
8. Clean the work.
9. Submit consent of surety, if any, for final payment.

1.10 PROCEDURES AND CONTROLS

A. Project Meetings: Arrange for and attend meetings with the Architect and such other persons as the Architect requests to have present. The Contractor shall be represented by a principal, project manager, general superintendent or other authorized main office representative, as well as by the Contractor's field superintendent. An authorized representative of any subcontractor or sub-subcontractor shall attend such meetings if the representative's presence is requested by the Architect. Such representatives shall be empowered to make binding commitments on all matters to be discussed at such meetings, including costs, payments, change orders, time schedules and manpower. Any notices required under the Contract may be served on such representatives. Written reports of meeting minutes shall be prepared by the Contractor and distributed by the Contractor to attendees, the Architect, and Owner within three business days.

1. Pre-Construction Conference: Attendance by Architect, Contractor, major subcontractors. Agenda shall include: Quality of workmanship, coordination, interpretations, job schedule, submittals, approvals, requisition procedures, testing, protection of construction, indoor air quality, and construction waste management.
2. Exterior Envelope Meeting: Attendance by Architect, Contractor, major subcontractors. Agenda shall include as applicable: Review of exterior wall details, wall construction, sample panel preparation, cleaning, control and expansion joints, cold weather procedures.
3. Progress Meetings: Hold regularly before preparation of payment requests and additional meetings as requested by the Architect. Attendance by Architect, Contractor, and others as determined by Contractor. Agenda shall include work in progress and payment requests.
4. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction, as specified. Preinstallation Conferences may be part of Progress Meeting agenda. Attendance by Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow. Agenda shall include a review of progress of other construction activities and preparations for the particular activity under consideration.

B. Emergency Contacts: Furnish the Owner and Architect, in writing, the names and telephone numbers of individuals to be contacted in the event of an out-of-hours emergency at the building site. Post a similar list readily visible from the outside of the field office or a location acceptable to the Architect.

- C. Layout: Layout work and be responsible for all lines, elevations, and measurements of the building, grading, utilities and other work executed under the contract.
- D. Field Measurements: Verify measurements at the building prior to ordering materials or commencing work. No extra charge or compensation will be allowed because of differences between actual dimensions and measurements indicated on the Drawings. Differences which may be found shall be submitted to the Architect for decision before proceeding with the work.
- E. Field Measurements for Fixed Equipment: Dimensions for fixed equipment to be supplied under this Contract or separate contracts shall be determined by field measurements taken jointly by the Contractor and the equipment supplier involved. A record of the field measurements shall be kept until time of substantial completion of the project, or until the equipment has been fully installed and accepted by the Owner, whichever is later. Responsibility for fixed equipment fabricated accurately to field measurements for proper fit and operation shall be that of the Contractor. Contractor shall pay all costs involved in correcting any misfitting fixed equipment as fabricated.
- F. Project Limit Line: The boundaries of the site do not limit the responsibility of the Contractor to perform the work in its entirety. Make utility connections as indicated.
- G. Matching: Where matching is indicated, the Architect shall be the sole and final judge of what is an acceptable match. Mockups and sample submissions are required.
- H. Observation: Notify the Architect and authorities having jurisdiction at least thirty-six hours in advance of concealing any work.
- I. Utilities: Prior to interrupting utilities, services or facilities, notify the utility owner and the Owner and obtain their written approval a minimum 48 hours in advance.
- J. Clean-Up: Frequently clean-up all waste, remove from site regularly, and legally dispose of off-site.
- K. Installer's Acceptance of Conditions: All installers shall inspect substrates and conditions under which work is to be executed and shall report in writing to the Contractor all conditions detrimental to the proper execution and completion of the work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning work means installer accepts previous work and conditions.
- L. Coordination: The Contractor shall be fully responsible for coordinating all trades, coordinating construction sequences and schedules, and coordinating the actual installed location and interface of all work.
- M. Request For Interpretation (RFIs):
 - 1. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
 - a. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 - 2. Content of the RFI: Include a detailed, legible description of item needing interpretation.
 - 3. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow three working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.

4. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or RFIs with numerous errors.

- N. Existing Articles of Unusual Value: If during demolition, excavation, or disposal work articles of unusual value or of historical or archaeological significance are encountered, the ownership of such articles is retained by the Owner, and information regarding their discovery shall be immediately furnished to the Architect. If the nature of the article is such that work cannot proceed without danger of damage, work in the area shall be immediately discontinued until the Architect has determined the proper procedure to be followed. Delays in time thereby shall be a condition for which the time of the Contract may be extended. Costs incurred after discovery in the salvaging of such articles shall be borne by the Owner.

1.11 SUBMITTALS

- A. Required Submittals: Submit shop drawings, product data, initial selection samples, verification samples, calculations, coordination drawings, schedules, and all other submittals as specified in individual specification sections.
- B. Submittal Schedule: Within 30 days after award of contract and before first application for payment, prepare list of submittals in chronological sequence showing all submittals and proposed date first due at Architect's office and proposed date due to be returned to Contractor. Note relevant specification section number.
- C. Contractor's Preparation of Submittals: Modify and customize all submittals to show interface with adjacent work and attachment to building. Identify each submittal with name of project, date, Contractor's name, subcontractor's name, manufacturer's name, submittal name, relevant specification section numbers, and Submittal Schedule reference number. Stamp and sign each submittal to show the Contractor's review and approval of each submittal before delivery to Architect's office; unstamped and unsigned submittals will be returned without action by the Architect. Leave 4" x 6" open space for Architect's "action" stamp.
 1. Electronic Submittals: Provide a copy of all submittals in electronic format to the Architect. Architect will return a file of reviewed submittal in electronic format to the Contractor for distribution to subcontractors, suppliers, fabricators, governing authorities and others as necessary for proper performance of the Work. Unless otherwise amenable to the Architect, additional hard copies of submittals will not be reviewed by the Architect (or Consultant) and will not be returned to the Contractor.
 2. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 3. Name file with submittal number or other unique identifier, including revision identifier.
 4. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect and Construction Manager.
 5. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Architect.
- D. Product Data: Provide manufacturer's preprinted literature including, without limitation, manufacturer's standard printed description of product, materials and construction,

recommendations for application and use, certification of compliance with standards, instructions for installation, and special coordination requirements. Collect data into one submittal for each unit of work or system; mark each copy to show which choices and options are applicable to project.

1. Installer Copy: Verify that the Installer has a current copy of the relevant product data, including installation instructions, before permitting installation to begin.
- E. Shop Drawings: Provide accurately prepared, large scale and detailed shop drawings prepared specifically for this project. Show adjacent conditions and related work. Show accurate field dimensions and clearly note field conditions. Identify materials and products in the work shown. Note special coordination required.
1. After Architect's action, follow specified distribution procedure.
- F. Samples: Provide units identical with final materials and products to be installed in the work. Where indicated, prepare samples to match Architect's sample. Label each sample with description, source, generic name or manufacturer's name and model number. Architect will review samples for confirmation of visual design intent, color, pattern, texture and type only; Architect will not test samples for compliance with other Contract requirements which shall remain the exclusive responsibility of the Contractor.
1. Initial Selection Samples Submittal Quantities: For initial selection purposes, submit 1 set of samples showing the complete range of colors and finishes available.
 2. Verification Samples Submittal Quantities: For verification of an initial selection, submit 3 sets of samples; one set will be returned to Contractor to be maintained at project site for quality control comparisons.
- G. Timing of Submittals: Submit submittals in a timely fashion to allow at least 10 business days for each office's review and handling. This means that submittals which have to be reviewed by the Architect and one of their consultants require at least 20 business days for review and handling. Add ten business days for each additional consultant who must review a submission.
- H. Architect's Action on Submittals: Architect will review submittals, stamp with "action stamp", mark action, and return to Contractor. Architect will review submittals only for conformance with the design concept of the project. The Contractor is responsible for confirming compliance with other Contract requirements, including without limitation, performance requirements, field dimensions, fabrication methods, means, methods, techniques, sequences and procedures of construction, coordination with other work. The Architect's review and approval of submittals shall be held to the limitations stated in the Owner/Architect Agreement and the Conditions of the Contract. In no case shall approval or acceptance by the Architect be interpreted as a release of Contractor of their responsibilities to fulfill all of the requirements of the Contract Documents.
1. Required Resubmittal: Unless submittal is noted "reviewed" or "reviewed except as noted, resubmission not required," make corrections or changes to original and resubmit to Architect.
 2. Distribution: When submittal is noted "reviewed" or "reviewed as noted, resubmittal not required," make prints or copies and distribute to Owner, Subcontractors involved, and to all other parties requiring information from the submittal for performance or coordination of related work.

1.12 WARRANTIES

- A. Warranties Required: Refer to individual trade sections for specific product warranty requirements.
- B. Procurement: Where a warranty is required, do not purchase or subcontract for materials or work until it has been determined that parties required to countersign warranties are willing to do so.
- C. Warranty Forms: Submit written warranty to Owner through Architect for approval prior to execution. Furnish two copies of executed warranty to Owner for their records; furnish two additional conformed copies where required for maintenance manual.
- D. Work Covered: Contractor shall remove and replace other work of project which has been damaged as a result of failure of warranted work or equipment, or which must be removed and replaced to provide access to work under warranty. Unless otherwise specified, warranty shall cover full cost of replacement or repair, and shall not be pro-rated on basis of useful service life.
- E. Warranty Extensions: Work repaired or replaced under warranty shall be warranted until the original warranty expiration date or for ninety days whichever is later in time.
- F. Warranty Effective Starting Date: Guarantee period for all work, material and equipment shall begin on the date of substantial completion, not when subcontractor has completed their work nor when equipment is turned on. In addition to the one year guarantees for the entire work covered by these Contract Documents, refer to the various sections of the specifications for extended guarantee or maintenance requirements for various material and equipment.

1.13 CUTTING AND PATCHING

- A. Limitations: Do not cut and patch any work in a manner that would result in a failure of the work to perform as intended, decreased energy performance, increased maintenance, decreased operational life, or decreased safety.
 - 1. Structural Work: Do not cut structural work or bearing walls without written approval from Architect. Where cutting and patching of structural work is necessary and approved by Architect, perform work in a manner which will not diminish structural capacity nor increase deflection of member. Provide temporary shoring and bracing as necessary. Ensure the safety of people and property at all times.
- B. Cutting and Patching Materials: Use materials identical to materials to be cut and patched. If identical materials are not available or cannot be used, use materials that match existing materials to the greatest extent possible. Provide finished work that will result in equal to or better than existing performance characteristics.
- C. Inspection: Before cutting and patching, examine surfaces and conditions under which work is to be performed and correct unsafe and unsatisfactory conditions prior to proceeding.
- D. Protection: Protect adjacent work from damage. Protect the work from adverse conditions.
- E. Cutting: Cut work using methods least likely to damage adjoining work. Use tools designed for sawing or grinding, not hammering or chopping. Use saws or drills to ensure neat, accurately formed holes to sizes required with minimum disturbance to adjacent work. Temporarily cover openings; maintain weathertightness and safety.

1. Utilities: Locate utilities before cutting. Provide temporary utilities as needed. Cap, valve, or plug and seal ends of abandoned utilities to prevent entrance of moisture or other foreign matter.
- F. Patching: Patch with seams and joints which are durable and not visible. Comply with specified tolerances for similar new work; create true even planes with uniform continuous appearance. Restore finishes of patched areas and, if necessary, extend finish restoration onto adjoining unpatched area to eliminate evidence of patching and refinishing. Repaint entire assemblies, not just patched area. Remove and replace work which has been cut and patched in a visually unsatisfactory manner as determined by the Architect.
- G. Qualifications: Retain experienced and specialized firms, original installers if possible, to perform cutting and patching. Workmen shall be skilled in type of cutting and patching required.

1.14 TEMPORARY FACILITIES AND UTILITIES

- A. Scope of Temporary Work: This article is not intended to limit the scope of temporary work required under the Contract. Provide all temporary facilities and utilities needed.
- B. Permits and Fees: Obtain and pay for all permits, fees and charges related to temporary work.
- C. Codes and Authorities Having Jurisdiction for Temporary Facilities and Utilities: Comply with all requirements of authorities having jurisdiction, codes, utility companies, OSHA, and industry standards including, but not limited to the following:
 1. NFPA Code 241, Building Construction and Demolition Operations.
 2. ANSI-A10 Series, Safety Requirements for Construction and Demolition.
 3. NECA National Joint Guideline NJG-6, Temporary Job Utilities and Services.
 4. Electrical Service: NEMA, NECA, and UL.
- D. Field Offices: Provide Contractor's field offices as needed. Keep current copies of all Contract Documents and project paperwork neatly on file at jobsite. Permit Architect's unrestricted use of Contractor's field office facilities including copiers, telephones, plan tables, and other equipment. Furnish, maintain, and pay for light, power, phone, fax, and other field office services.
- E. Shops and Sheds: At Contractor's option, provide shops and sheds for Contractor's use as needed. Locate shops and sheds where acceptable to Owner and authorities having jurisdiction. Prior to completion of construction, temporary storage facilities and surplus stored materials shall be removed from the site.
- F. Storage/ Laydown Area: The Contractor will be allowed the use of an area within the adjacent parking lot as parking, storage, and a laydown area as required for the duration of the project as required.
- G. Temporary Heat: Provide temporary heat as needed to protect the work and create a suitable work environment. Provide temporary heat to protect the exterior construction against injury or damage resulting from cold temperature and dampness, to heat materials, and to maintain the minimum temperatures specified herein and in individual specification sections. Protect building from soot, smoke and fire damage. Do not use heaters which would interfere with curing of mortar and grout or damage any materials.

1. Heaters for temporary heat shall be approved temporary steam generators or forced warm air heaters located outside the building or vented to the outside, or other safety type UL approved heating devices acceptable to the Architect.
 2. Oil burning salamander type heaters will not be permitted. Non-vented, open flame heaters will not be permitted inside the building once the building is closed-in.
 3. Propane type-heaters will not be permitted within the area of the building or near stockpiles of combustible materials.
 4. Permanent building equipment shall not be used without written permission from the Owner. If the equipment is used for temporary heating or cooling, it shall be adequately maintained per manufacturer's instructions and protected with filters, strainers, controls, reliefs, and similar items. Prior to turnover to Owner, the equipment shall be in a clean, like new condition. The guarantee period shall not start until the equipment is turned over to the Owner for their use. Do not invalidate existing warranty by any action or failure to act. Clean and change air filters frequently to prevent construction dust and debris from contaminating system.
- H. Pumping and Drainage: Protect excavations, trenches, buildings and materials from rain water, ground water, backup or leakage of sewers, drains and other piping, and from water of any other origin. Promptly remove any accumulation of water. Provide and operate all pumps, piping and other equipment necessary for pumping, drainage and protection from water.
- I. Temporary Enclosures: Provide temporary enclosures to maintain proper temperatures and to prevent weather damage. Always maintain legal means of egress.
- J. Snow and Ice: Remove all snow and ice which interferes with work or safety.
- K. Streets, Walks and Grounds: Maintain public and private roads and walks clear of debris caused by construction operations. Repair all damage caused to streets, drives, curbs, sidewalks, fences, poles and similar items where disturbed or damaged by building construction and leave them in as good condition after completion of the work as before operations started.
- L. Protection: Protect nearby property and the public from construction activities. Provide and maintain barricades, warning signs and lights, railings, walkways and similar items. Immediately repair damaged property to its condition before being damaged.
- M. Construction Fencing: Provide construction fencing and barriers as applicable to the project to protect personnel, the public, and to control access.
1. Provide fencing of adequate size to allow ongoing construction work, material storage and dumpster.
- N. Security: Secure site against unauthorized entry at all times. Provide secure, locked temporary enclosures. Protect the work at all times. Provide watchman service, if necessary, to protect the work.
- O. Signs: Erect project identification signs in compliance with details to be provided by Architect. Signs shall be minimum 4' x 8' exterior grade plywood and shall contain the names of the project, Owner, Architect, major Consultants, Contractor, and major financing institution. Except for safety and warning signs, no other signs are permitted. Location as acceptable to the Architect.
- P. Fire Prevention: Take every precaution to prevent fire. Provide and maintain in good operating condition suitable and adequate fire protection equipment and services, and comply with

recommendations regarding fire protection made by the representative of the fire insurance company carrying insurance on the Work or by the local fire chief or fire marshal. The area within the site limits shall be kept orderly and clean, and all combustible rubbish shall be promptly removed from the site.

- Q. Egress: Maintain safe and legal means of egress at all times. At all times, provide at least two separate means of egress.

1.15 PRODUCTS AND SUBSTITUTIONS

- A. Specified Products: In all cases in which a manufacturer's name, trade name or other proprietary designation is used in connection with materials or articles to be furnished under this Contract, whether or not the phrase "or equal" is used after such name, the Contractor shall provide the product of the named manufacturers without substitution, unless a written request for a substitution has been submitted by the Contractor and approved in writing by the Architect.
- B. Deviations from Detailed Requirements: If the Contractor proposes to use material which, while suitable for the intended use, deviates in any way from the detailed requirements of the Contract Documents, the Contractor shall inform the Architect in writing of the nature of such deviations at the time the materials is submitted for approval, and shall request written approval of the deviation from the requirements of the Contract Documents.
- C. Approval of Substitutions: In requesting approval of deviations or substitutions, the Contractor shall provide evidence, including, but not limited to manufacturer's data, leading to a reasonable certainty that the proposed substitution or deviation will provide a quality of result at least equal to that attainable if the detailed requirements of the Contract Documents were strictly followed. If, in the opinion of the Architect, the evidence presented by the Contractor does not provide a sufficient basis for such reasonable certainty, the Architect may reject such substitution or deviation without further investigation.
- D. Intent of Contract Documents: The Contract Documents are intended to produce a landscape of consistent character and quality of design. All components of the landscape have been selected to have a coordinated design in relation to the overall appearance of the project. The Architect shall judge the design and appearance of proposed substitutes on the basis of the suitability in relation to the overall design of the Project, as well as for their intrinsic merits. The Architect will not approve as equal to materials specified proposed substitutes which in the Architect's opinion, would be out of character, obtrusive, or otherwise inconsistent with the character or quality of design of the Project. In order to permit coordinated design of color and finishes the Contractor shall furnish the substituted material in any color, finish texture, or pattern which would have been available from the manufacturer originally specified, at no additional cost to the owner.
- E. Additional Costs or Impact: Any additional cost, or any loss or damage arising from the substitution of any material or any method for those originally specified shall be borne by the contractor, notwithstanding approval or acceptance of such substitution by the Owner or the Architect, unless such substitution was made at the written request or direction of the Owner and the Architect. Any decrease in the cost of the substitution shall be returned to the Owner.
- F. Manufacturers: To the greatest degree possible, provide primary materials and products from one manufacturer for each type or kind. Provide secondary materials as recommended by manufacturers of primary materials.

- G. Substitution Requests: Refer to Section 016200 - SUBSTITUTION REQUEST FORM. Submit 3 copies. Identify product to be replaced by substitute by reference to specification sections and drawing numbers. Provide Contractor's certification and evidence to prove compliance with Contract Document requirements as acceptable to Architect.
- H. Substitution Conditions: Substitution requests will be returned without action unless one of the following conditions is satisfied. The Contractor shall state which of the following conditions applies to the requested substitution:
1. Request is due to an "or equal" clause.
 2. Specified material or product cannot be coordinated with other work.
 3. Specified material or product is not acceptable to authorities having jurisdiction.
 4. Substantial advantage is offered Owner in terms of cost, time, or other valuable consideration.
 5. Specified material or product is not available.
- I. Invalid Substitutions: Contractor's submittal and Architect's acceptance of shop drawings, samples, product data or other submittal is not a valid request for, nor an approval of a substitution unless the Contractor presents the information when first submitted as a Request for Substitution.

Compatibility of Materials Used in the Work:

1. Ensure complete compatibility between materials.
2. Compatibility shall include adhesion, erosion, solubility, differential thermal response, and galvanic action.
3. Provide evidence of compatibility.
4. Provide custom testing where evidence is not available.
5. Where materials are not compatible, provide necessary isolation or transition materials and provide details of same.
6. Correct defects resulting from incompatibility including de-construction and re-construction of assemblies – whether materials are part of a submittal and substitution process or not.
7. Proposed substitutions may be rejected where compatibility information is not provided; or where compatibility is not adequately addressed, according to the Architect's judgment; or where incompatible materials would negatively impact the project's success.

1.16 DELIVERY, STORAGE AND HANDLING

- A. Manufacturer's Instructions: Strictly comply with manufacturer's instructions and recommendations and prevent damage, deterioration and loss, including theft. Minimize long-term storage at the site. Maintain environmental conditions, temperature, ventilation, and humidity within range permitted by manufacturers of materials and products used.

1.17 RECORD DOCUMENTS

- A. General: Keep record documents neatly and accurately. Record information as the work progresses and deliver to Architect at time of final acceptance. Include in record documents all field changes made, all relevant dimensions, and all relevant details of the work. Keep record documents up to date with all field orders and change orders clearly indicated.
- B. Drawings: Keep four separate sets of blackline prints at the site. Neatly and accurately note all deviations from the Contract Documents and the exact actual location of the work as installed.

Marked-up and colored prints will be used as a guide to determine the progress of the work installed. Requisitions for payment will not be approved until the record documents are accurate and up-to-date.

1. At completion of the work, submit one complete set of marked-up prints for review. After acceptance, these marked-up prints shall be used in the preparation of the record drawings.
 2. Architect shall furnish Contractor with AutoCAD files for originals of the Contract Drawings. Make modifications to these files as shown on the marked-up prints. Remove superseded data to show the completed installation.
 3. Deliver the completed AutoCAD record drawings, in the same version as Contract Drawings, properly titled and dated to the Architect. Indicate preparer of record drawings. These record drawings shall become the property of the Owner.
- C. Specifications: Maintain one clean copy of complete specifications [including addenda, modifications, and bulletins with changes, substitutions, and selected options clearly noted. Circle or otherwise clearly indicate which manufacturer and products are actually used.
- D. Operating and Maintenance Manuals: Manuals shall be submitted which contain the following:
1. Description of the system provided.
 2. Handling, storage, and installation instructions.
 3. Detailed description of the function of each principal component of the systems or equipment.
 4. Operating procedures, including prestartup, startup, normal operation, emergency shutdown, normal shutdown and troubleshooting.
 5. Maintenance procedures including lubrication requirements, intervals between lubrication, preventative and repair procedures, and complete spare parts list with cross reference to original equipment manufacturer's part numbers.
 6. Safety and environmental considerations.
- E. Copies of Operating and Maintenance Manuals: Three copies of the manuals shall be provided within sufficient time to allow for training of Owner's personnel. Submit one copy of the manuals to the Architect for review no later than 90 calendar days prior to substantial completion, or building turn over, whichever comes first. Submit the remaining five copies within 15 days after first review set is returned to contractor. Progress payment may be withheld if this requirement is not met.
- 1.18 PROJECT CLOSE OUT
- A. Complete the following prior to Substantial Completion:
1. Provide Contractor's Punch List of incomplete items stating reason for incompleteness and value of incompleteness.
 2. Advise Owner of insurance change over requirements.
 3. Submit all warranties, maintenance contracts, final certificates and similar documents.
 4. Obtain Certificate of Occupancy and similar releases which permit the Owner's full and unrestricted use of the areas claimed "Substantially Complete".
 5. Submit record documents.
 6. Deliver maintenance stocks of materials where specified.
 7. Complete startup of all systems and instruct Owner's personnel in proper operation and routine maintenance of systems and equipment.
 8. Complete clean up and restoration of damaged finishes.
 9. Remove all temporary facilities and utilities that are no longer needed.

10. Request Architect's inspection for Substantial Completion.

B. Architect will either issue a Certificate of Substantial Completion or notify Contractor of work which must be performed prior to issue of certificate.

C. Complete the following prior to Final Acceptance and payment:

1. Obtain Certificate of Substantial Completion.
2. Submit final application for payment, showing final accounting of changes in the work.
3. Provide final releases and lien waivers not previously submitted.
4. Submit certified copy of final punch list stating that Contractor has completed or corrected each item.
5. Submit final meter readings, record of stored fuel and similar information.
6. Submit Consent of Surety for final payment.
7. Submit evidence of Contractor's continuing insurance coverage (if required by Contract Documents).

1.19 FINAL CLEANING AND REPAIR

A. Clean Up: Immediately prior to the Architect's inspection for Substantial Completion, the Contractor shall completely clean the premises and clean and prepare the completed work in order for it to be used for its intended purpose in accordance with the Contract Documents.

B. Pest Control: Engage a licensed exterminator, who practices integrated pest management (IPM), to inspect the project and eliminate rodents, termites and all other insects and pests. Coordinate pest control plan with Owner. Owner's written approval is required prior to application. Submit proposed program to Owner and Architect. Program shall clearly indicate the following:

1. Area or areas to be treated.
2. Manufacturer's printed instructions and MSDS for each chemical to be used.
3. Pollution preventive measures to be employed.

C. Repairs: Repair and touch-up all damaged and deteriorated products and surfaces.

PART 2 - PRODUCTS [Not Used]

PART 3 - EXECUTION [Not Used]

END OF SECTION

DOCUMENT 012200

UNIT PRICES

PART 1 GENERAL

1.00 GENERAL PROVISIONS

- A. Attention is directed to the PROCUREMENT AND CONTRACTING REQUIREMENTS and all Sections within DIVISION 01, GENERAL REQUIREMENTS, which are made a part of this Section of the Specifications.

1.01 SUMMARY

- A. This section establishes pre-agreed upon prices, per certain units of work, as a means to determine adjustments to the Contract Price in the event of changes to the scope of the project. The Unit Prices listed below are not to be used to tabulate the extent of the project or for use in determining the lump sum bid.

1.02 RELATED REQUIREMENTS

- A. Refer to GENERAL CONDITIONS for limitations.
- B. Examine Contract Documents for requirements that affect work of this Section.

1.03 QUANTITIES AND COST ADJUSTMENTS

- A. As soon as the work involved in each unit cost item has been completed, submit documentation to establish the actual quantities provided. Submit to the Architect for review and issuance of Change Order.
- B. Change Order amount for each unit cost item will be based on actual quantities multiplied by the unit cost. This unit cost includes all mark-ups applicable taxes, overhead, and profit as described below.

1.04 UNIT PRICES

- A. Should certain work be increased or decreased from those required by the Contract Documents, by authorization and at the option of the Owner, the below unit prices shall, be the basis of payment to the Contractor or credit to the Owner, for such increase or decrease in the work. The Unit Prices shall represent the exact net amount per unit to be paid the Contractor (in the case of additions or increases) or to be refunded the Owner (in the case of decreases). No additional adjustment will be allowed for overhead, profit, insurance, or other direct or indirect expenses of the Contractor or Subcontractors. No additional adjustments will be allowed for over excavation, overblasting, or other work without the prior written approval of the Owner.

<u>Unit</u>	<u>Add</u>	<u>Deduct</u>
1. Remove tree, per inch tree caliper	\$ _____	\$ _____
2. Exposed aggregate pavement, complete, per sq yd	\$ _____	\$ _____

<u>Unit</u>	<u>Add</u>	<u>Deduct</u>
3. Tinted exposed aggregate pavement, complete, per sq yd	\$ _____	\$ _____
4. Resin bound aggregate paving, complete, per sq yd	\$ _____	\$ _____
5. Reset standard granite curb, complete in place, per lin. ft.	\$ _____	\$ _____
6. Reset wide granite curb, complete in place, per lin. ft.	\$ _____	\$ _____
7. Bench with footings, complete, each	\$ _____	\$ _____
8. Post light with footings, complete, each	\$ _____	\$ _____
9. Wood rail with metal bracket, complete, per lin. ft.	\$ _____	\$ _____
10. Trash Receptacle with footing, complete, each	\$ _____	\$ _____
11. Sod, furnished and installed complete, per sq ft.	\$ _____	\$ _____
12. Hydroseed, furnished and installed complete, per sq. ft.	\$ _____	\$ _____
13. Mulch, furnished and installed complete, per sq ft.	\$ _____	\$ _____
14. Shrub – Hydrangea quercifolia, 3’ B&B, furnished and installed complete, each	\$ _____	\$ _____
15. Shrub – Fothergilla gardenii, #5 pot, furnished and installed, each	\$ _____	\$ _____
16. Shrub – Clethra Alnifolia ‘Hummingbird”, #5 pot, furnished and installed, each	\$ _____	\$ _____
17. Shrub – Ilex glabra ‘Shamrock’, #5 pot, furnished and installed, each	\$ _____	\$ _____
18. Ground Cover– Vinca minor, 4” pot, furnished and installed complete, each	\$ _____	\$ _____
19. Planting soil, as specified, per c.y.	\$ _____	\$ _____

B. The above unit prices shall include all labor, materials, dewatering, shoring, removal, overhead, profit, insurance, etc., to cover the finished work of the several kinds called for. Changes shall be processed in accordance with the provisions of the Document 005210, AGREEMENT FORM governing Changes in the Work and Section 012600, CONTRACT MODIFICATION PROCEDURES.

C. The above unit prices shall be guaranteed through December 31, 2021.

END OF SECTION



SUBMITTAL TRANSMITTAL

Project: _____ Date: _____
A/E Project Number: _____

TRANSMITTAL A To (Contractor): _____ Date: _____ Submittal No. _____
From (Subcontractor): _____ By: _____ [] Resubmission

Table with 4 columns: Qty., Reference / Number, Title / Description / Manufacturer, Spec. Section Title and Paragraph / Drawing Detail Reference

- Submitted for review and approval
Resubmitted for review and approval
Complies with contract requirements
Will be available to meet construction schedule
A/E review time included in construction schedule
Substitution involved - Substitution request attached
If substitution involved, submission includes point-by-point comparative data or preliminary details
Items included in submission will be ordered immediately upon receipt of approval

Other remarks on above submission: [] One copy retained by sender

TRANSMITTAL B To (A/E): _____ Attn: _____ Date Rec'd by Contractor: _____
From (Contractor): _____ By: _____ Date Trnsmt'd by Contractor: _____

- Approved
Approved as noted
Revise / Resubmit
Rejected / Resubmit

Other remarks on above submission: [] One copy retained by sender

TRANSMITTAL C To (Contractor): _____ Attn: _____ Date Rec'd by A/E: _____
From (A/E): _____ [] Other By: _____ Date Trnsmt'd by A/E: _____

- Approved
Approved as noted
Not subject to review
No action required
Revise / Resubmit
Rejected / Resubmit
Approved as noted / Resubmit
Provide file copy with corrections identified
Sepia copies only returned
Point-by-point comparative data required to complete approval process
Submission Incomplete / Resubmit

Other remarks on above submission: [] One copy retained by sender

TRANSMITTAL D To (Subcontractor): _____ Attn: _____ Date Rec'd by Contractor: _____
From (Contractor): _____ By: _____ Date Trnsmt'd by Contractor: _____

Copies: [] Owner [] Consultants [] _____ [] _____ [] _____ [] One copy retained by sender



SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST

Project: _____

To (A/E): _____

From (Contractor): _____
Date: _____
A/E Project Number: _____
Contract For: _____

List Subcontractors and Major Material Suppliers proposed for use on this Project as required by the Construction Documents. Attach supplemental sheets if necessary.

Section Number	Section Title	Firm	Address	Phone Number (Fax Number)	Contact
----------------	---------------	------	---------	---------------------------	---------

Attachments

Signed by: _____ Date: _____

Copies: Owner Consultants _____ _____ _____ _____ _____ _____ File

DOCUMENT 014339

MOCK-UP REQUIREMENTS

PART 1 GENERAL

1.00 GENERAL PROVISIONS

- A. Attention is directed to the PROCUREMENT AND CONTRACTING REQUIREMENTS and all Sections within DIVISION 01, GENERAL REQUIREMENTS, which are made a part of this Section of the Specifications.

1.01 SUMMARY

- A. Furnish and install mock-ups suitable to illustrate finish colors, materials and methods of construction. Maintain mock-ups as standard of colors, patterns, materials, performance and workmanship for entire project.
- B. Contractor shall be required to set aside a minimum of 200 square feet of area dedicated exclusively for mock-up construction and exhibition for the entire life of the Contract.

1.02 RELATED REQUIREMENTS

- A. Examine Contract Documents for requirements that affect Work of this Section. Other Specification Sections that directly relate to Work of this Section include, but are not limited to:
 - 1. Section 011000, GENERAL REQUIREMENTS.
 - 2. Individual Specification Sections that specify field mock-ups of individual pieces of the Work.

1.03 SUBMITTALS

- A. Samples: Refer to individual Specification Sections for submittal requirements of mock-up components and coordinate accordingly

1.04 QUALITY ASSURANCE

- A. Design Modifications: Make design modifications to work only as required to meet performance requirements and to coordinate the work. Indicate proposed design modifications on shop drawings. Maintain original design concept without altering profiles and alignments indicated.

1.05 MOCK-UP SCHEDULE

- A. Contractor shall prepare "Mock-Up Site" immediately following mobilization to allow the maximum quantity of time for Architect's viewing and examination.
- B. Mock-ups shall be completed for Architect's examination at least 45 days prior to scheduled start of construction or fabrication, as applicable for each type of work, unless otherwise specified.
- C. Refer to attached mock-up schedule for list of required mock-ups and related types

and sizes. This list is not intended to be all inclusive. Contractor shall be responsible for all mock-ups required under each individual specification section.

PART 2 PRODUCTS

2.01 MATERIALS AND PRODUCTS

- A. Provide materials, components, and products for exterior assembly as specified in individual specification sections.

PART 3 EXECUTION

3.01 GENERAL

- A. Refer to PART 1, GENERAL PORTIONS OF THE VARIOUS Specification Sections for specific requirements regarding condition of surfaces, mockup size, erection, and erection tolerances.

3.02 MOCK-UP PROCEDURES

- A. Provide mock-ups and field samples of finishes at project as required by individual Specification Sections.
 - 1. Mock-ups shall not be used in final, completed work.
 - 2. Architect may reject, or withhold action on mock-ups requiring coordination with other mock-ups until related mock-ups are constructed and reviewed by Architect.
- B. Contractor shall erect field samples and mock-ups at the Project "Mock-Up Site", at location acceptable to Architect. Size of individual mock-up, protection of mock-up and removal and disposal of mock-up shall be as specified in individual Specification Section.
 - 1. Modify and customize mock-ups as required to show interface with adjacent work and attachment to structures or building.

3.03 PROTECTION OF MOCK-UPS

- A. Mock-ups shall be adequately protected from damage until they are no longer necessary.

3.04 REMOVAL AND DISPOSAL OF MOCK-UPS

- A. Demolish and remove mock-ups from site at completion of the Project. Legally dispose of demolished mock-up materials.

END OF SECTION

SECTION 015690

TEMPORARY TREE AND PLANT PROTECTION

PART 1 GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the PROCUREMENT AND CONTRACTING REQUIREMENTS and all Sections within DIVISION 01, GENERAL REQUIREMENTS, which are made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Protection of existing trees and plants from damage as a result of the Contractor's operations including, but not limited to:
 - 1. Tree protection fencing.
 - 2. Root pruning and construction pruning.
 - 3. Airspading of root zones.
 - 4. Root invigoration and fertilization.

1.3 RELATED REQUIREMENTS

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Section 024113, SELECTIVE SITE DEMOLITION AND REMOVALS: Clearing and grubbing.
 - 2. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING: Excavation and backfill.
 - 3. Section 329300, TREES, PLANTS, AND GROUND COVERS: New plant material.

1.4 REFERENCE STANDARDS

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. American National Standards Institute (ANSI):
 - Z133.1 Safety Requirements for Pruning, Trimming, Repairing, Maintaining and Removing Trees, and for Cutting Brush.
 - 2. International Society of Arboriculture (ISA):

Guide Guide for Establishing Values of Trees and Other Plants

3. National Arborist Association (NAA):

Ref. 1 Pruning Standards for Shade Trees

1.5 SUBMITTALS

- A. Prepare and submit drawings indicating the extent of tree protection fencing required.
- B. Proposed methods, and schedule for effecting tree and plant protection shall be submitted for approval.
- C. Proposed methods, materials, and schedule for root pruning, construction pruning, root invigoration, and tree fertilization by Certified Arborist shall be submitted for approval.

1.6 QUALITY ASSURANCE

- A. All tree work shall be performed by a professional Certified Arborist with a minimum five years experience, who has successfully completed a certification program equal to the Massachusetts Certified Arborist (MCA) program/examination sponsored by the Massachusetts Arborists Association, 8-D Pleasant Street, South Natick, MA 01760; (508) 653-3320; FAX: (508) 653-4112; E-mail: MaarbAssn@aol.com.

1.7 DAMAGE PENALTIES

- A. Certain specimen trees within the construction areas and in other key locations will be identified by the Owner and the Architect, and marked with red tags. Loss of any of these trees will result in fines assessed at \$10,000 per tree. Damage to all other trees on the property will be assessed at the rate of \$200 per inch caliper of the tree.
- B. A fine of \$1,000 will be levied against the Contractor for each incident of construction inside tree protection areas.
- C. Damages to trees, shrubs, and other vegetation will be assessed by the Architect and Owner in accordance with the ISA Guide.
- D. Trees or roots visibly damaged will cause the Owner to withhold from the Contractor an assessed amount conforming to the requirements stipulated above for a period of two years. After that period the impact of the damage to any tree will be assessed accordingly.
- E. If any trees or shrubs designated to be saved are damaged and replacement is required, a number and diameter of trees or shrubs of the same species and variety, as specified by the Owner and Architect, shall be furnished and planted by the Contractor. The total inch diameter of the replacement trees or shrubs shall equal the diameter of the tree or shrub to be replaced.

1.8 PRECONSTRUCTION TREE PREPARATION

- A. Trees to remain inside or within 20 ft. of Limit of Work, shall be inspected by Certified Arborist prior to commencement of work. Based on arborist's evaluation, pre-emptive

measures shall be taken to reduce harm to trees and to the site work.

- B. Pre-emptive measures shall include, but not be limited to, deadwood removal, root pruning with airspade, feeding, structural pruning, spraying, root invigoration, or other horticultural treatments to improve vigor of affected plants.

PART 2 PRODUCTS

2.1 TREE PROTECTION FENCING

- A. Tree protection fencing shall be the following:
 - 1. Galvanized chain link fencing, 4 ft. high.
 - 2. Fabric shall be a good commercial quality of steel wire of 2 in. mesh and 11 gauge.
 - 3. Fittings shall be malleable iron casting, wrought iron forgings, or pressed steel and provided with pin connections. Equipment shall be designed to carry 100% overload.
 - 4. Piping shall be steel conforming to ASTM A 120 except that pipe shall be unthreaded and untested for water pressure.
- B. Stakes for fencing shall be 7 ft. galvanized steel posts, driven a minimum of 3 ft. into the ground. Posts shall be spaced 10 ft. o.c. maximum.
- C. For fencing within the drip line of trees, surface mounted post anchors may be acceptable. Review with Architect and arborist and obtain written approval prior to installing. Post installation shall not damage tree root systems.

2.2 ROOT PRUNING

- A. Peat moss and mulch materials shall be as specified under Section 329300, TREES PLANTS, AND GROUND COVERS.
- B. Liquid fertilizer to be applied to root pruned and construction pruned trees shall be Peters M 77 Sequestered-Chelated Soluble Fertilizer manufactured by W.R. Grace and Co., Cambridge, MA 02140, Gold Start Liquid Fertilizer, manufactured by Nutra-Flo Company, 1919 Grand Ave, Sioux City, IA 51106-5708; Phone: 712-277-2011; 800-831-4815; Fax: 712-279-1946; Agro- Culture Liquid Fertilizer, manufactured by Agro-Culture Liquid Fertilizers, 3055 W. M-21, P.O. Box 150, St. Johns, Michigan 48879; 1-800-678-9029, or approved equal. Liquid fertilizer shall be approved by Certified Arborist.
- C. Dormant oil spray shall be a dormant miscible spray equal to Sunspray, Scalecide, or Volck Oil.
- D. Insecticide shall be Isotox manufactured by Ortho; QuickPRO, manufactured by Monsanto; LESCO Sevin Brand SL, #019106, manufactured by LESCO, or approved equal. Insecticide shall be approved by Certified Arborist.

PART 3 EXECUTION

3.1 INSTALLATION OF FENCING

- A. Prior to start of demolition work and clearing and grubbing operations, tree protection fencing shall be installed in accordance with the following:
 - 1. Fencing shall be installed at the tree protection areas indicated on the Drawings.
 - 2. Fencing shall be installed at the drip line of trees to be protected, unless otherwise approved by the Architect.

3.2 ROOT PRUNING

- E. Where construction will be within drip line of existing trees designated to remain, roots shall be pruned with airspade., and as indicated on the drawings.
- F. All root pruning shall be done by Certified Arborist only. Trenching, vibrating plow, and stump grinding are NOT suitable means for root pruning.
- G. Roots greater than 1 in. diameter shall be pruned by means of a hand saw, or other approved means.
- H. Install root protection measures as prescribed by Certified Arborist.

3.3 ROOT INVIGORATION

- A. Certified Arborist to provide plan for improving soil conditions by addressing soil compaction and promoting efficient root growth in selected areas. Conditions to be addressed include but are not limited to soil compaction, poor soil nutrients, and girdling roots.
- B. Methods to address poor soil conditions to include but not be limited to root collar excavation, air-tilling of roots to find fine roots, incorporating organic matter, fertilizing, importing loam or topsoil, and applying mulch.

3.4 CONSTRUCTION PRUNING

- A. Construction pruning shall conform to NAA Ref.1 for Class IV - Crown Reduction Pruning. Work shall conform to the requirements of ANSI Z133.1, and shall be reviewed in the field with the Architect and Certified Arborist prior to start of work.

3.5 FERTILIZATION AND INSECT SPRAYING

- A. Root pruned and construction pruned tree shall be treated with liquid fertilizer, dormant oil spray, and insecticide as prescribed by Certified Arborist.
- B. Liquid fertilizer shall be applied at a rate recommended by the manufacturer and as required by NAA Ref. 2.
- C. Dormant oil spray shall be applied in early spring before buds begin to swell at a rate recommended by the manufacturer.
- D. Insecticide spray shall be applied twice to root pruned trees following application of

dormant oil spray. Spray insecticide at rates recommended by spray manufacturer at intervals appropriate for effective insect control.

3.6 REMOVAL OF PROTECTION

- A. All protection shall remain in place throughout the construction period. Remove protection devices only after written permission has been granted by the Architect.

END OF SECTION



SUBSTITUTION REQUEST (After the Bidding Phase)

Project: _____ Substitution Request Number: _____

 From: _____
 To: _____ Date: _____

 A/E Project Number: _____
 Re: _____ Contract For: _____

Specification Title: _____ Description: _____
 Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____
 Manufacturer: _____ Address: _____ Phone: _____
 Trade Name: _____ Model No.: _____
 Installer: _____ Address: _____ Phone: _____
 History: New product 2-5 years old 5-10 yrs old More than 10 years old
 Differences between proposed substitution and specified product: _____

Point-by-point comparative data attached - REQUIRED BY A/E

Reason for not providing specified item: _____

Similar Installation:
 Project: _____ Architect: _____
 Address: _____ Owner: _____
 _____ Date Installed: _____

Proposed substitution affects other parts of Work: No Yes; explain _____

Savings to Owner for accepting substitution: _____ (\$ _____).
 Proposed substitution changes Contract Time: No Yes [Add] [Deduct] _____ days.

Supporting Data Attached: Drawings Product Data Samples Tests Reports _____

SUBSTITUTION REQUEST (Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

Attachments: _____

A/E's REVIEW AND ACTION

- Substitution approved - Make submittals in accordance with Specification Section 01330.
- Substitution approved as noted - Make submittals in accordance with Specification Section 01330.
- Substitution rejected - Use specified materials.
- Substitution Request received too late - Use specified materials.

Signed by:

Date:

Additional Comments: Contractor Subcontractor Supplier Manufacturer A/E _____

DOCUMENT 018900

SITE CONSTRUCTION PERFORMANCE REQUIREMENTS

PART 1 GENERAL

1.00 GENERAL PROVISIONS

- A. Attention is directed to the PROCUREMENT AND CONTRACTING REQUIREMENTS and all Sections within DIVISION 01, GENERAL REQUIREMENTS, which are made a part of this Section of the Specifications.

1.01 SUMMARY

- A. This Section specifies the general requirements for the site work included in the Contract.
- B. These requirements supplement those contained in the Standard General Conditions of the Construction Contract and their Supplemental Conditions.
- C. References are included in this Section to Articles of the General Conditions to call the Contractor's attention to frequently needed requirements.

1.02 PERMITS

- A. Unless otherwise provided in the Supplementary Conditions, the Contractor shall obtain and pay for all construction permits and licenses. The Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. The City will waive all fees associated with permits.

1.03 LAWS AND REGULATIONS

- A. Contractor shall give all notices and comply with all laws and regulations applicable to furnishing and performance of the Work.
- B. If the Contractor performs any work that is contrary to laws or regulations, the Contractor shall bear all claims, costs, losses and damages caused by, arising out of or resulting therefrom.

1.04 UTILITIES

- A. Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing underground facilities (utilities) at or contiguous to the site is based on information and data furnished to Owner or Architect by the owners of such underground facilities (utilities) or by others.
 - 1. The Owner and Architect 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 and Contractor shall have full responsibility for: (i) reviewing and checking all such information and data; (ii) locating all underground facilities (utilities) shown or indicated in the Contract Documents; (iii) coordination of the Work with the owners of such underground facilities (utilities) during construction; and (iv) the safety and protection of all such underground facilities (utilities) and repairing any damage thereto resulting from the Work.
- B. Not Shown or Indicated: If an underground facility (utility) is uncovered or revealed at

or contiguous to the site which was not shown or indicated in the Contract Documents, the 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), identify the owner of such underground facility (utility) and give written notice to that facility (utility) owner and to Owner and Architect. Architect will promptly review the underground facility (utility) 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 of the underground facility (utility). If the Architect concludes that a change in the Contract Documents is required, revised plans and specifications will be issued to reflect and document such consequences. During such time, the Contractor shall be responsible for the safety and protection of such underground facility (utility).

- C. Contractor shall notify all municipal agencies and utility companies owning or operating utilities, of proposed work affecting the utilities, or agencies.
- D. Contractor shall give written notification within the time period required by the agency or company for advance notification before commencing work. A copy of the notification shall be furnished to the Architect. Agencies include but are not limited to Town of Arlington Water and Sewer Division.
- E. Contractor shall notify "DIG SAFE" before commencing any work in the vicinity of existing subsurface utilities.
- F. Contractor shall secure in-place existing utilities whose support is affected by the work and cooperate and assist the agency or company operating the utility in maintaining the utility services. Contractor shall correct any damage to the utilities caused by construction operations by repair or replacement, as required by the utility owner. When the repair or replacement is made by the utility owner, Contractor shall pay all costs assessed by the utility owner for the work.
- G. If the existing utilities are found to conflict with the proposed work, the Contractor shall protect and maintain the utilities and take measurements to determine the location, type and dimensions of the utility. The information shall be furnished to the Architect who will determine the changes required in the proposed work or existing utilities to resolve the conflict as soon thereafter as is reasonable.
- H. Contractor shall verify the location, size, invert elevation and type of existing facilities at all points of connection prior to ordering new utility materials.

1.05 SOIL SUPPORT

- A. Contractor shall furnish and install excavation soil support devices or use soil strengthening techniques required to perform excavations in accordance with the current requirements of the U.S. Department of Labor, Occupational Health & Safety Administration and all federal, state, and municipal laws and regulations.

1.06 REFERENCE STANDARDS

- A. References are made to technical societies, organizations and groups using the following abbreviations. All work so referred shall conform to the current edition of the referenced standard.

AASHTO American Association of State Highway Transportation Officials

ACI American Concrete Institute

ACOE United States Army Corps of Architects

AGC Associated General Contractors of America

ANSI American National Standards Institute
AOAC Association of Official Agricultural Chemists
ASTM American Society for Testing and Materials
AWPA American Wood Preservers Association
AWWA American Water Works Association
NEMA National Electrical Manufacturers Association
NEWWA New England Water Works Association
OSHA Occupational Safety and Health Administration
UL Underwriters Laboratory

1.07 TRAFFIC MAINTENANCE

- A. Contractor shall maintain access to the site and through the work zones for personnel and vehicles of emergency services, utility agencies, inspection services, and others authorized to enter, move about and work on the site.
- B. When work is required on public roadways, Contractor shall furnish, install, maintain, and remove all signs, drums, barricades, steel plates, and other devices required by the federal or state government or municipality to maintain and protect pedestrians and vehicular traffic.
- C. Protective measures shall be installed at site access points to prevent mud and other debris from being deposited on the public roadways by construction traffic. The public roadways shall be swept as required to remove any deposits.

1.08 STATE AND LOCAL REFERENCE STANDARDS

- A. Building Code Massachusetts State Building Code
BWSC Boston Water and Sewer Commission
DEP Massachusetts Department of Environmental Protection
MHD Massachusetts Highway Department
MWRA Massachusetts Water Resources Authority

END OF SECTION

SECTION 024113

SELECTIVE SITE DEMOLITION AND REMOVALS

PART 1 GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the PROCUREMENT AND CONTRACTING REQUIREMENTS and all Sections within DIVISION 01, GENERAL REQUIREMENTS, which are made a part of this Section of the Specifications.

1.2 WORK INCLUDED

- A. Provide all equipment and do all work necessary to demolish, remove and salvage site structures, clean up debris and trash and prepare site in general, as indicated on the Drawings.

1.3 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Section 015690, TREE AND PLANT PROTECTION.
 - 2. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING.
 - 3. Section 312500, EROSION AND SEDIMENT CONTROL.

1.4 INFORMATION NOT GUARANTEED

- A. The Contractor's attention is directed to "Information Not Guaranteed" under Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING.

1.5 SUBMITTALS

- A. The following shall be submitted:
 - 1. Certificates of severance of utility services.
 - 2. Permit for transport and legal disposal off-site of demolition material and debris.
 - 3. Demolition procedures and operational sequence for review and acceptance by Architect.
 - 4. Location plan of staging areas and schedule for moving staging equipment into those areas shall be submitted for Architect's approval prior to mobilization and related site preparation operations.
- B. Pre-demolition photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit before the Work begins.

1.6 PROTECTION

- A. Prevent movement, settlement or collapse of adjacent services, sidewalks, driveways and trees. Assume liability for such movement, settlement, or collapse. Promptly repair damage at no cost to the Owner.
- B. Cease operations and notify Owner immediately if safety of adjacent structures appears to be endangered. Take precautions to properly support structures. Do not resume operations until safety is restored.
- C. Provide, erect, and maintain street boardings, sidewalk shed, barricades, lighting, and guardrails as required to protect general public, workers, and adjoining property.
- D. Do not interfere with use of adjacent buildings. Maintain free and safe passage to and from.

1.7 EXISTING SERVICES

- A. Arrange and pay for disconnecting, removing, capping, and plugging utility services. Disconnect and stub off. Notify the affected utility company in advance and obtain approval before starting this work.
- B. Place markers to indicate location of disconnected services. Identify service lines and capping locations on Project Record Documents.

1.8 TREE DAMAGE PENALTIES

- A. Damages to trees, shrubs, and other vegetation will be assessed by the Architect and Owner in accordance with the ISA Guide and Section 015690, TREE AND PLANT PROTECTION.

1.9 MAINTAINING TRAFFIC

- A. Do not close or obstruct roadways without permits.
- B. Conduct operations with minimum interference to public or private roadways.

1.09 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.10 WARRANTY

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

PART 2 PRODUCTS

2.1 SALVAGING

- A. Materials indicated on the Drawings or designated in the field by the Owner to be salvaged shall be carefully removed and stockpiled on site or delivered to the Owner. For materials not used within the site for the proposed project, the Owner may request transport by the Contractor to a facility within the Town.
- B. Mechanical and electrical items to be salvaged shall be protected from the weather.

PART 3 EXECUTION

3.1 DEMOLITION

- A. Structures indicated to be removed shall be completely removed including foundations, except when approved by the Architect, to a minimum of 4 ft. below finished grade for graded areas.
- B. Remove from site, contaminated, vermin infested, or dangerous materials encountered and disposed of by safe means so as not endanger health of workers and public.
- C. Backfill areas excavated as a result of demolition. Use backfill material specified in Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING.
- D. Rough grade areas affected by demolition and leave areas level, maintaining grades and contours of site.
- E. Site Access and Temporary Controls: Conduct demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
 - 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

3.2 ABANDONED PIPES - DRAINS AND SEWERS

- A. Drain and sewer pipes indicated to be abandoned shall be completely filled with an 8 in. thick mortar jointed masonry bulkhead. If a pipe indicated to be abandoned and plugged appears to be in active service, it shall not be plugged, and the Architect shall be notified.
- B. Other utility pipes shall be cut and capped outside the excavation and abandoned piping removed from the site.
- C. Frames, grates, covers, traps, and other castings shall be salvaged.

3.3 CLEARING AND GRUBBING

- A. Trees, shrubs, and other vegetation not indicated on the Drawings or designated in the field by the Architect to remain and required for execution of the Work shall be cleared and grubbed.

- B. Stumps shall be removed to their full depth. Roots 3 in. and larger shall be removed to a depth of 2 ft. below finished grade. Stumps shall be legally disposed of off-site.

3.4 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

- A. Existing memorials, fences, stone walls, catch basins, structures and utilities to remain shall be suitably protected from damage.

3.5 LOAM AND TOPSOIL

- A. Loam and topsoil shall be stripped to their full depth from areas to be excavated, filled, regraded, or resurfaced. Avoid mixing with fill/subbase/non-organic material below.
- B. Loam and topsoil shall be stockpiled on-site and protected. No loam and topsoil shall be removed from the site without the written permission of the Architect.
- C. Stockpiled loam and topsoil which conforms to the specifications may be used as Planting Soil for fill and finish grading within landscaped areas in accordance with Sections 329200, and 329300. Contractor shall submit soil test results of stockpiled material for Architect's approval. Contractor shall bear the cost of soil testing.

3.6 PAVEMENT REMOVAL

- A. Where pavement and/or curb to be removed abuts pavement and curb to remain, a neat, straight saw cut shall be made with a concrete power saw.
 - 1. Pavement and/or curb removal shall include removal of subbase as required to accommodate proposed construction materials.

3.7 SITE RESTORATION

- A. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction.
- B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.8 PROTECTION OF PROPERTY TO REMAIN

- A. The Contractor's attention is directed to Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING for protection of utilities to remain, and Section 015690, TREE AND PLANT PROTECTION for the protection of existing trees.

3.9 DISPOSAL OF MATERIALS

- A. Material resulting from demolition and not scheduled for salvaging shall become the property of the Contractor and shall be legally disposed of off-site at Contractor's expense. Disposal shall be performed as promptly as possible and not left until the final clean up.

3.10 SALVAGEABLE MATERIALS

- A. Material resulting from demolition and not scheduled for salvaging shall become the property of the Contractor and shall be legally disposed of off-site at Contractor's expense. Disposal shall be performed as promptly as possible and not left until the final clean up.

3.11 ADJUST EXISTING MANHOLES AND CATCH BASINS

- A. Existing manholes and catch basins shall be adjusted to line and grade as indicated on the Drawings in accordance with Commonwealth of Massachusetts Highway Department (MHD) Standard Specification for Highways and Bridges..

END OF SECTION

SECTION 033001

CAST-IN-PLACE CONCRETE – SITE WORK

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Provide all equipment and materials, and do all work necessary to construct the cast-in-place concrete for sitework, including but not limited to: below grade slabs, pads, bases, foundations, and footings, complete, as indicated on the Drawings and as specified.

1.3 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that relate directly to work of this Section include, but are not limited to the following:
1. Section 079201, EXTERIOR JOINT SEALANTS.
 2. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; Excavation, backfill, compaction and establishment of subgrade elevations.
 3. Section 321313, PORTLAND CEMENT CONCRETE PAVING; Exposed concrete paving.
 4. Section 321640, GRANITE CURB.

1.4 RELATED WORK

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.
1. American Concrete Institute (ACI):
 - 301 Structural Concrete for Buildings
 - 303R Guide to Cast-In-Place Architectural Concrete Practice
 - 306.1 Cold Weather Concreting
 - 308 Standard Practice for Curing Concrete
 - 325.9R Guide for Construction of Concrete Pavements and Concrete Bases
 2. American Plywood Association (APA):
 - Ref. 1 APA Design/Construction Guide, Residential and Commercial
 3. American Society for Testing and Materials (ASTM):
 - A 36 Structural Steel
 - A 123 Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip
 - A 185 Welded Steel Wire Fabric for Concrete Reinforcement
 - A 307 Carbon Steel Externally Threaded Standard Fasteners
 - A 386 Zinc Coating (Hot-Dip) on Assembled Steel Products

A510	General Requirements for Wire Rods and Course Round Wire, Carbon Steel
A 569	Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip, Commercial Quality
A 615	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C 33	Concrete Aggregates
C 143	Slump of Portland Cement Concrete
C 150	Portland Cement
C 171	Sheet Materials for Curing Concrete
C 309	Liquid Membrane-Forming Compounds for Curing Concrete
C 494	Chemical Admixtures for Concrete
D 1752	Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

4. Commonwealth of Massachusetts Highway Department (MHD)
Standard Specification for Highways and Bridges

1.5 SUBMITTALS

- A. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- B. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- C. Formwork Shop Drawings: Show formwork construction including form-facing joints, rustications, construction and contraction joints, form joint-sealant details, form tie locations and patterns, inserts and embedments, cutouts, cleanout panels, and other items that visually affect exposed to view cast-in-place concrete.
- D. Samples of the following shall be submitted:
- | <u>Item</u> | <u>Sample Size</u> |
|------------------------|---|
| Preformed joint filler | Two pieces, full depth and width, 12 in. length |
| Form | 12 in. x 12 in. |
| Form ties | 1 each, complete |
- E. Submit manufacturer's product data for forms and accessories.
- F. Field quality-control test and inspection reports.
- G. Prior to start of concrete work, Contractor shall submit to the Architect for review a schedule for execution of the work of this section and a location plan indicating sequence of concrete placement and location of proposed control joints and construction joints, if required.

1.6 DESIGN OF CONCRETE MIX

- A. Mix design shall be certified by independent testing laboratory. Statement of materials constituting design of mixes (as required by referenced standards) shall be submitted for Architect's approval within one week following award of Contract.

- B. Concrete mix design shall include the following information.
1. Proportions of cement, fine and coarse aggregates, and water.
 2. Water-cement ratio, design strength, slump, and air content.
 3. Type of cement and aggregates.
 4. Type and dosage of all admixtures.
 5. Special requirements for pumping.
 6. Range of ambient temperature and humidity for which the design is valid.
 7. Any special characteristics of the mix which require precautions in the mixing, placing, finishing, or curing methods to achieve the finished product specified.
- C. No concrete shall be delivered to the job site until the Architect has approved the design mixes.

1.7 QUALITY ASSURANCE

- A. Unless otherwise specified, cast-in-place concrete work shall conform to ACI 301. Construction of concrete walks and subbases shall conform to ACI 325.9R.
- B. Dimensions, locations, and details of equipment pads, anchors, supports, and similar features indicated on the Drawings are approximate. Manufacturer's approved shop drawings of equipment to be supported, anchored, or contained thereby shall be consulted for exact location, size, and details.
- C. Proposed wall footings shall be laid out and staked for review and approval by Architect prior to pouring concrete.
- D. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- E. Pre-installation Conference: Conduct conference at Project site.

1.8 QUALITY CONTROL

- A. Unless otherwise specified herein, or indicated on the Drawings, concrete formwork construction and materials shall conform to ACI 301, 318, and 347, and the following:
1. Variation from plumb
 - a. In lines and surfaces of arrises: In any 10 ft. of length $\frac{1}{4}$ in., Maximum for the entire length 1 in.
 - b. For exposed conspicuous lines: In any 20 ft. length $\frac{1}{4}$ in, Maximum for the entire length $\frac{1}{2}$ in.
 2. Variation in sizes and location of sleeves, wall openings: $\frac{1}{4}$ in. (+/-)
 3. Variation in cross sectional dimensions of beams and in thickness of slabs: Minus $\frac{1}{4}$ in. Plus $\frac{1}{2}$ in.
 4. Variation in location of anchor bolts unless provided with sleeves or other means of adjustment: $\frac{1}{4}$ in.
- B. Maximum deflection of form facing materials at concrete surfaces exposed to view shall be $\frac{1}{240}$ of span between structural members.

- C. Reinforcing steel shall be fabricated to conform to the required shapes, dimensions, and tolerances specified in CRSI Manual.
- D. Allowable Tolerances:
 - 1. Fabricating:
 - a. Sheared length: Plus or minus 1 in .
 - b. Stirrups and ties: Plus or minus 1/2 in .
 - c. Members more than 8 in., but not over 2 ft. - 0 in. deep: Plus or minus 1/2 in .
 - d. Members more than 2 ft. - 0 in. deep: Plus or minus 1 in .
 - e. Crosswise of members: Space evenly within 2 in. of stated separation.
 - f. Lengthwise of members: Plus or minus 2 in .
 - 2. Maximum bar relocation to avoid interference with other reinforcing steel, conduits, or other embedded item: 1 bar diameter.

1.9 TESTING

- A. Inspection and testing of the concrete mix will be performed by an independent testing laboratory approved by the Architect. Testing equipment shall be supplied by the laboratory, and the preparation of samples and all testing shall be performed by the laboratory personnel.
- B. Concrete materials and operations will be tested and inspected as work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered, nor shall it obligate the Architect to final acceptance.
- C. The following testing services shall be provided by the Owner, at no cost to the Contractor:
 - 1. Review and test of the Contractor's proposed materials for compliance with the specifications.
 - 2. Review of the Contractor's proposed mix design.
 - 3. Sampling and testing of materials at plants or stockpiles during the course of the work for compliance with the specifications .
 - 4. Strength tests of concrete specimens .
 - 5. Inspection of concrete batching, mixing, and delivery .
- D. The following testing services shall be provided, at the Contractor's expenses:
 - 1. Additional testing and inspection required because of changes in materials or proportions, requested by the Contractor.
 - 2. Additional testing of materials or concrete occasioned by their failure by testing or inspection to meet specification requirements.
- E. At least four standard compression test cylinders shall be made and tested from each day's placement of concrete. Four concrete test cylinders will be taken for every 50 cubic yards of each type and design strength of concrete placed. Two cylinders shall be tested at seven days, and two at 28 days. One additional test cylinder will be taken during cold weather concreting, and will be cured at the job site under the same conditions as the concrete it represents. If job experience indicates additional cylinder tests or other tests are required for proper control or determination of concrete quality, such tests shall be made.
- F. One slump test will be taken for each set of test cylinders taken.

- G. Submit to the Owner, for forwarding to the testing laboratory, proposed concrete mix design for review, before beginning work.
- H. Provide free access to work and full assistance and cooperation, concrete for samples, and such auxilliary personnel and equipment as needed for testing agency to take samples for required tests. Notify testing agency and Architect of intent to place concrete at least 24 hours before placement.

PART 2 - PRODUCTS

2.1 DENSE GRADED CRUSHED STONE BASE COURSE

A. Dense Graded Crushed Stone

- 1. Shall conform with Massachusetts Highway Department (MHD) Standard Specifications for Construction Highways and Bridges.
- 2. The percent of wear of the crushed stone shall not be more than 40 when tested in accordance with AASHTO T 96. The percent of wear shall not be more than 50 if crushed igneous rock is used.
- 3. Dense Graded Crushed Stone shall meet the following gradation requirement.

<u>Sieve Size</u>	<u>% Passing by Weight</u>
3-1/2 in.	100
3 in.	90 - 100
2 in.	75 - 100
1 in.	50 - 80
1/2 in.	30 - 60
No. 4	15 - 40
No. 200	0 - 6

2.2 FORM MATERIALS AND ACCESSORIES

A. Formwork :

- 1. Form-Facing Panels for As-Cast Finishes: Steel, glass-fiber-reinforced plastic, high-density overlay, Class 1, or better, Finnish phenolic overlaid birch plywood or other approved nonabsorptive panel materials that will provide continuous, true, and smooth architectural concrete surfaces in accordance with ACI 303.1. Furnish in largest practicable sizes to minimize number of joints.
- 2. Formwork shall produce an extremely smooth finish as displayed in approved mockup.
- 3. Form Sealers: In accordance with ACI 303 Chapter 4, Section 4.8 for each different type of formwork material or liner. Sealers containing oils will not be permitted.
- 4. Form Release Agents: In accordance with ACI 303 Chapter 4, Section 4.9 for each different type of formwork material or liner.

B. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with smooth form finish. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

- 1. Forms shall not impart visible straight or spiral mark on concrete columns.

C. Concrete surfaces which will be concealed in completed structure shall be formed to have a "rough form" finish as defined by ACI 301.

- D. Forms shall be true to line and free from warp, and shall be of sufficient strength, when braced, to resist the pressure of the concrete during placement within the allowable tolerances.
- E. Surfaces of forms to be in contact with concrete shall be coated with nonstaining form release compound; wetting or coating with grease or oil will not be accepted as a substitute. Approval of the Architect shall be obtained before coated (plastic-faced) form material or liners are used in lieu of form release compound.
- F. Unless otherwise indicated on the Drawings, exposed concrete arrises shall be chamfered. Where other dimension is not indicated on the Drawings, chamfer shall be 3/4 x 3/4 in.
 - 1. Chamfer shall not be employed where masonry or other material will subsequently be installed flush with one of the adjacent surfaces of the concrete.
 - 2. Where a wash or slope is indicated on the Drawings, no additional chamfer is required.
 - 3. Chamfer shall be mitered at changes in direction.

2.3 FORM ACCESSORIES

- A. Form ties shall be factory-fabricated metal ties, shall be of the removable or internal disconnecting or snap-off type, and shall be of a design that will not permit form deflection and will not spall concrete upon removal. Solid backing shall be provided for each tie. Except where removable tie rods are used, ties shall not leave holes in the concrete surface less than 1/4 inch nor more than 1 inch deep and not more than 1 inch in diameter. Removable tie rods shall be not more than 1-1/2 inches in diameter.
- B. Where steel adjacent to vertical faces of forms cannot be otherwise secured, mortared doughnuts shall be used to prevent steel lying too close to finish vertical faces of the concrete.
- C. Forms at doweled joints shall have accurately sized and located holes for dowels. Split forms may be used to facilitate stripping.
- D. Reglets shall be made of polyvinyl chloride, grey color. Where reglets are indicated on the Drawings they shall be assumed to be continuous. Reglets shall be filled with a disposable packing material to prevent entrance of concrete.
- E. Form Release Agent: Form releasing agents shall be commercial formulations that will not bond with, stain or adversely affect concrete surfaces. Agents shall not impair subsequent treatment of concrete surfaces depending upon bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds.
- F. Construction Joint Form: Burke Concrete Products, "Keyed Kold Joint", or approved equal.

2.4 STEEL BARS AND SUPPORTS

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 60 percent.
- B. Steel reinforcing bars shall conform to ASTM A 615/A 615M, Grade 60, deformed, including Supplementary Requirements S1.
 - 1. Bars employed as reinforcement and dowels shall be deformed type.
 - a. Cutting of bars by torch will not be permitted.

2. Bars employed as dowels, spirals, and structural ties or supports shall be hot-rolled plain rounds.
 - a. Plastic-coated dowels, such as Double-Coat plastic-coated steel dowel bars, manufactured by Republic Steel Corporation, are acceptable.
 3. Bars employed in joints subject to movement shall be hot-rolled plain rounds.
 - a. Bars for use in joints subject to movement shall be saw-cut. Bars crimped or bent in cutting will not be acceptable.
 - C. Reinforcing bars shall be manufactured in the United States.
 - D. Epoxy-Coated Wire: ASTM A 884/A 884M, Class A, Type 1 coated-steel wire, with less than 2 percent damaged coating in each 12-inch (300-mm) wire length.
 - E. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets. Fabric reinforcement shall be furnished in flat sheets; reinforcement furnished in rolls will not be acceptable.
 - F. Steel failing to meet the requirements of this specification or the Drawings will be rejected and shall be removed from the site immediately. Rejected steel shall be replaced with new steel conforming to this specification, at no additional cost to the Owner.
 - G. Bolsters, chairs, supports, and other devices for spacing, supporting, and fastening of reinforcing in place shall conform to requirements of CRSI Manual.
 - H. Tie wire shall be black annealed wire, 16 gauge or heavier.
- 2.5 CONCRETE
- A. Concrete shall be air-entrained type, conforming to ASTM C 94. Air-Entraining Admixture: ASTM C 260.
 - B. Unless otherwise indicated on the Drawings, minimum 28 day compressive strength shall be 4,000 psi.
 1. Concrete slump shall be no less than 2 in. nor greater than 4 in., determined in accordance with ASTM C 143.
 2. Maximum Water-Cementitious Materials Ratio: 0.45.
 3. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.
 - C. Cement shall be Portland cement, conforming to ASTM C 150, Type I or II.
 - D. Aggregates shall conform to ASTM C 33.
 - E. Concrete shall contain a water reducing agent to minimize cement and water content of the concrete mix at the specified slump. Water reducing agent shall conform to ASTM C 494.
 - F. No calcium chloride or admixtures containing calcium chloride shall be added to the concrete. No admixtures other than those specified shall be used in the concrete without the specific written permission of the Architect in each case.

2.6 CURING MATERIALS

- A. Curing shall be by moist curing or by use of curing compound.
- B. Curing paper shall be a nonstaining, fiber reinforced laminated kraft bituminous product conforming to ASTM C 171. Four mil polyethylene sheeting may be substituted for curing paper.
- C. Liquid membrane forming curing compounds will not be permitted.
- D. Curing compound shall be a resin-base, white pigmented compound conforming to ASTM C 309, Type 2.

2.7 EXPANSION JOINTS

- A. Unless otherwise indicated on the Drawings, wall and foundation expansion joints shall be located 30 ft. o.c., maximum.
- B. Below grade base slab joints shall be located as indicated on the Drawings.
- C. Where indicated, wall expansion joints shall be 1/2 in. wide, and recessed ••• in. from face of wall. Expansion joint filler shall be preformed, nonbituminous type joint filler conforming to ASTM D 1752, Type II, similar to Sealtight Cork Expansion Joint Filler, manufactured by W.R. Meadows, Inc., or approved equal.
 - 1. Premolded filler shall be one piece for the full depth and width of the joint.
 - 2. Use of multiple pieces of lesser dimensions to make up required depth and width of joint will not be permitted.
 - 3. Except as otherwise noted on the Drawings, joint filler shall be 3/8 in. thick.
- D. Where indicated, concrete slab-on-grade shall be doweled at each expansion joint. One end of the dowel shall be greased.
- E. Round Expansion Joint Dowels: ASTM A615, Grade 60, epoxy-coated, smooth, billet-steel bars, clean and free of rust and scale.
- F. Square Expansion Joint Dowels: ASTM A108, epoxy-coated, alloy-steel square bar.
- G. Sleeves for Square Dowels: Sika Greenstreak square dowel sleeves and bases sized to fit epoxy-coated square dowels.
- H. Dowel Caps for Round Dowels: Plastic caps approximately 4" long, designed and manufactured to fit over ends of expansion joint dowels to allow longitudinal movement of dowels after concrete has hardened.
- I. Dowel Aligners for Round Dowels: PNA Dowel Aligners, or accepted substitute.
- J. Concrete slab-on-grade shall be doweled at each expansion joint. One end of the dowel shall be greased.

2.8 CONTROL JOINTS (BELOW GRADE SLABS)

- A. Control joints indicated to be sawn shall be made by saw cutting concrete slab after concrete is finished and when the surface is stiff enough to support the weight of workmen without damage

to the slab. Saw blade shall cut into slab at least 1 in., but in no case less than 25% of slab depth.

- B. Unless otherwise indicated on the Drawings, control joints shall be located 10 ft. o.c. maximum.

2.9 BOLTS

- A. Anchor bolts shall conform to ASTM A 307.

PART 3 - EXECUTION

3.1 GRADING

- A. Areas to receive concrete will be compacted and brought approximately to subgrade elevation under Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; before work of this section is performed. Final fine grading, filling, and compaction of subgrade to receive concrete, as required to form a firm, uniform, accurate, and unyielding subgrade at required elevations and to required lines, shall be done under this Section.
- B. Existing subgrade material which will not readily compact as required shall be removed and replaced with satisfactory materials. Additional materials needed to bring subgrade to required line and grade and to replace unsuitable material removed shall be material conforming to this Section.
- C. Subgrade of areas to receive concrete shall be recompacted as required to bring top 8 in. of material immediately below aggregate base course to a compaction of at least 90% of maximum density, as determined by ASTM D 1557, Method D. Subgrade compaction shall extend for a distance of at least 1 ft. beyond concrete edge.
- D. Excavation required in subgrade shall be completed before fine grading and final compaction of subgrade are performed. Where excavation must be performed in completed subgrade or subbase subsequent backfill and compaction shall be performed as directed by the Architect as specified in Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING. Completed subgrade after filling such areas shall be uniformly and properly graded.
- E. Areas being graded or compacted shall be kept shaped and drained during construction. Ruts greater than or equal to 2 in. deep in subgrade, shall be graded out, reshaped as required, and recompacted before placing concrete.
- F. Materials shall not be stored or stockpiled on subgrade.
- G. Disposal of debris and other material excavated and/or stripped under this section, and material unsuitable for or in excess of requirements for completing work of this Section shall conform to the following:
 - 1. Material shall be legally disposed of off-site.
- H. Prepared subgrade will be inspected and tested by an independent testing agency, provided and paid for by the Contractor, prior to installation of paving base course. Disturbance to subgrade caused by inspection procedures shall be repaired under this Section of the specification.
 - 1. Contractor shall submit a minimum of six (6) Proctor compaction test results indicating conformance to compaction density requirements specified herein.

3.2 AGGREGATE BASE COURSE

- A. Aggregate base course for paving and the spreading, grading, and compaction methods employed shall conform to standard requirements for usual base course of this type for first class road work, and the following:
 - 1. Massachusetts Department of Transportation Specification for "Subbase and Base Course".
- B. Compaction of aggregate base course shall be to 95% of maximum density as determined by ASTM D 1557, Method D. Stone greater than 2-1/2 in. shall be excluded from course.
- C. Width of base course shall be greater than or equal to the width of pavement surface, if continuous lateral support is provided during rolling, and shall extend at least 2 x base thickness beyond edge of the course above, if not so supported.
- D. Aggregate material shall be applied in lifts less than or equal to 6 in. thick, compacted measure. Each lift shall be separately compacted to specified density, using a 6 ton steel wheel roller or vibratory roller equivalent to a 6 ton static roller, or an approved equivalent.
 - 1. Material shall be placed adjacent to wall, manhole, catch basin, and other structures only after they have been set to required grade and level.
 - 2. Rolling shall begin at sides and progress to center of crowned areas, and shall begin on low side and progress toward high side of sloped areas. Rolling shall continue until material does not creep or wave ahead of roller wheels.
 - 3. Surface irregularities which exceed 1/2 in. measured by means of a 10 ft. long straightedge shall be replaced and properly compacted.
- E. Subgrade and base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with gravel. Materials spilled outside pavement lines shall be removed and area repaired.
- F. Portions of subgrade or of construction above which become contaminated, softened, or dislodged by passing of traffic, or otherwise damaged, shall be cleaned, replaced, and otherwise repaired to conform to the requirements of this specification before proceeding with next operation.

3.3 ACCEPTABILITY OF CONCRETE SURFACES

- A. Concrete structures to receive concrete topping slab shall be inspected to ensure that surface is suitable to receive concrete. Waterproofed surfaces shall be thoroughly cured and suitably protected with protection board prior to start of concrete work of this section.

3.4 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
 - 2. [Class B, 1/4 inch (6 mm)] [Class C, 1/2 inch (13 mm)] [Class D, 1 inch (25 mm)] for rough-formed finished surfaces.

- C. Forms shall be sufficiently tight to prevent leakage of mortar, and, where necessary, shall have temporary openings as required for thorough cleaning and as required for the introduction of concrete to avoid excessive free fall.
- D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- E. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- F. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- G. Chamfer exterior corners and edges of permanently exposed concrete.
- H. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.5 PLACING OF REINFORCING

- A. Reinforcing bars shall be placed in accordance with ACI 301, 318, and CRSI "Manual of Standard Practice". Reinforcing bars showing cracks after bending shall be discarded and replaced with new material conforming to this Section at no additional cost to the Owner.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Reinforcing shall be thoroughly cleaned of loose mill and rust scale, dirt, ice, and other foreign material which may reduce the bond between concrete and reinforcing. Where there is a delay in placing concrete after reinforcement is in place, bars shall be reinspected and cleaned when necessary.
- C. Unless permitted by the Architect, reinforcing bars shall not be cut in the field.
- D. After forms have been coated with form release compound, but before concrete is placed, reinforcing steel shall be securely wired in exact position called for, and shall be maintained in that position until concrete is placed and compacted. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Chair bars and supports shall be provided in a number and arrangement satisfactory to the Architect.
 2. Metal supports shall be the types which will not penetrate and show through or stain surfaces which are to be exposed to view, painted or unpainted. Supports at surfaces which will be exposed to the weather shall be stainless steel, plastic tipped, or other non-corrosive material.
 3. Where steel is adjacent to vertical form face and cannot be otherwise secured, mortar doughnuts shall be used to prevent steel from lying too close to finished vertical concrete face.
 4. Where waterproofed surfaces are indicated, reinforcing bar chairs, bolsters, and other supports shall not rest on waterproofing membrane. To protect membrane from puncture, chairs, bolsters, etc., shall rest on 1/4 in. thick hardboard, which shall be centered under the support leg. Area of hardboard shall not be less than 3 sq. in. per leg.
- E. Except as otherwise noted, laps at joints in welded wire fabric reinforcement shall be at least 6 in. and shall be securely tied with tie wire.
- F. Except as otherwise specified, reinforcing steel shall be spliced by lapping bar ends, placing bars in contact, and tightly wiring. Minimum lap of spliced bars shall conform to ACI 318.
1. Bars No. 14 and larger shall not be lap spliced.
- G. Doweled Joints
1. Dowels at expansion joints and at other locations where movement of the joint is expected shall be thoroughly clean on the embedded portion to permit good bond, and shall be greased or otherwise treated to prevent bond for the full length of the portion which is intended to move in the concrete.
 2. Factory plastic-coated dowels where approved for use need not be lubricated, and the plastic coating need not be removed from any part of the dowel.
 3. Dowels in concrete which are placed in locations or under temperature conditions which may be expected to cause movement of the concrete toward the joint, at any time during the life of the structure, shall have a cap on the lubricated end (either end of a factory plastic-coated dowel). Cap shall provide a 2 in. long air space into which dowel may move when concrete expands toward joint. Cap shall be properly secured to the end of the dowel, to prevent cap being dislodged during concrete placing operations, but to permit dowel to slide into the air space when concrete expands.
- H. Bending: Bend bars cold; do not use heat reinforcing or bend by make-shift methods. Discard bent, kinked or otherwise damaged bars.
- I. Welding of reinforcing bars will be permitted only where permission of the Architect has been obtained in advance. Such welding shall be performed only under conditions established by the Architect.
1. Weld reinforcing bars according to AWS D1.4, where indicated.
- J. Unless otherwise indicated on the Drawings, reinforcing shall extend within 2 in. of formwork and expansion joints. Reinforcement shall continue through construction joints.
- K. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 PLACING CONCRETE

- A. Before placing concrete, forms and space to be occupied by concrete shall be thoroughly cleaned, and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint, and other material which might tend to reduce bond.
- B. Existing concrete, earth, and other water-permeable material against which new concrete is to be placed shall be thoroughly damp when concrete is placed. There shall be no free water on surface.
- C. Concrete which has set or partially set before placing shall not be employed. Retempering of concrete will not be permitted.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 2. If concrete can not be mechanically consolidated, concrete shall be thoroughly spaded and tamped to secure a solid and homogeneous mass, thoroughly worked around reinforcement and into corners of forms.
- E. Cold-Weather Placement: Comply with ACI 306.1.
- F. Hot-Weather Placement: Comply with ACI 301.
- G. When joining fresh concrete to concrete which has attained full set, latter shall be cleaned of foreign matter, and mortar scum and laitance shall be removed by chipping and washing. Clean, roughened base surface shall be saturated with water, but shall have no free water on surface. A coat of 1:1 cement-sand grout, approximately 1/8 in. thick, shall be well scrubbed into thoroughly dampened concrete base. New concrete shall be placed immediately, before grout has dried or set.

3.7 FINISHING BELOW GRADE SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
 - 1. Concrete slabs and pads shall be screeded off and finished true to line and grade, and free of hollows and bumps. Surface shall be dense, smooth, and at exact level and slope required.
 - 2. Finished concrete surface for subbases shall be wood-floated to a slightly rough surface. Surface shall not deviate more than 1/4 in. in 10 ft.
- B. Control joints shall be scored into slab surface with scoring tool.
- C. Where finishing is performed before end of curing period, concrete shall not be permitted to dry out, and shall be kept continuously moist from time of placing until end of curing period, or until curing membrane is applied.

3.8 PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. It is essential that concrete be kept continuously damp from time of placement until end of specified curing period. It is equally essential that water not be added to surface during floating and troweling operations, and not earlier than 24 hours after concrete placement. Between finishing operations surface shall be protected from rapid drying by a covering of waterproofing paper. Surface shall be damp when the covering is placed over it, and shall be kept damp by means of a fog spray of water, applied as often as necessary to prevent drying, but not sooner than 24 hours after placing concrete. None of the water so applied shall be troweled or floated into surface.
- C. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3.9 EXPANSION JOINTS

- A. Expansion joint shall be 3/8 in. wide, clean, dry, and free of loose material, dirt, oil and grease, and shall be formed in the concrete to required width with preformed joint filler in place. Joint filler shall extend the full length of the expansion joint.
 - 1. Depth of filler shall extend to the full thickness of the concrete in vertical surfaces and in concealed horizontal surfaces.
 - 2. Depth of filler in exposed horizontal surfaces shall be as required to form a 1/2 in. deep sealant recess below finished surface to depth recommended by sealant manufacturer.

3.10 EXPANSION JOINT DOWELS

- A. Center vertically in slab, unless indicated otherwise.
- B. Center longitudinal position of each dowel horizontally on joint, except where indicated otherwise.
- C. Install at same spacing as slab bar unless indicated on Drawings.
- D. Install a cap or sleeve on one end of each dowel as indicated on Drawings.
- E. Prior to installing the cap or sleeve on the dowels, completely coat surfaces of each dowel on the cap-side or sleeve-side of the expansion joint with debonding compound.

- F. Cut holes in expansion joint fill material accurately to fit tightly around dowels so that concrete will not leak into gaps between the dowels and the expansion joint material.
- G. Install dowels 90 degrees horizontally and vertically to expansion joint using dowel aligners to help maintain alignment.
- H. Install the dowel aligners in accordance with the manufacturer's current printed instructions.

3.11 CONTROL JOINTS

- A. Joints shall be sawn as soon as the concrete will withstand the energy of sawing without raveling or dislodging aggregate particles. For most concrete mixtures, this means sawing should be completed within the first 6 to 18 hours and never delay more than 24 hours. Early-entry saws may be used to allow cutting to begin within a few hours after placement.
- B. Control joints indicated shall be sawn 1/8 in. wide by using a diamond blade concrete power saw. Saw shall cut into slab at least 25% of slab depth. Saw cut joints shall be straight and accurate to line.
 - 1. Saw cut joints shall be sawn flush to vertical surfaces.
 - 2. Unless otherwise indicated on the Drawings, control joints in pedestrian pavements shall be located 10 ft. o.c. maximum.
 - 3. Doweled Control Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.12 REMOVING FORMS AND SUPPORTS

- A. Forms shall be removed preventing injury to the concrete and ensuring the complete safety of the structure. Formwork for columns, walls, side of beams and other parts not supporting the weight of concrete may be removed when the concrete has attained sufficient strength to resist damage from the removal operation but not before at least 24 hours has elapsed since concrete placement. Supporting forms and shores shall not be removed from beams, floors and walls until the structural units are strong enough to carry their own weight and any other construction or natural loads. Supporting forms or shores shall not be removed before the concrete strength has reached 70 percent of design strength, as determined by field cured cylinders or other approved methods. This strength shall be demonstrated by job-cured test specimens, and by a structural analysis considering the proposed loads in relation to these test strengths and the strength of forming and shoring system. The job-cured test specimens for form removal purposes shall be provided in numbers as directed and shall be in addition to those required for concrete quality control. The specimens shall be removed from molds at the age of 24 hours and shall receive, insofar as possible, the same curing and protection as the structures they represent.
- B. Forms to be reused on the work shall be thoroughly cleaned immediately after stripping. Damaged forms shall not be used. Only clean, sound, dimensionally correct forms shall be used.

3.13 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

END OF SECTION

SECTION 044302

GRANITE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Provide all equipment and materials, and do all work necessary to furnish and install the granite work as indicated on the Drawings and as specified, including granite piers, as indicated on the Drawings. Contractor to use salvaged granite piers whenever possible, new granite to be purchased only at permission of Architect and Owner.

1.2 RELATED WORK

- A. Examine Contract Documents for requirements that affect the work of this Section. Other Specification Sections that relate directly to work of this Section include, but are not limited to:
 - 1. Section 024113, SELECTIVE SITE DEMO AND REMOVALS; salvaged granite piers.
 - 2. Section 033001, CAST-IN-PLACE CONCRETE; footings.
 - 3. Section 055501, METAL FABRICATIONS; brackets and metal plates.
 - 4. Section 061063, EXTERIOR ROUGH CARPENTRY; wood rails.
 - 5. Section 312300, SITE EXCAVATING, BACKFILLING, AND COMPACTING.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.
 - 1. 1. American Society for Testing and Materials (ASTM):
 - C 91 Masonry Cement
 - C 97 Absorption and Bulk Specific Gravity of Natural Building Stone
 - C 136 Sieve Analysis of Fine and Coarse Aggregates
 - C 144 Aggregate for Masonry Mortar
 - C 150 Portland Cement
 - C 170 Compressive Strength of Dimension Stone
 - C 207 Hydrated Lime for Masonry Purposes
 - C 270 Mortar for Unit Masonry
 - C 615 Granite Dimension Stone
 - C 880 Flexural Strength of Natural Building Stone
 - C 920 Elastomeric Joint Sealants
 - C 962 Use of Elastomeric Joint Sealants
 - C 1028 Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method

1.4 SAMPLE INSTALLATIONS

- A. Provide sample pier installation as directed by Architect, conforming to typical Project construction. Sample shall show the granite pier setting, metal brackets and plate, and wood rail and other pertinent details of installation.
- B. Replace sample installation as many times as necessary until Architect's approval of the installation has been obtained. Upon Architect's approval, construct all subsequent granite work to conform to approved sample installation.

1.5 COORDINATION

- A. Coordinate work with that of other sections affecting, affected by, this work, as necessary to assure the steady progress of the work under the Contract.
- B. Do all cutting and drilling to accommodate work of other sections, as expressly indicated and as reasonably inferred from Contract Documents Specifications, or required for the proper completion of the Work.

1.6 DELIVERY, HANDLING, AND STORAGE

- A. Granite shall be stored on wood skids or pallets, covered with non-staining, waterproof membrane and protected from the weather. Skids shall be placed and stacked in such a manner as to evenly distribute the weight of the granite materials and to prevent breakage, cracking, and damage to granite pieces. Granite materials shall be stored in such a manner as to allow air to circulate around the granite material. Granite shall not be permitted to be in direct contact with the ground any time during storage.
- B. Granite shall be carefully handled to prevent chipping, breakage, soiling, or other damage. Pinch or wrecking bars shall not be used without protecting edges of granite with wood or other rigid materials. Granite units shall be lifted with wide-belt type slings wherever possible; wire rope or ropes containing tar or other substances which might cause staining or damage to granite finish shall not be used.
- C. Granite damaged in any manner will be rejected and shall be replaced with new materials at no additional cost to the Owner.

1.7 PROTECTION OF FINISHED SURFACES

- A. Finished surfaces adjacent to the granite work shall be adequately protected from soiling, staining, and other damage.

1.8 JOB CONDITIONS

- A. Cold Weather Protection:
 - 1. Do not use frozen materials or materials mixed or coated with ice or frost.
 - 2. Do not build on frozen work; remove and replace granite work damaged by frost or freezing.
 - 3. During all seasons, protect partially completed granite work against weather when work is not in progress.

PART 2 PRODUCTS

2.1 GENERAL STANDARDS

- A. Quarrying Supervision
 - 1. Quarrying shall be supervised and coordinated by the granite fabricator to insure that the as-quarried block orientations will yield finished material with characteristics as described herein.
 - 2. All granite shall be cut from matched blocks. Matched blocks shall mean blocks extracted from a single bed of stratum in the quarry. The use of blocks chosen at random, though similar in general character and color to that of the approved granite will not be permitted, except by written permission of the Architect.
- B. Examinations
 - 1. Examination at the Quarry: Quarried blocks shall be made available for inspection by the

Architect at his request.

2. Examination at the Fabrication Plant: Production units shall be made available for inspection by the Architect at his request. To this end, the Subcontractor shall, after approval of final shop drawings, advise the Architect when production has begun and of the earliest possible opportunity to inspect a representative sampling of production work.
3. Contractor shall provide lighting that is sufficient in intensity and color range to permit an adequate examination to the satisfaction of the Architect.

C. Criteria for Granite

1. Visual: All examinations, selections, and approvals shall be for the purpose of achieving a final appearance of granite with greatest possible uniformity, and will be based upon the following criteria:
 2. All granite shall be of sound stock and uniform texture, and shall be free from holes, seams, shakes, clay pockets, spalls, stains, starts, and other defects which would impair the strength, durability and appearance of the work, as determined by the Architect.
 3. Inherent variations characteristic of the granite and the quarry from which the granite is to be obtained shall be brought to the attention of the Architect at the time the samples are submitted for approval, and shall be subject to approval of the Architect.
 4. All granite shall be selected for background color, veining, marking and matching, shall run in even shades, and shall be set accordingly.

D. Physical and Mechanical: Contractor to submit data to the Architect.

1. Absorption and Bulk Specified Gravity (ASTM C 97).
2. Flexural strength (ASTM C 880).
3. Compressive Strength (ASTM C 170).
4. Modulus of Rupture (ASTM C 99).
5. Abrasion Resistance, Hardness (ASTM C 241).

E. Any granite materials rejected for non-compliance with these standards shall be replaced at no additional cost to the Owner.

2.2 STONE FABRICATION

A. General: Fabricate stone units in sizes and shapes required to comply with requirements indicated, including details on Drawings and Shop Drawings.

1. For granite, comply with recommendations in NBGQA's "Specifications for Architectural Granite."

B. Cut and drill sinkages and holes in stone for anchors, fasteners, supports, and lifting devices as indicated or needed to set stone securely in place; shape beds to fit supports.

C. Cut stone to produce pieces of thickness, size, and shape indicated and to comply with fabrication and construction tolerances recommended by applicable stone association or, if none, by stone source, for faces, edges, beds, and backs.

1. Clean backs of stone to remove rust stains, iron particles, and stone dust.

D. Contiguous Work: Provide chases, reveals, reglets, openings, and similar features as required to accommodate contiguous work.

E. Finish exposed faces and edges of stone, except sawed reveals, to comply with requirements indicated for finish and to match approved samples and mockups.

F. Carefully inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.

1. Grade and mark stone for overall uniform appearance when assembled in place. Natural

variations in appearance are acceptable if installed stone units match range of colors and other appearance characteristics represented in approved samples and mockups.

- G. Flatness Tolerance: Variation from true plane, or flat surfaces, shall be determined by use of a 4 ft. long straightedge, applied in any direction on the surface. Such variations on polished, honed and fine rubbed surfaces at the bed and joint arris lines shall not exceed 3/64 in. or 1/16 of the specified joint width, whichever is greater. On surfaces having other finishes the maximum variation from true plane shall not exceed 1/4 of the specified joint width.
- H. Variations from true plane on other parts of face surfaces shall not exceed the following:
 - 1. 4-cut and sawn finishes 1/8 in.
 - 2. Thermal and coarse stippled sandblasted finishes 3/16 in.
- I. Backs of pieces shall be sawn or roughly dressed to approximate true planes. Maximum variation in thickness from the specified shall not exceed the following:
 - 1. 1/2 in. on pieces above 3 in. modular thick

2.3 GRANITE

- A. Granite shall be supplied by Swenson Granite Works 369 North State Street, Concord, NH 03301 Phone: (603) 225-4322; Fax: (603) 228-2915; Swenson Granite Works 86 Route 101A, Amherst, NH 03031; Phone: (603) 672-7827; Fax: (603) 673-3848, or other Landscape Architect approved source. Exposed surfaces of granite shall match the existing elements on site.
 - 1. Granite color and finish: to match existing elements on site.
 - 2. Granite shall be of the sizes and dimensions indicated on the Drawings.
- B. All faces shall be at right angles to the plane of the top.
- C. Granite shall be cut accurately to required shapes and dimensions.
- D. Unless otherwise indicated on the Drawings, arrises shall be cut sharp and true to square, and continuous with adjoining arrises. Where indicated, arrises shall be eased to radius indicated on the Drawings.

2.4 SETTING BED MORTAR

- A. Setting bed mortar shall be equal to "Laticrete 3701 Fortified Mortar Bed", a polymer fortified blend of carefully selected polymers, portland cement and graded aggregates, manufactured by Laticrete International, Inc., One LATICRETE Park North, Bethany, CT 06524-3423 USA · 1.800.243.4788 · +1.203.393.0010, or approved equal. Mix with water according to manufacturer's instructions.

2.5 THIN SET BED AND/OR BOND COAT

- A. High strength bond coat between concrete base slab and setting bed mortar, and between setting bed mortar and granite shall be equal to "Laticrete 254 Platinum", one-step, polymer fortified, thin-set mortar bond coat, manufactured by Laticrete International, Inc., One LATICRETE Park North, Bethany, CT 06524-3423 USA · 1.800.243.4788 · +1.203.393.0010, or approved equal.

2.6 MORTAR GROUT FOR POINTING

- A. Sanded Grout: shall be 1500 Sanded Grout, a premium, factory prepared grout designed to be mixed with water. 1500 Sanded Grout is formulated from a blend of high strength portland cement, graded aggregates, polymers and color-fast pigments and provides a grout joint that is

dense, hard and durable, manufactured by Laticrete International, Inc., One LATICRETE Park North, Bethany, CT 06524-3423 USA · 1.800.243.4788 · +1.203.393.0010, or approved equal.

1. For grout joint widths of 1/16" (1.5 mm) up to 3/8" (9 mm).
2. Color shall match color of granite.

2.7 ANCHORAGE AND SETTING MATERIALS

- A. Pins, Dowels, Anchor Bolts, Nuts, Washers, and Shims: Fabricate from AISI Type 302/304 stainless steel.
- B. Stone Anchors: Type and size required to securely anchor and fasten stonework in place and as indicated on the Drawings. Fabricate anchors and dowels from Type 302/304 stainless steel.
- C. Epoxy adhesive for fastening stainless steel dowels into adjoining limestone blocks and/or concrete foundations shall be a two-component, 100% solids, moisture-insensitive, high-modulus, high strength, structural, epoxy paste adhesive conforming to ASTM C 881, similar to "Sikadur 31, Hi-Mod Gel", manufactured by Sika, Glendale Heights, IL 60139, or approved equal.
- D. Provide lead or plastic setting buttons sized to maintain uniform joints.

PART 3 EXECUTION

3.1 ACCEPTABILITY OF CONCRETE BASE

Contractor shall examine the concrete foundation to determine its adequacy to receive granite unit and mortar setting bed. Evidence of inadequate condition shall be brought to the immediate attention of the Architect.

- A. B. Start of work of this Section shall constitute acceptance of the concrete foundation.

3.2 CLEANING

- A. After setting, granite work shall be carefully cleaned, removing all dirt, stains, and other defacements.
 1. Mild abrasive cleaners that contain no harsh or caustic ingredients may be used, with fiber brooms or brushes and clear water. Wire brushes, steel wool, and acids or other solutions which may cause discoloration are expressly prohibited.
- B. Upon completion of granite work, surfaces shall be left in a clean, unsoiled condition, acceptable to the Architect.

3.3 PROTECTION

- A. Granite work shall be properly and adequately protected under the responsibility of the Contractor until final acceptance of the Project by Owner.
- B. After the granite work has been installed, it shall be properly and adequately protected from damage. Boxing or other suitable protection shall be provided by Contractor wherever required. However, no lumber which may stain or deface the granite shall be used. Nails shall be high-quality galvanized or non-rusting.

END OF SECTION

SECTION 055000

METAL FABRICATIONS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 WORK INCLUDED

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
1. Miscellaneous bearing and leveling plates.
 2. Custom brackets and supports for wood rails.
 3. Custom metal cover plate for piers.
 4. Custom metal inlay in paving.

1.3 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
1. Section 033000, CAST-IN-PLACE CONCRETE; Placing of inserts and anchors.
 2. Section 044302, GRANITE; Piers.
 3. Section 321314, Exposed Aggregate Concrete Paving.

1.4 REFERENCES

- A. Comply with applicable requirements of following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.
1. American Institute of Steel Construction (AISC):
Code of Standard Practice for Steel Buildings and Bridges
Specification for the Design, Fabrication and Erection of Structural Steel for Buildings
 2. American Iron and Steel Institute (AISI):
Specifications for the Design of Light Gage Cold-Formed Steel Structural Members
 3. American National Standards Institute (ANSI):
A14.3 Safety Requirements for Fixed Ladders
A202.1 Metal Bar Grating Manual
 4. American Society for Testing and Materials (ASTM):
A 27 Steel Castings, Carbon, for General Application
A 36 Structural Steel
A 47 Ferritic Malleable Iron Castings
A 48 Gray Iron Castings

- A 53 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
- A 123 Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip
- A 153 Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- A 307 Carbon Steel Externally Threaded Standard Fasteners
- A 325 High Strength Bolts for Structural Steel Joints
- A 366 Steel, Carbon, Cold-Rolled sheet, Commercial Quality
- A 385 High-Quality Zinc Coatings (Hot-Dip)
- A 386 Zinc Coating (Hot-Dip) on Assembled Steel Products
- A 446 Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
- A 500 Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
- A 501 Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
- A 510 General Requirements for Wire Rods and Course Round Wire, Carbon Steel
- A 569 Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality
- A 570 Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality
- A 588 High –Strength Low Alloy Structural Steel with 50 ksi [345 MPa] Minimum Yield Point to 4 in. [100mm] Thick
- A 606 Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance
- A 611 Steel, Cold-Rolled Sheet, Carbon, Structural
- A 743 Castings, Iron-Chromium, Iron-Chromium Nickel, and Nickel-Base Corrosion-Resistant, General Application
- A 780 Repair of Damaged Hot-Dip Galvanized Coatings
- A 786 Rolled Steel Floor Plates
- E 894 Anchorage of Permanent Metal Railing Systems and Rails for Buildings
- E 935 Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings
- E 985 Specifications for Permanent Metal Railing Systems and Rails for Buildings
- 5. American Welding Society (AWS):
 - D1.1 Structural Welding Code – Steel
 - D1.3 Structural Welding Code - Sheet Steel
- 6. Corps of Engineers (CE):
 - CRD-C-621 Specification for Nonshrink Grout
- 7. Steel Structures Painting Council (SSPC):
 - PA 1 Paint Application Specification No. 1
 - SP 3 Power Tool Cleaning
 - SP 6 Commercial Blast Cleaning

1.5 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.6 SUBMITTALS

- A. Shop Drawings: Submit shop drawings of work showing size and thickness of each member, type of material, method of connection and assembly. Show dimensions, clearances, anchorages, relationships to surrounding work, coatings, and other pertinent details of fabrication and installation.
 - 1. Show profiles, reinforcing, fasteners, and any accessories.
 - 2. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.
- B. Product Data: Provide manufacturer's product data, installation instructions, use limitations, and recommendations for each material used. Provide certifications that materials comply with requirements.
- C. Calculations: Where installed metal fabrication work is indicated to comply with certain design loadings, provide professionally prepared calculations, material properties, certification, and other information required for structural analysis of performance of work.
- D. Welders Certification: Provide certifications, signed by Contractor, certifying that welders employed at project comply with requirements specified under AWS D1.1 and AWS D1.2.

1.7 GENERAL REQUIREMENTS

- A. The Contractor shall verify all measurements and shall take all field measurements necessary before fabrication. Welding to or on structural steel shall be in accordance with AWS D1.1/D1.1M. Items specified to be galvanized, when practicable and not indicated otherwise, shall be hot-dip galvanized after fabrication. Galvanizing shall be in accordance with ASTM A 123/A 123M, ASTM A 653/A 653M, or ASTM A 924/A 924M, as applicable. Exposed fastenings shall be compatible materials, shall generally match in color and finish, and shall harmonize with the material to which fastenings are applied. Materials and parts necessary to complete each item, even though such work is not definitely shown or specified, shall be included. Poor matching of holes for fasteners shall be cause for rejection. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall provide strength and stiffness. Joints exposed to the weather shall be formed to exclude water.

1.8 WORKMANSHIP

- A. Miscellaneous metalwork shall be well formed to shape and size, with sharp lines and angles and true curves. Drilling and punching shall produce clean true lines and surfaces. Welding shall be continuous along the entire area of contact except where tack welding is permitted. Exposed connections of work in place shall not be tack welded. Exposed welds shall be ground smooth. Exposed surfaces of work in place shall have a smooth finish, and unless otherwise approved, exposed riveting shall be flush. Where tight fits are required, joints shall be milled. Corner joints shall be coped or mitered, well formed, and in true alignment. Work shall be accurately set to established lines and elevations and securely fastened in place. Installation shall be in accordance with manufacturer's installation instructions and approved drawings, cuts, and details.

1.9 ANCHORAGE

- A. Anchorage shall be provided where necessary for fastening miscellaneous metal items securely in place. Anchorage not otherwise specified or indicated shall include slotted inserts made to

engage with the anchors, expansion shields, and power-driven fasteners when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; and lag bolts and screws for wood.

1.10 QUALITY ASSURANCE

- A. Engineering: Provide services of a professional engineer, registered in Commonwealth of Massachusetts, to design and certify that work of this Section meets or exceeds performance requirements specified.
- B. Shop fabricate work to greatest extent possible. Label each piece in shop to facilitate field assembly.
- C. Welding: Perform welding in conformance with AWS D1.1 and D1.3. as applicable.

1.11 PRODUCT HANDLING AND STORAGE

- A. Store work off ground and under cover. Protect from damage. Repair and clean work before erection.

1.12 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Provide allowance for trimming and fitting at site.
- B. Do not permit use of metal fabrication work until work is completely and fully installed and ready to assume intended design loads. Do not permit overloading of metal fabrication systems. Do not permit use of concrete filled metal pan stair systems until concrete is placed and cured.

1.13 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 STEEL

- A. General: Provide products and materials of new stock, free from defects, and of best commercial quality for each intended purpose.
- B. Steel Plates, Shapes, and Bars: ASTM A 36.
- C. Steel Tubing: ASTM A 500 or A 501, hot or cold rolled, as required for design loading.
- D. Steel Pipe: ASTM A 53, schedule 40, Type S (seamless), black except where galvanized is indicated, Grade A for cold-bending.

- E. Steel Sheet: ASTM A 366, A 570, or A 611, grade required for design loading.
 - 1. Stainless steel pipe, flat bar stock, and related components shall be AISI Type 304 with No. 4 satin finish.
- F. Rolled Steel Floor Plates: ASTM A 786.
- G. Steel Bars for Gratings: ASTM A 569 or ASTM A 36.

2.2 STAINLESS STEEL

- A. Stainless Steel: Comply with following standards and requirements for stainless steel components:
 - 1. Tubing: ASTM A 554, Type 316 stainless steel, as standard with manufacturer.
 - 2. Pipe: ASTM A 312, Type 316 stainless steel.
 - 3. Castings: ASTM A 743, Grade CF 8 or CF 20.
 - 4. Plate: ASTM A 167, Type 316 stainless steel.

2.3 NONFERROUS METALS

- A. General: Provide products and materials of new stock, free from defects, and of best commercial quality for each intended purpose.
- B. Aluminum Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.
- C. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.
- D. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- E. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.4 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F 593 (ASTM F 738M) for bolts and ASTM F 594 (ASTM F 836M) for nuts, Alloy Group 1 (A1).
- D. Anchor Bolts: ASTM F 1554, Grade 36.
 - 1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.
- E. Eyebolts: ASTM A 489.

- F. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).
- G. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
- H. Wood Screws: Flat head, ASME B18.6.1.
- I. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).
- J. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).
- K. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.
- L. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material for Anchors in Exterior Locations: Alloy Group 1 (A1) stainless-steel bolts complying with ASTM F 593 (ASTM F 738M) and nuts complying with ASTM F 594 (ASTM F 836M).
- M. Inserts: Threaded or wedge type, galvanized ferrous castings; either ASTM A 47 malleable iron, or ASTM A 27 cast steel. Provide threaded inserts and wedge inserts manufactured by one of the following or Architect approved equal:
 - 1. Hohmann and Barnard.
 - 2. Gateway Erections, Inc.
 - 3. Richmond Screw Anchor Co.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Grout for Exterior Applications: Provide Factory-packaged, non-shrink, non-staining, hydraulic controlled expansion cement formulation for mixing with water at project site. Provide formulation that is resistant to erosion from water exposure without need for protection by a sealer or waterproof coating. Provide Super Por-Rok, Erosion-Resistant Anchoring Cement, manufactured by Minwax Construction Products Division, or equal as approved by Architect.

2.6 FABRICATION – GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

- B. Fabricate work of this Section to be straight, plumb, level and square, and to sizes, shapes and profiles indicated on approved shop drawings. Ease exposed edges. Cut, reinforce, drill and tap metal work as required for proper assembly.
1. Fabricate miscellaneous supports, brackets, braces and the like required to fully complete the work.
 2. Obtain loading requirements from suppliers of work to be supported. Design and support systems with a safety factor of at least 6 unless otherwise indicated.
 3. Allow for thermal movement resulting from 100°F change in ambient temperature.
 4. Shear and punch metals accurately. Remove burrs.
 5. Ease exposed edges to a radius of approximately 1/32 in., unless indicated otherwise. Form bent corners to smallest radius possible without causing grain separation or impairing work.
 6. Remove sharp or rough areas on exposed traffic surfaces.
 7. Weld seams continuously. Spot welding is permitted for temporary welding only.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- F. Weld corners and seams continuously to comply with the following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.
- H. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- I. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- J. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

- K. Work Exposed to View: For work exposed to view, select materials with special care. Provide materials which are smooth and free of blemishes such as pits, roller marks, trade names, scale and roughness. Fabricate work with uniform hairline joints. Form welded joints and seams continuously. Grind welds flush to be smooth after painting. For exposed fasteners, use hex head bolts or Phillips head machine screws.
- L. Galvanizing: Hot-dip galvanize exterior metal fabrications, items located in exterior wall assemblies, and other items indicated to be galvanized, in compliance with ASTM A 123, ASTM A 153, or ASTM A 386. Provide minimum 1.5 oz./ft.2 zinc coating. Galvanize after fabrication.

2.7 FABRICATION

- A. Shelf and Relieving Angles: Fabricate shelf and relieving angles from steel angles and shapes of sizes indicated for attachment to building structure. Fabricate shapes with slotted holes to receive anchor bolts, of size and spacings indicated. If not indicated, holes not more than 6 in. from ends and not more than 24 in. on center. Align expansion joints in angles with building expansion joints, and with control joints in masonry cavity wall exterior wythe.
- B. Miscellaneous Bearing and Leveling Plate Fabrication: Provide miscellaneous loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Fabricate units flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts as required.
- C. Concrete Filled Pipe Bollard Fabrication: Provide minimum 8 in. diameter Schedule 80 steel pipe of length to extend from at least 3 ft. below grade to at least 30 in. above grade, unless otherwise indicated.
- D. Miscellaneous Framing and Supports: Fabricate miscellaneous framing and supports to adequately support live and dead loads with a safety factor of 5. Provide necessary anchors, inserts, and fasteners. Fabricate support system to carry entire load of work being supported to structure above. Do not transfer any loads to ceiling systems.
 - 1. Cut, drill, and tap units to receive hardware, hangers and similar items.
 - 2. Coordinate loading and attachment requirements for miscellaneous framing and supports with manufacturers of items being supported.

2.8 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.9 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
- C. Shop Paint for assemblies shall be Tnemec "Series 27 F.C. Typoxy", polyamide epoxy, or approved equal. Dry film thickness of application shall be 4.5 to 6.0 mil. Color shall be black; surface texture shall be flat.
- D. Field Finish Paint shall be Tnemec Series 2 coat high performance system or approved equal. Color shall be black, with eggshell finish.
- E. Bituminous-based paint for electrolytic isolation shall be cold applied black asphaltic mastic conforming to SSPC Paint 12, with no asbestos fibers

2.10 STAINLESS-STEEL FINISHES

- A. Remove tool and die marks and stretch lines or blend into finish.
- B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- C. Bright, Directional Satin Finish: No. 4.
- D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.11 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. As-Fabricated Finish – “Mill Finish”: AA-M10 (Mechanical Finish: as fabricated, unspecified).

2.12 ELECTROLYTIC SEPARATION/CORROSION RESISTANCE

- A. Coating for electrolytic separation between steel and concrete and grout shall be a high-build coal tar epoxy providing one coat protection for steel and concrete in a variety of chemical, immersion and underground conditions, manufactured by Tnemec Company, Inc., 6800 Corporate drive, Kansas City, MO 64120-1372; Tel. 816-483-3400; Kop-Coat Inc, 436 Seventh Avenue, Pittsburgh, PA 15219-1818; 1/412/227-2700, parent company RPM, International 2628 Pearl Road - P.O. Box 777 - Medina, Ohio 44258; Phone: 330.273.5090 - Fax: 330.225.8743; Carboline Company, 2150 Schuetz Road, St. Louis, MO 63146; Phone: 800-848-4645 or 314-644-1000; FAX: 314-644-4617, or approved equal.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordinate and furnish anchorage devices, setting drawings, diagrams, templates, instructions, and directions for installation of concrete inserts, sleeves, anchor bolts, and miscellaneous items to be embedded or attached to concrete work, masonry work, or structural steel work.

3.2 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners necessary for securing work of this Section to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors required.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Erect work square, plumb and true, accurately fitted, and with tight joints and intersections. All anchors, inserts and other members to be set in concrete or masonry shall be furnished loose by this trade to be built-into concrete and masonry by those trades. Avoid field cutting or drilling to greatest extent possible.
- D. Brace work rigid and secure to surrounding construction. Provide temporary bracing or anchors where required.
- E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- F. Field Welding: Comply with AWS D1.1 and D1.2 for procedures of manual metal-arc welding, appearance and quality of welds, and correction methods for defective welds.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- G. Where members other than expansion bolts or inserts are fastened into concrete, set such members in proprietary-type expanding grout manufactured specifically for such purpose. Use grouts strictly in accordance with manufacturer's directions. Form to receive members with galvanized metal sleeves, or other approved method to provide at least 1/2 in. clearance around entire perimeter. At exposed applications, hold expanding grout back 1/2 in. from finish surface and fill voids with Portland cement grout to match color and texture of surrounding concrete surface.
- H. Electrolytic Isolation: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or where dissimilar metals are to come into contact with one another, with an application of a heavy coating of bituminous paint on contact surfaces in addition to shop coat specified above. Do not permit the bituminous paint in any way to remain on surfaces to be exposed or to receive sealant.

3.3 INSTALLATION

- A. Miscellaneous Bearing and Leveling Plates: Clean concrete and masonry surfaces of bond reducing materials. Roughen surfaces if required to improve bond to surface. Clean bottom surface of leveling plates immediately prior to installation.
- B. Steel Pipe Bollards: Install steel pipe bollards as indicated on Drawings. Set bollards in concrete. Concrete shall be as specified in Section 033000, CAST-IN-PLACE CONCRETE. Provide temporary bracing to accurately plumb bollards until concrete base has set. Fill pipe with concrete and form a smooth, rounded crown on top to shed water.
- C. Miscellaneous Items: Carefully review Drawings for miscellaneous metal items required by various trades but not specifically listed above, such as miscellaneous clip angles, miscellaneous steel bracketing, and other miscellaneous metal items as indicated on Drawings, reasonably implied therefrom, or reasonably necessary for thorough completion of work.

3.4 ADJUSTING, REPAIRING, CLEANING, AND PROTECTION

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.
- C. Non-Galvanized Surfaces: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed surfaces with same material as used for shop painting. Comply with SSPC PA 1.

END OF SECTION

SECTION 061063

EXTERIOR ROUGH CARPENTRY

PART 1 GENERAL

1.00 GENERAL PROVISIONS

- A. Attention is directed to the PROCUREMENT AND CONTRACTING REQUIREMENTS and all Sections within DIVISION 01, GENERAL REQUIREMENTS, which are made a part of this Section of the Specifications.

1.01 WORK INCLUDED

- A. Provide all materials and equipment, and do all work required to construct wood rails as part of the granite and wood perimeter fence indicated on the Drawings and as specified.

1.02 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that relate directly to work of this Section include, but are not limited to:
 - 1. Section 044302 GRANITE, salvaged granite piers.
 - 2. Section 055501 METAL FABRICATIONS, metal bracket.
 - 3. Section 312300 SITE EXCAVATING, BACKFILLING AND COMPACTING.

1.03 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

- 1. American Society for Testing and Materials (ASTM):

- ASTM F 537 Standard Specification for Design, Fabrication, and Installation of Fences Constructed of Wood and Related Materials

1.04 SUBMITTALS

- A. Samples: Wood Rail
- B. Shop Drawings of granite and wood fence shall be submitted.

1.05 QUALITY ASSURANCE

- A. Installation of wood rails shall conform to ASTM F 537.

PART 2 PRODUCTS

2.01 LUMBER, GENERAL

- A. Comply with DOC PS 20 and with grading rules of lumber grading agencies certified by ALSC's Board of Review as applicable. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by ALSC's Board of Review.

- 1. Factory mark each item with grade stamp of grading agency.
 - 2. For items that are exposed to view in the completed Work, omit grade stamp and provide

- certificates of grade compliance issued by grading agency.
3. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content:

1. Boards: 15 percent.
2. Dimension Lumber: 15 percent for 2-inch nominal (38-mm actual) thickness or less; 19 percent for more than 2-inch nominal (38-mm actual) thickness].
3. Timber. 19 percent

2.02 LUMBER

A. Fence Rails: lumber shall be:

1. Red Cedar, of sound stock, clear of knots.
3. Rails to be sawn not split.

2.03 FASTENERS

A. General: Provide fasteners of size and type indicated, acceptable to authorities having jurisdiction, and that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.

1. Use fasteners with hot-dip zinc coating complying with ASTM A 153 unless otherwise indicated.
2. For pressure-preservative-treated wood, use stainless-steel fasteners.

PART 3 EXECUTION

1.01 INSTALLATION, GENERAL

- A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit work to other construction; scribe and cope as needed for accurate fit.
- B. Framing Standard: Comply with AF&PA WCD1 unless otherwise indicated.
- C. Install metal framing anchors to comply with manufacturer's written instructions.
- D. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 1. "Fastening Schedule" in ICC's International Building Code.

END OF SECTION 061063

SECTION 079201

EXTERIOR JOINT SEALANTS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, sealing and caulking of joints as indicated on the Drawings and as specified, including but not limited to the following
1. Sealing of joints in exterior concrete and masonry construction.
 2. All other exterior sealing called for, or reasonably inferred from the Drawings, and as required to provide weathertight conditions in exterior assemblies.

1.3 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
1. Section 033001, CAST-IN-PLACE CONCRETE - SITEWORK.
 2. Section 321313, PORTLAND CEMENT CONCRETE PAVING.
 3. Section 044302, GRANITE.
 4. Section 321640, GRANITE CURBING.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
1. American Association of State Highway and Transportation Officials (AASHTO):
M 220 Preformed Elastomeric Compression Joint Seals for Concrete
 2. American Society for Testing and Materials (ASTM):
C 719 Adhesion and Cohesion of Elastomeric Joint Sealants under Cyclic Movement
C 790 Use of Latex Sealing Compounds
C 834 Latex Sealing Compounds
C 920 Elastomeric Joint Sealants
C 962 Use of Elastomeric Joint Sealants
C 1330 Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants
D 412 Test Methods for Rubber Properties in Tension
D 624 Test Method for Rubber Property - Tear Resistance
D 2628 Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements

3. Federal Specifications (Fed. Spec.):
- TT-S-00227 Sealing Compound: Elastomeric Type, Multi-Component (For Calking, Sealing, and Glazing in Buildings and Other Structures)
 - TT-S-001543A Sealing Compound: Silicone Rubber Base (For Calking, Sealing, and Glazing in Buildings and Other Structures)

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each sealant material used. Provide certifications that sealant materials comply with specified requirements.
- B. Initial Selection Samples: Submit samples manufacturer's color charts showing complete range of colors, textures, and finishes available for each material used.
- C. Verification Samples: Submit actual representative samples of each sealant material that is to be exposed in the completed work. Show full color ranges and finish variations expected. Provide sealant samples having minimum size of 4 in. long.
- D. Test Reports: Provide certified reports for all specified tests.

1.6 COMPATIBILITY

- A. Provide sealant and sealant joint backing materials suitable for the use intended and compatible with the materials with which they will be in contact. Compatibility of sealant and accessories shall be verified by the sealant manufacturer.

1.7 QUALITY ASSURANCE

- A. Source: For each sealant material type required for the work of this section, provide primary materials which are the product of one manufacturer. Provide secondary or accessory materials which are acceptable to the manufacturers of the primary materials.
- B. Installer: A firm with a minimum of five years experience in type of work required by this Section and which is acceptable to the manufacturers of the primary materials.
- C. Mock-Ups: Prior to commencing the primary work of this Section, provide mock-ups at locations acceptable to Architect. Obtain Architect's acceptance of visual qualities. Protect and maintain accepted mock-ups throughout the remainder of the work of this section to serve as criteria for acceptance of the work.

1.8 PROJECT CONDITIONS

- A. Weather: Perform work of this Section only when existing or forecasted weather conditions are within the limits established by manufacturers of the materials and products used.
- B. Substrates: Proceed with work only when substrate construction and penetration work is complete.

1.9 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Materials under this Section shall be delivered to, and stored at, the job site in unbroken factory sealed containers with labels intact

1.10 WARRANTY

- A. Furnish joint sealant manufacturer's written single-source performance warranty that joint sealant work will be free of defects related to workmanship or material deficiency for five years from date of Substantial Completion of the Project.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Before installation check each sealant for compatibility with adjacent materials and surfaces and with indicated exposures. Select sealers which are recommended by manufacturer for each application indicated. Where exposed to pedestrian or vehicular traffic, provide sealants which are non-tracking and are strong enough to withstand the traffic without damage.
- B. Provide colors as selected by Architect from manufacturer's standard and special (Tremco Fastpak) colors. Where specifically requested, provide custom color matches.

2.2 NON-SAG POLYURETHANE SEALANT

- A. Provide multi-part, non-sag, polyurethane based elastomeric sealant, complying with ASTM C 920 Type M, Grade NS, Class 25, Fed. Spec. TT-S-00227E Class A, having Shore A hardness of 20 to 30, cured modulus of elasticity at 100% elongation of not more than 75 psi, and tear resistance of not less than 50 lbs./inch when tested according to ASTM D 624.
- B. Provide one of the following products that meet or exceed specified requirements:
 - 1. Mameco International Vulkem 227
 - 2. Harry S. Peterson Co. Iso-Flex 2000
 - 3. Sika Sikaflex 2c NS.
 - 4. Sonneborn Sonolastic NP 2
 - 5. Tremco Dymeric.
- C. Where joint requires 50% movement capabilities, provide Tremco Dymeric Plus, or equal product approved by Architect.
- D. Extent: Provide non-sag polyurethane sealant for all paving joints, masonry to masonry joints, and other joints not indicated to be sealed with another type of sealant.

2.3 PREFORMED JOINT SEALER

- A. Preformed Resilient Joint Sealer: Preformed Resilient Joint Sealer for use at expansion joints in exterior concrete walls where specifically called for on Drawings shall be preformed, resilient, extruded polychlorophrene elastomeric joint sealer, conforming to ASTM D 2628 and AASHTO M 220 of indicated configuration(s), in continuous lengths, set in manufacturer's recommended primer-lubricating-adhesive consisting of moisture curing polyurethane and aromatic hydrocarbon solvent mixture (73% solid by weight) concrete gray color, equal to one of the following:
 - 1. D.S. Brown Co.
 - 2. Watson-Bowman & Acme Corp.

2.4 MISCELLANEOUS MATERIALS

- A. Primer: Provide primer recommended by sealant manufacturer for surfaces to be adhered to.
- B. Bond Breaker Tape: Provide polyethylene or other plastic tape recommended by sealant manufacturer to prevent three-sided adhesion.
- C. Backer Rod: Provide closed cell compressible rod of durable nonabsorptive material recommended by sealant manufacturer for compatibility with sealant, conforming to ASTM C 1330. Provide products of one of the following manufacturers:
 - 1. Backer Rod Manufacturing and Supply Co.
 - 2. Dow Chemical Co.
 - 3. W. R. Meadows, Inc.
 - 4. Williams Products, Inc.
 - 5. Woodmont Products, Inc..
- D. Joint backing for general use at joints in horizontal surfaces shall consist of two rows of butyl rubber or neoprene foam rod in contact with one another, and each compressed to approximately 2/3 original width when in place.
- E. Provide miscellaneous materials of type that will not bleed through sealant, discolor surface, or produce other deleterious effects. Select size to provide compression to approximately 2/3 original width when in place. Provide backing material profile concave to the rear of the sealant, and equipped with a bond-breaking film.

PART 3 - EXECUTION

3.1 INSPECTION

- A. The Installer shall examine substrates and conditions under which this work is to be performed and notify Contractor, in writing, of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning of sealant work means Installer's acceptance of joint surfaces and conditions.

3.2 PREPARATION

- A. Strictly comply with manufacturers' instructions and recommendations, except where more restrictive requirements are specified in this Section.
- B. Clean joint surfaces immediately before installation of sealants, primers, tapes and fillers. Remove substances which could interfere with bond. Etch or roughen joint surfaces to improve bond. Surfaces which have been given protective coatings and those that contain oil or grease shall be thoroughly cleaned with xylol or MEK solvent, with due precautions taken to minimize hazards.
- C. Unless otherwise indicated, use of sealants shall conform to the following: ASTM C 790 for latex sealants and ASTM C 962 for other sealants.
- D. Tape or mask adjoining surfaces to prevent spillage and migration problems.
- E. Prime surfaces as recommended by sealant manufacturer.

3.3 INSTALLATION

- A. Schedule work as long as possible after completion of concrete work and finished brick paving and granite work.
- B. Provide backer rods for liquid sealants except where specifically recommended against by sealant manufacturers.
- C. Prevent three sided adhesion by use of bond breaker tapes or backer rods.
- D. Force sealant into joints to provide uniform, dense, continuous ribbons free from gaps and air pockets. Completely wet both joint surfaces equally on opposite sides.
- E. Except in hot weather, make sealant surface slightly concave. Install sealants so that compressed sealants do not protrude from joints. Dry tool sealants to form a smooth dense surface. At horizontal joints form a slight cove to prevent trapping water.
- F. Provide sealants to depths indicated, or if not indicated, follow manufacturer's recommendations. For joints up to 3/8 in. width, depth of joint shall not exceed 1/2 in.; for joints larger than 1/2 in. width, depth of joint shall not exceed 5/8 in.

3.4 EXTENT OF SEALANT WORK

- A. General Extent: Seal joints indicated, and all exterior joints, seams, and intersections between dissimilar materials. Provide elastomeric sealant installation with backer rod in all exterior control joints.
- B. Exterior Sealing: Without limitation, the work of this Section includes sealing the following:
 - 1. Masonry to masonry joints.
 - 2. Masonry to other exterior materials, including concrete and metal.
 - 3. Concrete to concrete joints.
 - 4. Joints and cracks in paving and walks.
 - 5. Joint fillers for all joints.

3.5 CURING

- A. Cure sealants in strict compliance with manufacturers' instructions and recommendations to obtain highest quality surface and maximum adhesion. Make every effort to minimize accelerated aging effects and increase in modulus of elasticity.

3.6 CLEANING AND PROTECTION

- A. Remove smears from adjacent surfaces immediately, as the work progresses. Exercise particular care to prevent smearing or staining of surrounding surfaces which will be exposed in the finished work, and repair any damage done to same as result of this work without additional cost to Owner.
- B. Remove and replace work that is damaged or deteriorated.
- C. Clean adjacent surfaces using materials and methods recommended by sealant manufacturer. Remove and replace work that cannot be successfully cleaned.
- D. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protection immediately before final acceptance.

END OF SECTION

SECTION 129300

SITE FURNISHINGS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Provide all materials and equipment, and do all work necessary to furnish and install the site furnishings, as indicated on the Drawings and as specified.

1.3 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Section 03 3001, CAST-IN-PLACE CONCRETE - SITEWORK; Poured in place concrete foundation.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. American Society for Testing and Materials (ASTM):
 - A 153 Zinc Coating (Hot-Dip) on Iron and Steel Hardware

1.5 SUBMITTALS

- A. Complete shop drawings of each item specified shall be submitted.
- B. Where appropriate, and when approved by the Architect, manufacturer's catalogue cuts may be substituted for shop drawings.
- C. Certificate of wood treatment shall be submitted upon delivery of treated wood items.
- D. Submit assembly instruction drawings showing layout(s), connections, bolting and anchoring details as per manufacturer's standards.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials shall be the standard products of a manufacturer regularly engaged in the manufacture of such products. The materials provided shall be of a type with proven satisfactory usage for at least 2 years.

2.2 FASTENERS AND HARDWARE

- A. Provide manufacturer's standard materials and accessories as required for assembly of units and as indicated on the assembly drawings. Provide unexposed aluminum, stainless steel or steel plates, angles and supports as required for complete assembly. Separate dissimilar materials to prevent electrolytic action.

- 1. Fasteners and metal components shall be cadmium-plated steel or steel hot-dipped galvanized in accordance with ASTM A 153.

2.3 WOOD BENCH

- A. Bench shall be Plainwell Bench by LandscapeForms with jarrah wood seat and without center arm. Metal to be finished in Pangard II polyester powdercoat, in manufacturer standard color to be selected by landscape architect. Manufactured by LandscapeForms, 7800 E. Michigan Ave, Kalamazoo, MI, 49048. Tel: 269/381/0396. Email: specify@landscapeforms.com. Or approved equal.

2.4 METAL TRASH CAN

- A. Metal trash can to be Victor Stanley SDC-36 Side-Deposit Receptacle with 36 gal. capacity, with powder coat finish in manufacturer standard color to be selected by landscape architect. Include galvanized steel liner with powder coat finish. Manufactured by Victor Stanley, P.O Drawer 330, Dunkirk, MD, 20754. TEL: 301.855.8300. Email: sales@victorstanley.com. Or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

- A. The Contractor shall verify that finished grades and other operations affecting mounting surfaces have been completed prior to the installation of site furnishings. Site furnishings shall be installed plumb and true, at locations indicated, in accordance with the approved manufacturer's instructions.

3.2 ASSEMBLY AND ERECTION OF COMPONENTS

- A. Items shall be shipped knocked-down (KD) ready for site assembly. Packaged components shall be complete including all accessories and hardware. New parts shall be acquired from the manufacturer; substitute parts will not be accepted unless approved by the manufacturer. When the inspection of parts has been completed, the site furnishings shall be assembled and anchored according to manufacturer's instructions or as indicated. When site furnishings are assembled at the site, assembly shall not interfere with other operations or pedestrian and vehicular circulation.

3.3 ANCHORAGE, FASTENINGS AND CONNECTIONS

- A. Furnish metal work, mounting bolts or hardware in ample time for securing into concrete or masonry as the work progresses. Provide anchorage where necessary for fastening granite benches securely in place. Provide, for anchorage not otherwise specified or indicated, slotted inserts, expansion shields, and power-driven fasteners, when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; through bolts, lag bolts, and screws for wood. Provide non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish the fastenings to which they are applied. Conceal fastenings where practicable.

3.4 TESTING

- A. Each site furnishing shall be tested to determine a secure and correct installation. A correct installation shall be according to the manufacturer's recommendations and by the following procedure: The Contractor shall measure the physical dimensions and clearance of each installed site furnishing for compliance with manufacturer's recommendations and as indicated. Site furnishings which do not comply shall be reinstalled. Fasteners and anchors determined to be non-compliant shall be replaced. A written report describing the results of the testing shall be provided.

3.5 BENCHES

A. Examination

1. Do not begin installation until substrates are properly prepared.
2. Verify that substrates are stable and capable of supporting the weight of the product.

B. Installation

1. Install tables and benches in accordance with manufacturer's installation instructions.
2. Bolt and anchor tables and benches securely in place.

C. Adjusting

1. Any loose or missing hardware should be tightened or replaced immediately.
2. If any part is found to be cracked or broken it is recommended that the product be taken out of service until the appropriate repairs can be made.

D. Cleaning Metal Components

1. Should dirt from the environment build-up on this surface a wipe with a soft cloth and mild detergent will do the trick.
2. Abrasive cleaners, brushes and steel wool should be avoided.
3. If the finish is marred by a sharp object and the steel is exposed take a fine abrasive material to the area to improve the adhesion of the primer and touch-up paint. A quality grade exterior metal primer and top coat of matching color enamel should then be applied over the prepared surface.

E. Protection

1. Protect installed tables and benches until completion of project.

3.6 METAL TRASH CAN

- A. Metal Trash Can shall be located as indicated on the Drawings. Each receptacle shall be fastened to the base with a minimum of four bolts, unless otherwise indicated in the manufacturer's printed instructions.
- B. Metal Trash Can shall be positioned in the required location and firmly secured to the base.

END OF SECTION

SECTION 26 52 00

EXTERIOR LIGHTING

PART 1- GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 – GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following: exterior lighting fixtures, lamps, ballasts, poles standards, and accessories. The existing electrical box and service to the site will be reused. Contractor to provide new electrical lines, conduit, and pull boxes.

1.3 DEFINITIONS

- A. Fixture: A complete lighting unit. Fixtures include a lamp or lamps and parts required to distribute the light, position and protect lamps, and connect lamps to the power supply.
- B. Lighting Unit: A fixture, or an assembly of fixtures with a common support, including a pole or bracket plus mounting and support accessories.
- C. Luminaire: A fixture.

1.4 SUBMITTALS

- A. General: Submit the following according to Conditions of Contract and Division 1 Specification Sections.
- B. Product data describing fixtures, lamps, ballasts, poles, and accessories. Arrange product data for fixtures in order of fixture designation. Include data on features, poles, accessories, and the following:
 - 1. Outline drawings of fixtures and poles indicating dimensions and principal features.
 - 2. Electrical ratings and photometric data with certified results of independent laboratory tests.
- C. Product certifications signed by manufacturers of lighting units certifying that their products comply with specified requirements.
- D. Shop drawings from manufacturers detailing nonstandard fixtures and poles and indicating dimensions, weights, methods at field assembly, components, and accessories.
- E. Maintenance data for products for inclusion in Operating and Maintenance Manual specified in Division 1.

1.5 QUALITY ASSURANCE

- A. Comply with NFPA 70 "National Electrical Code" for components and installation.
- B. Comply with ANSI C2, "National Electrical Safety Code."
- C. Listing and Labeling: Provide fixtures and accessories that are listed and labeled for their indicated use and location on the Project.
 - 1. Special Listing and Labeling: Provide lighting units for use under water that are specifically listed and labeled for such use.
 - 2. The Terms "Listed" and "Labeled": As defined in the "National Electrical Code," Article 100.
 - 3. Listing and Labeling Agency Qualification: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.
- D. Manufacturers' Qualifications: Firms experienced in manufacturing lighting units that are similar to those indicated for this Project and that have a record of successful in-service performance.
- E. Light fixtures shall conform to all Dark Sky Requirements as defined in The "IES" (Illuminating Engineering Society of North America) Lighting Handbook, most recent edition.

1.6 STORAGE AND HANDLING OF POLES

- A. General: Store poles on decay-resistant treated skids at least 1 ft. above grade and vegetation. Support pole to prevent distortion and arrange to provide free air circulation.
- B. Metal Poles: Retain factory-applied pole wrappings until just before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.

1.7 WARRANTY

- A. Special Project Warranty: Submit a warranty, mutually executed by manufacturer and the Installer, agreeing to replace external parts of lighting fixtures exhibiting a failure of finish as specified below. This warranty is in addition to, and not a limitation of, other rights and remedies the Owner may have under the Contract Documents.
 - 1. Protection of Metal from Corrosion: Warranty against perforation or erosion of the finish due to weathering.
 - 2. Color Retention: Warranty against fading, staining, and chalking due to the effects of weather and solar radiation.
 - 3. Special Project Warranty Period: 5 years, beginning on the date of Substantial Completion.

PART 2- PRODUCTS

2.1 FIXTURE COMPONENTS, GENERAL

- A. Metal Parts: Free from burrs and sharp edges and corners.
- B. Sheet Metal Components: Corrosion-resistant aluminum, except as indicated. Form and support to prevent warping and sagging.
- C. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/ breather for enclosed fixtures.
- D. Doors, Frames, and Other Internal Access Provisions: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in the operating position. Provide for door removal for cleaning or replacing lens. Arrange for door opening to disconnect ballast.
- E. Exposed Hardware Material: Stainless steel.
- F. Reflecting Surfaces: Minimum reflectances as follows, except as otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
- G. Plastic Parts: Resistant to yellowing and other changes due to aging and exposure to heat and UV radiation.
- H. Lenses and Refractors: Materials as indicated. Use heat- and aging-resistant, resilient gaskets to seal and cushion lens and refractor mounting in fixture doors.

2.2 POST LIGHT

- A. Providence Medium Light Fixture (PROV/T3-32LED/3K/450/BLK/PCAT/STND) by Architectural Area Lighting, mounted on post PR4/4R10-125/BLK/BC5SEE, Manufacturer's Typical Mounting Detail.

2.3 INSTALLATION

- A. Set units plumb, square, level, and secure according to manufacturer's written instructions and shop drawings.

2.4 CONCRETE FOUNDATIONS

- A. Construct concrete foundations with 3000-pound, 28-day concrete conforming to Division 3 Section "Cast-In-Place Concrete." Comply with details and manufacturer's recommendations for reinforcing, anchor bolts, nuts, and washers.
- A. Pole Installation: Use fabric web slings (not chain or cable) to raise and set poles.

- A. Fixture Attachment: Fasten to indicated structural supports.
- A. Lamp fixtures with indicated lamps according to manufacturer's instructions. Replace malfunctioning lamps.
- 2. GROUNDING
 - A. Ground fixtures and metal poles according to Division 16 Section "Grounding."
 - 1. Poles: 1/0 ground wire attached to grounding electrode system as indicated on the Drawings.
- 3. FIELD QUALITY CONTROL
 - A. Inspect installed units for damage.
 - B. Provide advance notice of dates and times for field tests.
 - C. Provide instruments to make and record test results.
 - D. Tests: Verify normal operation of lighting units after installing fixtures and energizing circuits with normal power source. Include the following:
 - 1. Check for excessively noisy ballasts.
 - 2. Check for uniformity of illuminations.
 - 3. Written report of tests indicating actual illumination results.
- 4. ADJUSTING AND CLEANING
 - A. Clean components on completion of installation. Use methods and materials recommended by manufacturer.

END OF SECTION

SECTION 312300

SITE EXCAVATING, BACKFILLING AND COMPACTING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 WORK INCLUDED

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following: site excavating, backfilling, and compacting, as indicated on the Drawings and as specified.
- B. The work of this section shall include, but is not necessarily limited to the following:
1. Site excavation, filling, and grading.
 2. Excavation and backfill for site structures and utilities.
 3. Preparation of subgrade for slabs and pavements.
 4. Grading for landscape and pavement areas.
 5. Sheeting, bracing, and support of excavations as necessary.
 6. Drainage and dewatering as necessary to perform work in the dry.
 7. Placement and compaction of fills.
 8. Placement and compaction of aggregate base other than beneath pavements.

1.3 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
1. Section 024113, SELECTIVE SITE DEMOLITION AND REMOVALS; Clearing and grubbing and stripping of topsoil.
 2. Section 329119, LANDSCAPE GRADING.
 3. Aggregate base courses beneath paving is included under the applicable paving specification section.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
1. American Society for Testing and Materials (ASTM):
 - C 33 Concrete Aggregates
 - C 136 Sieve Analysis of Fine and Coarse Aggregates
 - D 422 Particle - Size Analysis of Soils
 - D 698 Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft. (6000kN-m/m.))
 - D 1556 Density of Soil In-Place by the Sand Cone Method

- D 1557 Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10-lb. (4.54-kg) Rammer and 18-in. (457-mm) Drop
 - D 2487 Classification of Soils for Engineering Purposes (Unified Soil Classification System)
 - D 3017 Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
 - D 3740 Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
 - D 4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils
 - E 329 Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction
 - E 548 General Criteria Used for Evaluating Laboratory Competence
2. Associated General Contractors of America, Inc.(AGC):
Manual of Accident Prevention in Construction

1.5 EXISTING CONDITIONS

- A. The Contractor shall become thoroughly familiar with the site, consult records and drawings of adjacent structures and of existing utilities and their connections, and note all conditions which may influence the work of this Section.
- B. By submitting a bid, the Contractor affirms that he has carefully examined the site and all conditions affecting work under this Section including work which has been let for construction under previous bid packages. No claim for additional costs will be allowed because of lack of full knowledge of existing conditions.
- C. The Contractor may, at his own expense, conduct additional subsurface testing as required for his own information.
 - 1. No excavation or testing shall be performed outside the Limit of Work as shown on the Drawings.

1.6 INFORMATION NOT GUARANTEED

- A. Information on the Drawings and in the Specifications relating to subsurface conditions, natural phenomena, and existing utilities and structures is from the best sources presently available. Such information is furnished only for the information and convenience of the Contractor, and the accuracy or completeness of this information is not guaranteed.
- B. Plans, surveys, measurements, and dimensions under which the work is to be performed are believed to be correct, but the Contractor shall have examined them for himself during the bidding period, as no additional compensation will be made for errors and inaccuracies that may be found therein.

1.7 QUALITY CONTROL

- A. The Owner reserves the right to retain a Testing Laboratory, to perform on-site observation and testing in accordance with Section 014000, QUALITY REQUIREMENTS during the following phases of the construction operations. The services of the Testing Laboratory may include, but not be limited to the following:
 - 1. Observation during excavation and replacement of existing fill beyond the pavilion area.
 - 2. Observation during placement and compaction of fills.

3. Laboratory testing and analysis of fill and bedding materials specified, as required.
 4. Observe construction and perform water content, gradation, and compaction tests at a frequency and at locations determined by the Testing Laboratory. The results of these tests will be submitted to the Architect, copy to the Contractor, on a timely basis so that the Contractor can take such action as is required to remedy indicated deficiencies. During the course of construction, the Testing Laboratory will advise the Architect in writing with copy to Contractor if, at any time, in his opinion, the work is not in substantial conformity with the Contract Documents.
 5. Observation of fills following interruptions by rains or other inclement weather.
- B. Perform field density tests in accordance with ASTM D 1556 or D 3017.
1. Make at least one field density test of the subgrade for every 2000 sq. ft. of paved area, but in no case less than three tests.
 2. In each compacted fill layer, make one field density test for every 2000 sq. ft. of overlying paved areas, but in no case less than three tests.
- C. The Testing Laboratory 's presence does not include supervision or direction of the actual work by the Contractor, his employees, or agents. Neither the presence of the Testing Laboratory, nor any observations and testing performed by him shall excuse the Contractor from defects discovered in his work.
- D. The Owner reserves the right to modify or waive Testing Laboratory services.
- E. Testing of soils shall be in accordance with the following:

Property	ASTM Test Method
Particle-Size Analysis	D 422
Liquid Limit	D 4318
Plasticity Index	D 4318

1.8 SUBMITTALS

- A. A 10 lb. sample of each off-site material proposed for use, and of any on-site material when so requested by the Architect or Testing Laboratory, shall be submitted for approval.
1. Samples shall be delivered to office of the Architect or Testing Laboratory, as directed.
 2. Samples required in connection with compaction tests will be taken and transported by the Testing Laboratory.

1.9 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

- A. The work shall be executed in such manner as to prevent any damage to adjacent property and any other property and existing improvements such as, but not limited to: streets, curbs, paving, utility lines and structures, monuments, bench marks and other public and private property. Protect existing structures and foundations from damage caused by settlement, lateral movement, 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 his 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 their original condition at the completion of operations. The Contractor

shall replace, at his own cost, existing bench marks, monuments, and other reference points which are disturbed or destroyed.

- C. Buried structures, utility lines, etc., including those which project less than 18 in. 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.

1.10 DRAINAGE AND DEWATERING

- A. The Contractor shall provide, at his own expense, adequate pumping and drainage facilities to keep excavated areas sufficiently dry from groundwater and/or surface runoff so as not to adversely affect construction procedures or cause excessive disturbance of underlying natural ground or excavation bottom.
- B. The Contractor shall grade and ditch the site as necessary to direct surface runoff away from open excavations and subgrade surfaces. Positive drainage (minimum 2.0% slope) shall be maintained at all times.
- C. Water handled as part of the Contractor's dewatering operations shall be discharged on-site to the ground surface in a location to be coordinated with the Architect and Geotechnical Consultant.
- D. Water from trenches and excavations shall be disposed of in such a manner as will not cause injury to public health nor to public or private property, nor to existing work, nor to the work completed or in progress, nor to the surface of roads, walks, and streets, nor cause any interference with the use of the same by the public. Methods of disposal of pumped effluent shall not cause erosion or siltation.
- E. Under no circumstances place fills, pour concrete, or install piping and appurtenances in excavations containing free water.
- F. There shall be sufficient pumping equipment, in good working order, available at all times to remove water.
- G. Where, in the opinion of the Testing Laboratory pumping of excavations is not effective in maintaining a dry firm subgrade, other dewatering methods acceptable to the Testing Laboratory, shall be employed. This may include the use of well points or deep well dewatering.

1.11 FROST PROTECTION

- A. Do not excavate to full indicated depth when freezing temperatures may be expected, unless footings or slabs can be poured immediately after the excavation has been completed. Protect the excavation from frost if placing of concrete is delayed.
- B. Completed footings which have not been backfilled shall be protected from freezing by temporary additional earth cover, insulating blankets, heaters, or other methods acceptable to the Architect.
- C. Frozen material shall not be placed as fill or backfill.

1.12 SHORING AND SHEETING

- A. Provide shoring, sheeting and/or bracing at excavations, as required, to prevent collapse of earth at side of excavations.
- B. Comply with federal, state, and local regulations, or in the absence of such regulations, comply with the requirements contained in the AGC Manual.
- C. Remove sheeting and shoring and the like, as backfilling operations progress, taking all necessary precautions to prevent collapse of excavation sides.

1.13 ROCK

- A. Rock shall be defined as sound and solid mass, layer, or ledge of mineral matter in place of such hardness and texture that it:
 - 1. Mechanical Definition of Rock: Cannot be effectively loosened or broken down by ripping in a single pass with a late model tractor-mounted hydraulic ripper equipped with one digging point of standard manufacturer's design adequately sized for use with and propelled by a crawler type tractor rated between 210-and 240-net flywheel horsepower, operating in low gear, or
 - 2. Manual Definition of Rock: In areas where the use of the ripper described above is impracticable, rock defined as sound material of such hardness and texture that it cannot be loosened or broken by a 6-lb. drifting pick. The drifting pick shall have a handle not less than 34 in. in length.

1.14 COORDINATION

- A. Prior to start of earthwork the Contractor shall arrange an on-site meeting with the Architect for the purpose of establishing Contractor's schedule of operations and scheduling inspection procedures and requirements.
- B. As construction proceeds, the Contractor shall be responsible for notifying the Architect prior to start of earthwork operations requiring inspection and/or testing.
- C. The Contractor shall be responsible for obtaining test samples of soil materials proposed to be used and transporting them to the site sufficiently in advance of time planned for use of these materials for testing of materials to be completed. Use of these proposed materials by the Contractor prior to testing and approval or rejection, shall be at the Contractor's risk.
- D. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
 - 3. Contact utility-locator service for area where Project is located before excavating.

1.15 PROTECTION OF EXISTING LANDSCAPE

- A. The Contractor shall exercise care to preserve the natural landscape and shall conduct his construction operations so as to prevent any unnecessary destruction, scarring, or defacing of the natural surroundings in the vicinity of the Work.

1. Except where clearing is required for permanent works, for approved construction roads, and for excavation operations, all trees, native shrubbery, and vegetation shall be preserved and shall be protected from damage which may be caused by the Contractor's construction operations and equipment. Existing trees to remain shall be suitably protected from damage with fencing or other means acceptable to the Architect.
2. Movement of crews and equipment within the right-of-way and over routes provided for access to the work shall be performed in a manner to prevent damage to property. Where unnecessary destruction, scarring, damage, or defacing may occur as a result of the Contractor's operations the same shall be repaired, replanted, reseeded, or otherwise corrected at the Contractor's expense.

- B. Where indicated on the Drawings and as directed by the Architect, disturbed areas shall be temporary seeded.

1.16 PROTECTION OF EXISTING WATER SYSTEMS

- A. The Contractor shall comply with applicable Federal and State laws, orders, and regulations concerning the control and abatement of water pollution.
- B. The Contractor's construction activities shall be performed by methods that will prevent entrance, or accidental spillage, of solid matter, contaminants, debris, and other objectionable pollutants and wastes into streams, water courses, lakes, and underground water sources.

PART 2 - PRODUCTS

2.1 SOURCE OF MATERIALS

- A. Material shall be obtained from required on-site excavation, to the extent that suitable material is available, and from off-site sources, to the extent that suitable material is not available from on-site excavation. The Contractor shall maximize the reuse of excavated materials on-site to ensure there is no surplus soil material requiring off-site disposal.
- B. Reuse of excavated materials shall be conducted as directed by the Geotechnical Consultant.
- C. Satisfactory Soils: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- D. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols.
1. Unsuitable material is defined as surficial organics, surficial and buried topsoil and subsoil, old foundations and pavement, and compressible and deleterious materials.
 2. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

2.2 EMBANKMENT MATERIALS

- A. Embankment material shall be a granular material conforming to the following:
1. Liquid Limit shall not exceed 35%
 2. Plasticity Index shall be in the range of 2 to 10.

3. Gradation shall conform to the following:

Sieve Size %	Passing by Weight
2 in.	100
3/4 in.	80-100
No. 4	60-85
No. 40	35-60
No. 100	15-40
No. 200	0-12

2.3 BACKFILL MATERIALS

- A. On-site material for use in compacted backfill shall be natural, inorganic, granular soil, taken from areas of excavation after stripping of topsoil and removal of unsuitable material.
- B. Material containing organic matter, topsoil, organic silt, peat, or soft or frost-susceptible soil is unsuitable for any of the following uses:

Backfill beneath site structures and pavilion

Backfill beneath pavement and within 5 ft. of subgrade

Bearing strata material

Bedding

- C. Backfill materials shall be free from rocks greater than 8 in. in diameter or length, having largest dimension greater than 3/4 lift thickness, or greater than 1/2 ft.3 in volume, and foreign matter, such as construction debris, trash, wood, roots, leaves, sod, organic matter, or soft clay and silt. Backfill shall be clean, non-organic material, of non-swelling character, capable of being readily compacted to form a solid, stable embankment. Materials containing ice or frozen lumps shall not be employed.
- D. Backfill material shall be compacted clean washed sand with less than 10% passing the No. 200 sieve. Maximum diameter shall be 1-1/2 in. Testing laboratory shall examine and approve material before backfilling.
- E. Structural Fill: Backfill below and around foundations and other structural elements and above the select fill in trenches should consist of clean, well-graded sand and gravel free of organic material, trash, ice, frozen soil, and other deleterious materials. The recommended gradation for structural fill should satisfy the following limits.

U.S. Sieve Size and Number	Percent Finer by		Weight Maximum
	Minimum	Maximum	
4 inch	100	---	
2 inch	65	10	
No. 4	30	80	
No. 20	10	65	
No. 40	5	40	
No. 100	0	20	

No. 200	0	8
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1. The moisture content of the structural fill material should be adjusted before placement so that it is within 2 percent of the optimum moisture content.

- F. Select Fill: should be used as backfill around and above underground piping. Select fill shall consist of hard, durable sand and gravel, free from trash, organic matter, surface coatings and other deleterious materials. The recommended gradation for select fill should satisfy the following limits.

Percent Finer by U.S. Sieve Size and Number	Weight	
	Minimum	Maximum
4 inch	100	---
No. 10	30	100
No. 40	0	70
No. 200	0	15

1. The moisture content of the select fill material should be adjusted before placement so that it is within 2 percent of the optimum moisture content.

- G. Common Fill (in landscaped areas) shall be bankrun sand, gravel, or mixture thereof, graded within the following limits:

Sieve Size %	Passing by Weight
6 in.	100
No. 4	30-95
No. 200	0-15

- H. Aggregate Base shall be Dense-graded Crushed Stone, conforming to MHD Specifications Section M2.01.7.
- I. Planting Soils: Refer to Section 329200, LAWNS AND GRASSES and Section 329300, TREES, PLANTS AND GROUND COVERS.

PART 3 - EXECUTION

3.1 PROTECTIVE EQUIPMENT

- A. Provide all employees and subcontractor(s) with personal protective equipment and protective clothing consistent with the levels of protection for this work as indicated in the Contractor's Health and Safety Plan.

3.2 SUBGRADE INSPECTION

- A. Notify Architect when excavations have reached required subgrade.

- B. When excavations have reached required subgrade, Contractor shall have subgrades surveyed to determine if subgrade elevations will allow for the indicated depth of proposed materials to be placed on them.
 - 1. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material to achieve required subgrade elevation, as directed.
 - 2. If survey indicates that subgrade elevations are too high, continue excavation and reconstruct subgrades to required elevation as directed, without additional compensation.
 - 3. If survey indicates that subgrade elevations are too low, add compacted backfill or fill material to achieve required subgrade elevation as directed, without additional compensation.
- C. Proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph (5 km/h).
 - 2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).
 - 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.3 EXCAVATION

- A. Sheeting, shoring, bracing, pumping, bailing, and other incidental work necessary to make and maintain excavations and keep them free from water at all times during placing of concrete, utility lines, and fill and backfill materials, shall be performed or supplied as required. Fill and backfill shall be placed in dry or dewatered areas only.
- B. Sheeting shall be installed where required to maintain safe and workable conditions in excavations. Sheeting, including necessary swales and struts, shall be selected and designed by the Contractor. Use of sheeting shall equal or exceed minimum required for safety and/or conformance to law.
- C. Structures, pipes, pavement, earth, and other property liable to damage from excavation operations shall be braced, underpinned, and supported as required to prevent damage and movement.
- D. As excavation approaches underground utilities and structures, excavation shall be done by hand tools. Such manual excavation is incidental to normal excavation and no special payment will be made.
- E. Excavation shall include satisfactory disposal of excavated material not employed as backfill or fill materials.

1. Excavation material, other than topsoil, which is not required for or is unsuitable for backfill or fill materials, shall be legally disposed of off-site.
 - F. Excavation for pipe and other items shall be carried far enough below underside of item to accommodate bedding material.
 - G. Excavations which extend below indicated or specified levels ("over-excavation"), shall be filled to those levels with compacted Granular Fill Material.
 - H. If bearing surface of subgrade which is to receive fill, structure, concrete, or other construction becomes softened, disturbed, or unstable, unsuitable material shall be removed down to a firm bearing surface and replaced with suitable material. Subgrade shall then be protected from further disturbance until construction item is placed.
 - I. Excavations shall not be wider than required to set, brace, and remove forms for concrete, install structures, piping, or perform other necessary work. Width of trench at 12 in. above top of pipe or conduit shall not be greater than the sum of outside diameter of the pipe or the conduit plus 2 ft. (pipe O.D. + 2 ft.). Sides of trench above this level shall be sloping, at an angle 30 degrees or less from vertical, from this level to grade. In materials where sloping walls are not stable, trench walls shall be sheeted.
 - J. Explosives: Do not use explosives.
 - K. Below-ground Demolition
 1. Underground items, not indicated on the Drawings, which impede construction of new work indicated, shall be abandoned, demolished, and/or removed only with the approval of the Architect.
 - L. Proof roll areas to support foundations, pavements with a 35 ton rubber tired roller in four passes in two perpendicular directions. Undercut to level of stable soils in unstable areas. Perform work in presence of Testing Laboratory.
 - M. The excavation and handling of lead-impacted soil shall be conducted implementing Best Management Practices (BMPs) as recommended by the Geotechnical Consultant to help reduce potential exposure to elevated lead.
- 3.4 FILLING
- A. Filling shall be done in any area only after the Testing Laboratory has reviewed subgrade.
 - B. Benching: Fills placed on existing slopes which exceed 6 ft. horizontal to 1 ft. vertical shall be keyed or benched into the existing slope not less than 5 ft. to prevent the formation of slippage planes.
 - C. Compaction at End of Day: Areas undergoing filling shall be smooth-rolled before the end of the work day to seal and protect these areas from rainfall infiltration during the night.
- 3.5 FILL, BACKFILL, AND COMPACTION
- A. Excavation below finished grades shall be backfilled. Temporary planking, timbering, forms, debris, and refuse shall be removed before backfill is placed.

- B. Backfilling shall be done in any area only after the Architect or Testing Laboratory has inspected and approved subgrade, or other work in excavations. Notice that the work is ready for inspection shall be given promptly, and sufficient time shall be allowed for making necessary examinations.
- C. General Site Fill: General Site Fill for use in areas beyond the building limits and beyond structures shall be placed in lifts not exceeding 12 in. in loose thickness and compacted to 90% of maximum density, determined by ASTM D 1557.
- D. Where pumping of excavations is not effective and where permitted by the Architect or Testing Laboratory, Stone Fill may be placed below water without compaction in lieu of General Site Fill or Structural Backfill. There will be no adjustment in Contract price.
- E. In order to prevent lateral movement, care shall be exercised in placing backfill adjacent to foundation wall, footing, utility line and other structures. Backfill on opposite sides of such items shall be kept at approximately the same elevation as backfilling progresses to prevent unbalanced earth pressure. During backfilling the difference in elevation of backfill on opposite sides of the structure shall not exceed 12 in.
- F. Except as otherwise noted, tolerance of top surface of completed backfill shall be +2 in. from true grade indicated, and variations from indicated tolerance shall approximately compensate within each 100 ft.2 area.
- G. Subgrade and backfill of indicated areas or structures shall be compacted in accordance with requirements of ASTM D 1557, and as specified in the following table:

COMPACTION TABLE

Area or Structure	Subgrade Compaction Minimum %	Max. Compacted Thickness Per. Lift – in.	Compaction of Each Each Lift Minimum %
Above pipe cover to subgrade	85	12	90
Area or structure not otherwise noted	85	12	90
Concrete equipment pad	90	8	95
Footing, foundation, manhole, or similar structure, and within 2 ft. horizontally	90	8	95
Pavillion Footing and within 2 ft. horizontally	95	8	45
Pavement, including 1 ft. beyond edge	90	8	95
Pipe cover	--	6	95
Granular Fill	95	6	95

- H. Compaction requirements shall apply to material directly below the indicated supported item (base course, footing, or structure), and to all material above the undisturbed earth beneath fill, and enclosed by the following planes:
 - 1. Horizontal plane at the elevation of the bottom of the supported item (base course, footing, or structure), within a perimeter line located 2 ft. beyond the exterior face or edge of item.
 - 2. Flat planes extending from the perimeter line downward and outward at 45o angle with the horizontal, to where the planes intersect undisturbed earth. Where zones of higher and lower percentages of compaction overlap, that of the higher percentage shall apply.
- I. Compaction of backfill in excavation shall be to a density not less than that required of the surrounding area fill.
- J. Equipment and methods employed to achieve specified compaction shall be subject to the approval of the Architect and Testing Laboratory and equipment shall be replaced and methods revised as directed until specified compaction is obtained.
- K. Compaction of each lift shall be completed before compaction of the next lift is started.
- L. Backfill adjacent to wall, conduit, pipe, and similar item, and in other areas where wheeled equipment cannot safely be employed, shall be placed in 4 in. thick layers, to the specified compaction, using mechanical tampers.
- M. Contractor shall coordinate the reuse of excavated materials on-site with the recommendations of the Geotechnical Consultant.

3.6 MOISTURE CONTROL

- A. Variation of moisture content in fill and backfill materials shall be limited to Optimum Moisture (-1% to +2%). Moisture content shall be as uniformly distributed as practicable within each lift, and shall be adjusted as necessary to obtain the specified compaction.
- B. Material which does not contain sufficient moisture to be compacted to the specified densities shall be moisture conditioned by sprinkling, disking, windrowing, or other method approved by the Testing Laboratory.
 - 1. Material conditioned by sprinkling shall have water added before compaction. Uniformly apply water to surface of subgrade or layer of soil material to obtain sufficient moisture content. The Contractor shall maintain sufficient hoses and/or water distributing equipment at the site for this purpose.
- C. Material containing excess moisture shall be dried to required Optimum Moisture Content before it is placed and compacted. Excessively moist soils shall be removed and replaced or shall be scarified by use of plows, discs, or other approved methods, and air-dried to meet the above requirements.
- D. Materials which are within the moisture requirements specified above, but which display pronounced elasticity or deformation under the action of earthmoving and compaction equipment, shall be reduced to Optimum Moisture Content, or below, to secure stability.

- E. In the event of sudden downpours or other inclement weather, exposed subgrades and fills which, in the opinion of the Testing Laboratory, become inundated or excessively moistened shall have excess water removed and soil dried as specified above.

3.7 DUST CONTROL

- A. Contractor shall be responsible for dust control during all construction operations. 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, so as to minimize the creation and dispersion of dust. If the Architect decides that it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread calcium chloride as directed. Methods and materials for dust control shall be as approved by the Architect.

3.8 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.9 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Surplus satisfactory soil imported from off-site sources shall be transported off-site by the Contractor or relocated to designated storage areas on Owner's property and stockpiled or spread as directed by Architect.
- B. The transportation and off-site disposal of excavated materials generated during the course of the work under this Contract is prohibited without prior approval by the Architect. Contractor shall coordinate the reuse of excavated materials on-site with the recommendations of the Geotechnical Consultant.
- C. Remove waste material, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION

SECTION 312500

EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.00 GENERAL PROVISIONS

- A. Attention is directed to the PROCUREMENT AND CONTRACTING REQUIREMENTS and all Sections within DIVISION 01, GENERAL REQUIREMENTS, which are made a part of this Section of the Specifications.

1.01 SUMMARY

- A. This Section specifies equipment and materials for an erosion and sediment control program for minimizing erosion and siltation during the construction phase of the project. The erosion and sediment control provisions detailed on the Drawings and specified herein are the minimum requirements for an erosion control program. The Contractor shall provide additional control materials and methods as required to effect the erosion and siltation control principles specified herein.

1.02 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not for sitework,
 1. Section 011000, GENERAL REQUIREMENTS; Fencing, except silt fence.
 2. Section 024113, SELECTIVE SITE DEMOLITION AND REMOVALS ; Clearing and grubbing.
 3. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; Excavation and backfill.
 4. Section 329200, LAWNS AND GRASSES; Permanent seeding for lawns.

1.03 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 1. Commonwealth of Massachusetts Highway Department (MHD):

Specifications	Standard Specifications for Highways and Bridge
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1.04 SUBMITTALS

- A. Proposed methods, materials to be employed, and schedule for effecting erosion and siltation control and preventing erosion damage shall be submitted for approval. Submittals shall include:
 1. Proposed methods for effecting erosion and siltation control including 1" = 40' scale plans indicating location of erosion control devices and siltation basins.

2. List of proposed materials including manufacturer's product data.
3. Schedule of erosion control program indicating specific dates from implementing programs in each major area of work.

B. The following samples shall be submitted:

<u>Sample</u>	<u>Size</u>
Filter Fabric	12 x 12 in.

1.06 EROSION CONTROL PRINCIPLES

A. The following erosion control principles shall apply to the land grading and construction phases:

1. Stripping of vegetation, grading, or other soil disturbance shall be done in a manner which will minimize soil erosion.
2. Whenever feasible, natural vegetation shall be retained and protected.
3. Extent of area which is exposed and free of vegetation and duration of its exposure shall be kept within practical limits.
4. Temporary seeding, mulching, or other suitable stabilization measures shall be used to protect exposed critical areas during prolonged construction or other land disturbance.
5. Drainage provisions shall accommodate increased runoff resulting from modifications of soil and surface conditions during and after development or disturbance. Such provisions shall be in addition to existing requirements.
6. Sediment shall be retained on-site.
7. Erosion control devices shall be installed as early as possible in the construction sequence prior to start of clearing and grubbing operations and excavation work.

B. Cut and fill slopes and stockpiled materials shall be protected to prevent erosion. Slopes shall be protected with permanent erosion protection when erosion exposure period is expected to be greater than or equal to six months, and temporary erosion protection when erosion exposure period is expected to be less than six months.

1. Permanent erosion protection shall be accomplished by seeding with grass and covering with an erosion protection material, as appropriate for prevailing conditions.
2. Temporary erosion protection shall be accomplished by covering an erosion protection materials, as appropriate for prevailing conditions.
3. Except where specified slope is indicated on Drawings, fill slopes shall be limited to a grade of 2:1 (horizontal: vertical) cut slopes shall be limited to a grade of 1.5:1.

1.07 QUALITY ASSURANCE

A. Erosion control measures shall be established at the beginning of construction and maintained during the entire period of construction. On-site areas which are subject to severe erosion, and off-site areas which are especially vulnerable to damage from erosion and/or sedimentation, are to be identified and receive special attention.

- B. All land-disturbing activities are to be planned and conducted to minimize the size of the area to be exposed at any one time, and the length of time of exposure.
- C. Surface water runoff originating upgrade of exposed areas should be controlled to reduce erosion and sediment loss during the period of exposure.
- D. When the increase in the peak rates and velocity of storm water runoff resulting from a land-disturbing activity is sufficient to cause accelerated erosion of the receiving stream bed, provide measures to control both the velocity and rate of release so as to minimize accelerated erosion and increased sedimentation of the stream.
- E. All land-disturbing activities are to be planned and conducted so as to minimize off-site sedimentation damage.
- F. The Contractor is responsible for cleaning out and disposing of all sediment once the storage capacity of the sediment facility is reduced by one-half.
- G. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- H. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

PART 2 PRODUCTS

2.01 SILT FENCE

- A. Silt fence shall be a wire-bound woodroll snow fence covered with filter fabric. Fence shall be 4 ft. high minimum, and shall have 3/8 in. by 1-1/2 in. wide pickets, approximately 2 in. apart, bound together with at least 13 gage minimum, galvanized steel wire.
 - 1. Filter fabric shall be one of the following, or approved equal:

<u>Product</u>	<u>Manufacturer</u>
Trevira Spunbond	Hoechst Fibers Industries
Fabric Type 1120	Spartanburg, SC 29304
Supac N 5NP(UV)	Phillips Fibers Corporation
	Greenville, SC 29602
Envirofence Mirafi, Inc.,	Charlotte, NC 2822
 - 2. Silt fence shall be supported by steel posts, driven a minimum of 3 ft. into the ground. Posts shall be spaced 10 ft. o.c. maximum.

PART 3 EXECUTION

3.01 SILT FENCE

- A. Silt fence shall be constructed and installed as indicated on the Drawings, prior to start of clearing and grubbing operations.

3.02 MAINTENANCE AND REMOVAL OF EROSION CONTROL DEVICES

- A. Drainage structures shall be kept clean and clear of obstructions during construction period.
- B. Erosion Control Devices
 - 1. Sediment behind the erosion control device shall be checked twice each month and after each heavy rain. Silt shall be removed if greater than 6 in. deep.
 - 2. Condition of erosion control device shall be checked twice each month or more frequently as required. Damaged and/or deteriorated items shall be replaced. Erosion control devices shall be maintained in place and in effective condition.
 - 3. Sediment deposits shall be disposed of off-site, in a location and manner which will not cause sediment nuisance elsewhere.
- C. Removal of Erosion Control Devices
 - 1. Erosion control devices shall be maintained until all disturbed earth has been paved or vegetated, at which time they shall be removed. After removal, areas disturbed by these devices shall be regraded and seeded.
 - 2. Erosion protection material shall be kept securely anchored until acceptance of completed slope or entire Project, whichever is later.

END OF SECTION

SECTION 321314

EXPOSED AGGREGATE CONCRETE PAVING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. The work includes furnishing all labor, materials, equipment, and supervision to construct the exposed aggregate concrete paving work, integral color, and aggregate base course for walkways in accordance with the Drawings and Specifications.

1.2 RELATED WORK

- A. Examine Contract Documents for requirements that affect the work of this Section. Other Specification Sections that relate directly to work of this Section include, but are not limited to:
 - a. Section 033001, CAST IN PLACE CONCRETE - SITEWORK.
 - b. Section 055501, METAL FABRICATIONS - SITEWORK.
 - c. Section 079201, EXTERIOR JOINT SEALANTS.
 - d. Section 312300, EXCAVATING, BACKFILLING, AND COMPACTING.

1.3 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.
 - a. American Concrete Institute (ACI):
 - 305R Hot Weather Concreting
 - 306R Cold Weather Concreting
 - 325.9R Guide for Construction of Concrete Pavements and Concrete Bases.
 - b. American Society for Testing and Materials (ASTM):
 - A 185 Welded Steel Wire Fabric for Concrete Reinforcement
 - C 33 Concrete Aggregates
 - C 94 Ready-Mixed Concrete
 - C 143 Slump of Portland Cement Concrete
 - C 150 Portland Cement
 - C 171 Sheet Materials for Curing Concrete
 - C 231 Air Content of Freshly Mixed Concrete by the Pressure Method
 - C 309 Liquid Membrane-Forming Compounds for Curing Concrete
 - C 494 Chemical Admixtures for Concrete

C 920	Elastomeric Joint Sealants
C 962	Guide for Use of Elastomeric Joint Sealants
D 226	Asphalt-Saturated Organic Roofing Felt for Use in Membrane Waterproofing and Built-Up Roofing
D 1557	Moisture - Density Relations of Soils and Soil Aggregate Mixtures Using 10 lb. (4.54-kg) Rammer and 18-in. (457 mm) Drop
D 1752	Prefomed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

c. Americans with Disabilities Act (ADA):

Appendix to Part 1191 Accessibility Guidelines for Buildings and Facilities

d. Commonwealth of Massachusetts Highway Department (MHD):
Specifications Standard Specifications for Highways and Bridges

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.
1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. ACI Publications: Unless otherwise specified, work and materials for construction of the Portland cement concrete paving shall conform to ACI 325.9R.
- C. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1.
1. Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:
 - a). Contractor's superintendent.
 - b). Independent testing agency responsible for concrete design mixtures.
 - c). Ready-mix concrete producer.
- E. Work, materials, and color of the handicap ramp paving shall conform to applicable sections of Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities.
- F. Paving work, base course etc., shall be done only after excavation and construction work which might injure them have been completed. Damage caused during construction shall be repaired before acceptance.
- G. Existing paving areas shall, if damaged or removed during course of this project, be repaired or replaced under this section of the specification. Workmanship and materials for such repair and

replacement, except as otherwise noted, shall match as closely as possible those employed in existing work.

- H. Pavement, base, or subbase shall not be placed on a muddy or frozen subgrade.
- I. Color Admixture: Comply with Manufacturers instructions. Deliver colored admixture in original, unopened packaging. Store in dry conditions.

1.5 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

1.6 PRECONSTRUCTION MOCK-UP PANELS

A. General

1. Schedule mock-up casting for acceptance 30 days prior to casting of concrete surfaces represented by the mockups.
2. Locate mock-up panels in non-public areas accepted by the Architect.
3. Continue to cast mock-ups until acceptable mock-ups area produced. Accepted mock-ups shall be the standard for color, texture, and workmanship for the work.
4. Mock-up sequence of forming, placing, form removal, curing, and finishing shall be reviewed and accepted by the Architect.
5. Mock-up formwork shall be inspected and accepted by the Architect before placing of concrete.
6. Use the same concrete mixes and placement procedures, accepted in mock-ups, in the final work, unless otherwise directed by the Architect.
7. Protect accepted mock-ups from damage until completion and acceptance of the work represented by the mock-up.
8. Remove mock-up panels from site at completion of project, as directed by the Architect.

- B. Construct mock-up panels or areas as indicated to demonstrate the ability to cast concrete for exposed aggregate concrete paving to achieve shape, color, jointing and exposed aggregate textured finish required. Tamping or vibrating shall be minimized to allow coarse aggregate to remain near the surface. Mock-ups shall include or meet the following requirements:

1. Provide mock-up panel 5 ft. x 10 ft. size, full depth, one for each color.
2. Provide mock-ups simulating actual design and execution conditions for concrete mix materials, reinforcement, formwork, placing sequence, form removal, curing, finishing, and methods and materials of stain removal and correction of defective work.
3. On mock-ups where directed by the Architect, provide minimum of three variation of mix color to be used in the repair of defective work, in order to determine acceptable color and texture match.
4. Demonstrate in the construction of the mock-up formwork the sealer material, form release agent, and curing materials and methods to be used.

5. Include control joints and expansion joints with joint sealer.

- C. Source of Materials. Utilize the same source, stock, or brand of concrete materials for each class or mix of concrete which is to be exposed. Do not interchange materials or mixes until an additional mock-up shows that uniformity in finish texture and color, as compared to original mock-up will be maintained. If necessary, obtain and stockpile materials in sufficient quantity to ensure continuity and uniformity.

1.7 SUBMITTALS

- A. Description of Methods and Sequence of Placement. For each type of specially-finished concrete provide description of methods and sequence of placement.

- B. Manufacturers' product data shall be submitted for the following items:

Admixtures

Color Admixtures- Manufacturers color selector chart showing the color available

Aggregate, including sieve analysis

Concrete sealer

Curing material

Preformed joint filler

Form release agent

Surface retarder

Sealants

Fiber reinforcement

- C. Shop drawings of exposed aggregate paving shall be submitted. Drawings shall indicate expansion joint and control joint locations.

- D. Submit samples of the following:

1. Preformed joint filler, two pieces, full depth and width, 4 in. length.

2. Color chart for selection of sealant color.

3. A 3 lb. bag minimum sample of aggregate proposed for use in the exposed aggregate paving mix shall be submitted for approval. Accompanying the sample shall be information from the aggregate supplier indicating source, type, color, and gradation of aggregate.

- E. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:

1. Cementitious materials.

2. Steel reinforcement and reinforcement accessories.

3. Admixtures.

4. Curing compounds.

5. Applied finish materials.

6. Bonding agent or epoxy adhesive.

7. Joint fillers.

- F. Field quality-control test reports.

- G. Minutes of preinstallation conference.

1.8 TESTING AND INSPECTION

- A. The Owner reserves the right to inspect and test paving and associated work.

1.9 DESIGN OF CONCRETE MIX

- A. The Contractor shall be responsible for the design of the concrete mixture. Mix design shall match mix design used in approved mock-up panel and be certified by an independent testing laboratory. The statement of materials constituting the design mix shall be submitted to the Architect for approval within one week following award of Contract. The concrete mix design shall include the following information:
 - 1. Proportions of cement, fine and coarse aggregates, and water.
 - 2. Water-cement ratio, design strength, slump, and air content.
 - 3. Type of cement.
 - 4. Type of aggregates including sieve analysis.
 - 5. Type and dosage of all admixtures.
 - 6. Special requirements for pumping.
 - 7. Range of ambient temperature and humidity for which the design is valid.
 - 8. Any special characteristics of the mix which require precautions in the mixing, placing, finishing, or curing methods to achieve the finished product specified.
- B. No concrete shall be delivered to the job site until the Architect has reviewed and approved the design mix.

PART 2 PRODUCTS

2.1 AGGREGATE BASE COURSE

- A. Material for aggregate base course shall be a graded, granular, free-draining material, consisting of either durable stone and coarse sand or of blast furnace slag, practically free from loam and clay, and which can be readily compacted to form a stable foundation.
 - 1. Material shall be dense graded crushed stone conforming to MHD Specifications Section M2.01.7.

2.2 REINFORCEMENT

- A. Welded wire fabric reinforcement shall conform to the applicable requirements of ASTM A185. Fabric reinforcement shall be furnished in flat sheets. Fabric reinforcement in rolls will not be permitted.
- B. Fiber reinforcement shall be polypropylene fibre processed into fibrillated bundles designed to open when placed in concrete to produce a homogeneously distributed monofilament polypropylene fiber reinforcement.
 - 1. Fiber size (length) required shall be based on top size of coarse aggregate in the concrete mix, in accordance with manufacturer's recommendations and printed instructions.

2.3 CONCRETE

- A. Concrete shall be air-entrained type, conforming to ASTM C 94. Concrete to receive an exposed-aggregate surface shall contain a minimum of 560 lb. of ASTM C 150, Type II Portland cement per cubic yard of concrete, and a water-cement ratio no greater than 0.53 by weight. Minimum compressive strength shall be 4,000 psi at 28 days.
- B. Maximum slump shall not exceed 4 in. and air entrainment shall be 6 percent + 1 percent.
- C. Maximum size of coarse aggregate of the base mix shall be 3/4 in.
- D. Ready mixed concrete, if used, shall meet ASTM C 94.
- E. An oversanded base mix may be used, and if so, the water-cement ratio specified above shall govern the mix design, and the cement content shall be raised accordingly. Aggregate source and cement type and brand shall not be altered once construction begins.

2.4 CHEMICAL ADMIXTURES

- A. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.

2.5 MONOLITHIC AGGREGATE

- A. Special aggregate to be exposed shall be hard, sound, durable, and free of all deleterious materials and staining qualities.
- B. The select aggregate shall be stored off the ground and protected from contamination and moisture.
- C. The color and size of the aggregate shall be selected by the Architect and shall match that in the sample and approved mockup.
- D. Aggregate shall be of one sieve size or no more than two.
- E. Shape of aggregate shall resemble spheres and cubes. Flat, slivery stones which may become dislodged easily shall not be used.

2.6 CONCRETE FINISH RETARDER

- A. Spray applied, film forming, water based top surface retarder, calibrated for specific sized aggregate and finish requirements.
 - 1. Acceptable Materials: "Lithotex" Top Surface Retarder manufactured by L.M. Scofield Company; Tel. 1-800-800-9900; "Top Cast" manufactured by W.R. Grace & Co. 62 Whittemore Ave., Cambridge, MA 02140. 800-354-5414 x 5439, 703-626-1577, or approved equal.
- B. Spray applied film forming protective coating for surfaces adjacent to retarded finish surfaces.
 - 1. Acceptable Materials: "Face Off" by W.R. Grace & Co. 62 Whittemore Ave., Cambridge, Ma 02140. 800-354-5414 x 5439, 703-626-1577. or approved equal.

2.7 FLATWORK SEALER

- A. Surface water repellent sealer shall be MasterProtect H1000, high-performance, clear, breathable, 100% silane penetrating sealer, manufactured by BASF corporation Construction Sustems 889 Valley Park Drive, Shakopee, MN 55379, Tel. 1-800-43309517, or approved equal.

2.8 CURING MATERIALS

- A. Curing shall be by use of curing paper.
- B. Moisture-Retaining Cover: Curing paper shall be nonstaining, fiber reinforced laminated kraft bituminous product conforming to ASTM C 171. Four mil polyethylene sheeting may be substituted for curing paper.
- C. Water: Potable.

2.9 RELATED MATERIALS

- A. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- B. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to requirements.

2.10 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M[and ASTM C 1116]. Furnish batch certificates for each batch discharged and used in the Work.
 - 1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

2.11 EXPANSION JOINTS

- A. Unless otherwise indicated on the Drawings, expansion joints shall be located 30 ft. o.c., maximum.
- B. Expansion joint filler shall be preformed, nonbituminous type joint filler conforming to ASTM D 1752, Type II.
 - 1. Premolded filler shall be one piece for the full depth and width of the joint leaving a sealant recess as indicated.
 - 2. Use of multiple pieces of lesser dimensions to make up required depth and width of joint will not be permitted.
 - 3. Except as otherwise noted on the Drawings, joint filler shall be 1/2 in. thick.
- C. Dowel System: Greenstreak Speed Dowel Sleeve with base, for round, smooth or deformed dowels or approved equal.
 - 1. Material: Rigid polypropylene

D. Dowels shall be furnished under this Section, and shall be Type 304 stainless steel.

2.12 CONTROL JOINTS

A. Control joints indicated on the Drawings to be sawn, shall be made by saw cutting concrete slab after concrete is finished and when the surface is stiff enough to support the weight of workmen without damage to the slab. Saw blade shall cut into slab at least 1 in., but in no case less than 25% of slab depth.

B. Unless otherwise indicated on the Drawings, control joints shall be located 10 ft. o.c. maximum.

2.13 CONSTRUCTION JOINTS

A. Transverse construction joints shall be placed whenever placing of concrete is suspended for more than 30 minutes.

- 1. Butt joint with dowels or thickened edge joint shall be used if construction joints occurs at location of control joint.
- 2. Keyed joints with tiebars shall be used if the joint occurs at any other location.

2.14 GROUT

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

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

1. Nonshrink grout shall be one of the following, or approved equal:

<u>Manufacturer</u>	<u>Product</u>
Gifford-Hill Co.	Supreme
Master Builders Co.	Embeco
U.S. Grout Corporation	Five Star Grout

2.15 SEALANT

A. Sealant for sealing of expansion joints in concrete walks shall be a two component polyurethane based sealant conforming to Division 07.

1. Color of sealant shall be selected by the Architect from the manufacturer's full color range.

2.16 BOND BREAKER

A. Bond breaker shall be asphalt felt conforming to ASTM D 226, Type I or 6 mil polyethylene sheeting.

2.17 COLOR ADMIXTURE FOR TINTED EXPOSED AGGREGATE

- A. Color Admixture, color shall be Charcoal C-24 CHROMIX Admixture by Scofield, or approved equal.

PART 3 EXECUTION

3.1 GRADING

- A. Areas to be paved will be compacted and brought approximately to subgrade elevation under Section 312300, SITE EXCAVATING, BACKFILLING, AND COMPACTING before work of this section is performed. Final fine grading, filling, and compaction of subgrade to receive paving, as required to form a firm, uniform, accurate, and unyielding subgrade at required elevations and to required lines, shall be done under this Section.
- B. Existing subgrade material which will not readily compact as required shall be removed and replaced with satisfactory materials. Additional materials needed to bring subgrade to required line and grade and to replace unsuitable material removed shall be material conforming to Section 312300, SITE EXCAVATING, BACKFILLING, AND COMPACTING.
- C. Subgrade of areas to be paved shall be recompacted as required to bring top 8 in. of material immediately below gravel base course to a compaction of at least 90% of maximum density, as determined by ASTM D 1557, Method D. Subgrade compaction shall extend for a distance of at least 1 ft. beyond pavement edge.
- D. Excavation required in pavement subgrade shall be completed before fine grading and final compaction of subgrade are performed. Where excavation must be performed in completed subgrade or subbase subsequent backfill and compaction shall be performed as directed by the Architect as specified in Section 312300, SITE EXCAVATING, BACKFILLING, AND COMPACTING. Completed subgrade after filling such areas shall be uniformly and properly graded.
- E. Areas being graded or compacted shall be kept shaped and drained during construction. Ruts greater than or equal to 2 in. deep in subgrade, shall be graded out, reshaped as required, and recompacted before placing pavement.
- F. Materials shall not be stored or stockpiled on subgrade.
- G. Disposal of debris and other material excavated and/or stripped under this section, and material unsuitable for or in excess of requirements for completing work of this Section shall conform to the following:
 - 1. Material shall be legally disposed of off-site.
- H. Prepared subgrade will be inspected by the Architect. Subgrade shall be approved by the Architect before installation of paving base course. Disturbance to subgrade caused by inspection procedures shall be repaired under this Section of the specification.

3.2 AGGREGATE BASE COURSE

- A. Aggregate base course for paving and the spreading, grading, and compaction methods employed shall conform to standard requirements for usual base course of this type for first class road work, and the following:
 - 1. MHD Specifications Section 405, "Gravel Base Course".

- B. Compaction of aggregate base course shall be to 95% of maximum density as determined by ASTM D 1557, Method D. Stone greater than 2-1/2 in. shall be excluded from course.
- C. Width of base course shall be greater than or equal to the width of pavement surface, if continuous lateral support is provided during rolling, and shall extend at least 2 x base thickness beyond edge of the course above, if not so supported.
- D. Aggregate material shall be applied in lifts less than or equal to 6 in. thick, compacted measure. Each lift shall be separately compacted to specified density, using a 6 ton steel wheel roller or vibratory roller equivalent to a 6 ton static roller, or an approved equivalent.
 - 1. Material shall be placed adjacent to wall, manhole, catch basin, and other structures only after they have been set to required grade and level.
 - 2. Rolling shall begin at sides and progress to center of crowned areas, and shall begin on low side and progress toward high side of sloped areas. Rolling shall continue until material does not creep or wave ahead of roller wheels.
 - 3. Surface irregularities which exceed 1/2 in. measured by means of a 10 ft. long straightedge shall be replaced and properly compacted.
- E. Subgrade and base course shall be kept clean and uncontaminated. Less select materials shall not be permitted to become mixed with gravel. Materials spilled outside pavement lines shall be removed and area repaired.
- F. Portions of subgrade or of construction above which become contaminated, softened, or dislodged by passing of traffic, or otherwise damaged, shall be cleaned, replaced, and otherwise repaired to conform to the requirements of this specification before proceeding with next operation.

3.3 REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Before being placed in position, reinforcing for reinforced concrete shall be thoroughly cleaned of loose mill and rust scale, dirt, ice, and other foreign material which may reduce the bond between the concrete and reinforcing. Where there is delay in placing concrete after reinforcement is in place, bars shall be reinspected and cleaned when necessary.
- C. Any bar showing cracks after bending shall be discarded.
- D. Unless otherwise indicated on the Drawings, reinforcing shall extend within 2 in. of formwork and expansion joints. Reinforcing shall continue through control joints. Adjacent sheets of fabric reinforcing shall lap 6 in.
- E. After forms have been coated with form release agent, but before concrete is placed, reinforcing steel anchors shall be securely wired in the exact position called for, and shall be maintained in that position until concrete is placed and compacted. Chair bars and supports shall be provided in a number and arrangement satisfactory to the Architect.
- F. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- G. Fiber reinforcement shall be introduced directly into the concrete either at the batch plant or job

site at the rate of 1.6 pounds (minimum) per cubic yard (unless otherwise recommended by fiber reinforcement manufacturer). If introduced at the batch plant with the aggregate, no extra mixing time is required. If added at the job site, approximately 3 to 5 minutes mixing at agitating speed is required.

3.4 CONCRETE PLACEMENT

- A. Paving mix, equipment, methods of mixing and placing, and precautions to be observed as to weather, condition of base etc., shall meet the requirements of ACI 325.9R. Pavement shall be constructed in accordance with the Drawings.
- B. The Architect shall be notified of concrete placement sufficiently in advance of start of operation to allow his representative to complete preliminary inspection of the work, including subgrade, forms, and reinforcing steel, if used.
- C. Normal concrete placement procedures shall be followed. Concrete shall arrive at the jobsite so that no additional water will be required to produce the desired slump. When conditions develop that require addition of water to produce the desired slump, permission of the Architect must be obtained. The concrete shall be transported from the mixer to its place of deposit by a method that will prevent segregation or loss of material. Concrete shall be placed in accordance with ACI 304.
- D. Concrete shall be consolidated by suitable means to eliminate voids and pockets.
- E. The strike-off and darby or bullfloat operations should be such that a level surface is obtained sufficiently below the final finish grade to allow for volume growth due to the addition of the seeding aggregate.
- F. Expansion joints shall be formed in the concrete to required width with preformed joint filler in place. Depth of filler shall be as required to form a 5/8 in. deep sealant and backer rod recess below finished surface of walkway.

3.5 MONOLITHIC EXPOSED-AGGREGATE FINISH

- A. Monolithic Exposed-Aggregate Finish: Expose coarse aggregate in pavement surfaces as follows:
 - 1. Immediately after float finishing, spray-apply chemical surface retarder to pavement according to manufacturer's written instructions. (Surface retarder may be used, only after approval by the Architect and shall be of the same brand used to prepare the approved sample panel. The retarder shall be applied uniformly over the concrete surface and in accordance with the manufacturer's instructions.)
 - 2. If recommended by surface retarder manufacturer, cover pavement surface with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.
 - 3. When the concrete is hard enough to retain the aggregate and the mortar is still soft enough to be removed by brushing, the surface retarder shall be removed by brushing and flushing with water. The exposing operation of washing and brushing with a stiffbristle broom and pressure washer shall continue until the surface matches the approved sample panel. The final washing operation shall cease when the flush water runs clear, there is no noticeable cement film on the aggregate, and cement film is removed from aggregate surfaces to depth required.

3.6 CURING AND SEALING

- A. As soon as the washing operation ceases, the curing operation shall begin. The concrete shall be kept in continuously moist condition by covering with new, unwrinkled, nonstaining, high-quality curing paper for 5 days in warm weather (70 deg. F. or higher) or 7 days in cooler weather (50-70 deg. F.). The temperature of the concrete shall not be allowed to fall below 50 deg. F. during the curing period.
 - 1. During periods of excessively hot weather (95 deg. F., or above) ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305. Any concrete with a temperature above 95 deg. F. when ready for placement will not be acceptable, and will be rejected.
- B. After curing is completed, concrete surface shall be protected by applying concrete sealer in accordance with manufacturer's printed instructions.

3.7 CONSTRUCTION JOINTS

- A. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.
 - 1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
 - 2. Provide tie bars at sides of pavement strips where indicated.
 - 3. Butt Joints: Use epoxy bonding adhesive at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

3.8 EXPANSION JOINTS

- A. Expansion joints (isolation joints) shall be 1/2 in. wide and unless otherwise indicated on the Drawings, shall be located 30 ft. o.c., at building edge and at places where pavement meets other structures. Expansion joint shall be formed in the concrete to required width with preformed joint filler in place. Joint filler shall extend the full width and depth of the slab. Joint filler shall extend the full length of the expansion joint.
 - 1. Depth of joint filler shall be as required to form a 1-1/4 in. deep sealant and backer rod recess below finished concrete surface.
 - 2. Doweled Joints: Install sleeves and dowel bars at expansion joints as indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.9 CONTROL JOINTS

- A. Control joints indicated shall be sawn by using a diamond blade concrete power saw. Joint shall be made after concrete is finished and when the surface is stiff enough to support the weight of workmen without damage to the slab. Saw shall cut into slab at least 1 in., but in no case less than 25% of slab depth.

3.10 DECORATIVE SAW CUT JOINTS

- A. Unless otherwise indicated, decorative saw cut joints shall be sawn into the concrete slab at intervals and patterns indicated on the Drawings. Joint shall be made after concrete is finished

and when the surface is stiff enough to support the weight of workmen without damage to the slab, but before slab has achieved its final set. Saw cut joints shall be straight and accurate to line.

1. Saw cut joints shall be sawn flush to vertical surfaces.

B. Decorative saw cut joints shall be located each way to create scoring patterns indicated on the Drawings.

C. Depth of decorative saw cut joint shall be 3/4 in.

3.11 SEALING OF JOINTS

A. Where indicated on the Drawings, expansion joints and control joints shall be sealed with joint sealant in accordance with Division 07.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.

a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.

4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.

5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.

a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).

D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and

inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.13 PROTECTION OF CONCRETE SURFACES

- A. Concrete surfaces shall be protected from traffic or damage until surfaces have hardened sufficiently. If necessary 1/2 in. thick plywood sheets shall be used to protect the exposed surface.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

END OF SECTION

SECTION 321545.1

RESIN BOUND AGGREGATE SURFACING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following.
 - 1. Resin bound aggregate surfacing between wood railroad ties.

1.3 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Section 312300, SITE EXCAVATING, BACKFILLING, AND COMPACTING.
 - 2. Section 329300, TREES, PLANTS, AND GROUND COVERS.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.
 - 1. American Society for Testing and Materials (ASTM):
 - D 1557 Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10-lb. (4.54-kg) Rammer and 18-in. (475-mm) Drop
 - 2. Commonwealth of Massachusetts Highway Department (MHD):
 - Specifications Standard Specifications for Highways and Bridges

1.5 SUBMITTALS

- A. Samples: The following samples shall be submitted:

Material	Sample Size or Quantity
Top Course Stone	2 lb.
#8 AASHTO Stone	2 lb.
- B. Manufacturer's Product Data: Manufacturer's product data shall be submitted for the following materials:
 - 1. Resin

1.6 MOCK-UP

A. General

1. Schedule mock-up for acceptance 30 days prior to constructing resin bound aggregate surfaces represented by the mockups.
2. Locate mock-up panels in non-public areas accepted by the Architect.
3. Continue to construct mock-ups until acceptable mock-up is produced. Accepted mock-up shall be the standard for color, texture, mix ratio, and workmanship for the work.
4. Use the same aggregate top course mix and placement procedure, accepted in mock-ups, in the final work, unless otherwise directed by the Architect.
5. Protect accepted mock-ups from damage until completion and acceptance of the work represented by the mock-up.
6. Remove mock-up panels from site at completion of project, as directed by the Architect

B. Sample panel shall be 5 ft. x 5 ft. minimum.

C. Source of Materials. Utilize the same source of aggregate top course stone and resin. Do not interchange materials or mixes until an additional mock-up shows that uniformity in finish texture and color, as compared to original mock-up will be maintained. If necessary, obtain and stockpile materials in sufficient quantity to ensure continuity and uniformity.

1.7 TESTING AND INSPECTION

A. The Owner reserves the right to inspect and test paving and associated work in accordance with Division 01, GENERAL REQUIREMENTS.

1.8 PRODUCT DELIVER, STORAGE, AND HANDLING

A. Delivery: Deliver materials in manufacturer's original packaging, with identification labels clearly intact.

B. Storage:

1. Store all materials per manufacturer's instructions.
2. Store resin out of direct sunlight.
3. Resin must be stored in original, unopened containers.
4. Resin must be stored in a dry place with temperatures between 50 and 100 degrees F.
5. Resin to be used within one year of the expiration date on the container.
6. Aggregate top course must be protected against rain or snow with a tarp, kept at a temperature above 50 degree F and humidity level 10% or lower.

C. Handling: Use care when unwrapping, handling, and installing. All workers must wear protective clothing, safety glasses, gloves, and 2 filter masks when using resin products.

1.9 QUALITY ASSURANCE

A. Performance: Upon request, manufacturer shall submit for reference the information and contacts for no fewer than three projects where the paving system has been installed and in service for no less that three years, and which has proved wear resistance surface.

PART 2 - PRODUCTS

2.1 AGGREGATE BASE COURSE

- A. Material for aggregate base course shall be a graded, granular, non-frost susceptible, free-draining material, consisting of either durable stone and coarse sand or of blast furnace slag, practically free from loam and clay, and which can be readily compacted to form a stable foundation.
- B. Material shall be dense graded crushed stone conforming to MHD Specifications Section M2.01.7.

2.2 LEVELING COURSE

- A. #8 AASHTO Stone.

2.3 RESIN BOUND AGGREGATE

- A. Top course stone material shall be washed, 3/8 in. max. gravel, to mimic existing stone within rail corridor, hard and durable, with stone free from surface coatings and deleterious materials.
- B. Color shall be "cool gray" as approved by Architect.
- C. Resin shall be an aliphatic UV stable polyurethane, manufactured by Stone Resin Surfacing, LLC, Milford, CT 06460: TEL. 203-450-6640; info@stoneresinsurfacing.com, or approved equal.

2.4 FILTER FABRIC

- A. Filter fabric shall be a non-woven polypropylene fabric made specifically for use in subsurface drainage structures equal to Mirafi 140N, manufactured by Tencate, 365 South Holland Drive, Pendergrass, GA 30567; Tel 800 685 9990; Tel 706 693 2226; Fax 706 693 4400; www.mirafi.com, or approved equal.

PART 3 - EXECUTION

3.1 FILTER FABRIC

- A. Filter fabric shall be placed where indicated on the Drawings, in accordance with manufacturer's printed instructions. Where fabric edges meet, they shall overlap a minimum of 12 in.

3.2 AGGREGATE BASE COURSE

- A. Aggregate base course for paving and the spreading, grading, and compaction methods employed shall conform to standard requirements for usual base course of this type for first class road work, and the following:
 - 1. MHD Specifications Section 402, "Dense Graded Crushed Stone for Sub-Base".
- B. Compaction of aggregate base course shall be to 95% of maximum density as determined by ASTM D 1557, Method D. Stone greater than 2 in. shall be excluded from course.
- C. Aggregate material shall be applied in lifts less than or equal to 2 in. thick, compacted measure. Each lift shall be separately compacted to specified density

1. Material shall be placed adjacent to structures only after they have been set to required grade and level
2. Surface irregularities which exceed 1/2 in. measured by means of a 10 ft. long straightedge shall be replaced and properly compacted.

D. Base course shall be kept clean and uncontaminated.

3.3 RESIN BOUND AGGREGATE SURFACING

- A. Resin bound aggregate surfacing shall be done only after construction work which might injure it has been completed. Damage caused during construction shall be repaired before acceptance.
- B. Resin bound aggregate surfacing shall be constructed on a level, firmly compacted aggregate base.
- C. Recommended temperatures should be 50-85 degrees F.
- D. Mix the dry aggregate and resin using a mechanical mortar mixer per manufacturers specification. Use immediately.
- E. Spread the mixture evenly over the prepared surface using batons and edging to maintain a consistent depth. Finish the surface with a hand or mechanical trowel.
- F. Set up time varies according to the temperatures during installation. Protect the work throughout the set up/ curing time. Contractor to provide guards to monitor the area if curing needs to occur overnight.

END OF SECTION

SECTION 321640
GRANITE CURBING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. The work includes furnishing all labor, materials, equipment, and supervision to construct the granite curbing in accordance with the Drawings and Specifications.

1.3 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Section 024113, SELECTIVE SITE DEMO AND REMOVALS; Salvaging existing granite curbing for reuse under work of this Section.
 - 2. Section 033001, CAST-IN-PLACE CONCRETE - SITEWORK; Concrete for base.
 - 3. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; Establishment of subgrade elevations, subbase and base course.
 - 4. Section 321313, PORTLAND CEMENT CONCRETE PAVING

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. American Society for Testing and Materials (ASTM):
 - C 131 Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 - C 615 Structural Granite.
 - 2. Commonwealth of Massachusetts Highway Department (MHD):
 - 3. Specifications Standard Specifications for Highway and Bridges

1.5 SAMPLE SECTION

- A. A sample curb section of each type of specified stone, full dimension, 6 ft. long minimum, shall be fabricated prior to start of granite curbing. The work will be inspected by the Architect. If the original sample is not acceptable, the Contractor shall construct additional sample sections until an accepted sample is obtained. The accepted sections shall become the standard for the entire job, and shall remain undisturbed until completion of all granite curbing.

1.6 QUALITY ASSURANCE

- A. Unless otherwise indicated, granite curb materials and construction shall conform to the applicable portions of the following:
1. MHD Specifications Section 500, "Curb and Edging."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. New granite curb units shall be delivered to the job adequately protected from damage during transit.
- B. Curb shall be protected against staining, chipping, and other damage. Cracked, badly chipped, or stained units will be rejected and shall not be employed in the work.

1.8 REUSE OF EXISTING GRANITE CURBING

- A. Maximum reuse shall be made in the new work of existing granite curbing which is removed and stacked under Section 0241103, SELECTIVE SITE DEMO AND REMOVALS. Existing curb to be reused shall be reset in accordance with the requirements of this Section.

PART 2 - PRODUCTS

2.1 GRANITE CURB

- A. To the extent available, maximum reuse shall be made in the new work of existing granite curbing which is removed and stacked under Section 0241103, SELECTIVE SITE DEMO AND REMOVALS.
- B. New granite curb required to complete the work of this Section shall be a structural granite conforming to ASTM C 615, Class I Engineering Grade, suitable for curbstone use. Curb shall be free from seams which impair structural integrity, and with percentage of wear less than 32%, as determined by ASTM C 131. Granite curb shall be as follows: Granite For Curb: shall be a fine grained domestic gray granite to match existing curb and approved by the Architect.
- C. Curb materials shall conform to MHD Specifications Section M9.04.0 and shall meet requirements specified in the following subsection of Division III, Materials of the MHD Specifications:

Item	Section	Type
Vertical Granite Curb	M9.04.1	VA4
Transition Granite Curb	M9	

- D. Finish of new curb to match existing curbs.

2.2 CEMENT MORTAR

- A. Mortar for pointing joints between curbstones shall be a cement mortar composed of one part Portland cement and two parts sand, by volume with sufficient water to form a workable, stiff mixture.

2.3 CONCRETE

- A. Concrete for continuous haunch shall conform to Section 033001, CAST-IN-PLACE CONCRETE – SITEWORK.

PART 3 - EXECUTION

3.1 GRADING

- A. Areas to receive granite curb will be compacted and brought approximately to subgrade elevation under Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING before work of this section is performed. Final fine grading, filling, and compaction of subgrade to receive curbing, as required to form a firm, uniform, accurate, and unyielding subgrade at required elevations and to required lines, shall be done under this Section.
- B. Existing subgrade material which will not readily compact as required shall be removed and replaced with satisfactory materials. Additional materials needed to bring subgrade to required line and grade and to replace unsuitable material removed shall be material conforming to Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING.
- C. Subgrade of areas to receive curbing shall be recompacted as required to bring top 8 in. of material immediately below gravel base course to a compaction of at least 90% of maximum density, as determined by ASTM D 1557, Method D. Subgrade compaction shall extend for a distance of at least 1 ft. beyond curb edge.
- D. Excavation required in subgrade shall be completed before fine grading and final compaction of subgrade are performed. Where excavation must be performed in completed subgrade or subbase subsequent backfill and compaction shall be performed as directed by the Architect as specified in Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING . Completed subgrade after filling such areas shall be uniformly and properly graded.
- E. Areas being graded or compacted shall be kept shaped and drained during construction. Ruts greater than or equal to 2 in. deep in subgrade, shall be graded out, reshaped as required, and recompacted before placing granite curb.
- F. Materials shall not be stored or stockpiled on subgrade.
- G. Disposal of debris and other material excavated and/or stripped under this section, and material unsuitable for or in excess of requirements for completing work of this Section shall be legally disposed of off-site.
- H. Prepared subgrade will be inspected by the Architect. Subgrade shall be approved by the Architect before installation of aggregate base course. Disturbance to subgrade caused by inspection procedures shall be repaired under this Section of the specification.

3.2 SETTING CURB

- A. Curb shall be raised or flush as indicated on the Drawings. Curb shall be set in continuous concrete haunch over compacted or undisturbed subgrade with concrete bottom at minimum 6 in. below bottom of curb. Unless otherwise indicated, excavation shall be filled to required level with base course material as specified above.

- B. Vertical face of vertical curb shall be plumb, with curb top parallel to adjacent surface.
- C. Curb shall be set accurately to line and grade in continuous haunch. Curb units shall be fitted together as closely as possible. Curb shall not be field cut.
- D. Joints, between curb units shall be carefully filled with a cement mortar, and neatly pointed on the top and front exposed portions. After pointing, excess mortar shall be cleaned from curb surface.
- E. Backfill material on each side of curb shall be thoroughly compacted by means of power tampers. Extreme care shall be taken not to destroy alignment. Curb sections disturbed during backfilling or otherwise shall be reset to line and grade, and properly backfilled.

END OF SECTION

SECTION 328000

IRRIGATION SYSTEM

PART 1 GENERAL

1.00 GENERAL PROVISIONS

- A. Attention is directed to the PROCUREMENT AND CONTRACTING REQUIREMENTS and all Sections within DIVISION 01, GENERAL REQUIREMENTS, which are made a part of this Section of the Specifications.

1.01 DESCRIPTION OF WORK

- A. This is a Design/Build Specification: The Contractor is responsible for the design and engineering of the entire irrigation system including sizing all piping, calculating system hydraulics, testing, and all other work required for a complete operable system and for providing the specified guarantees. Design and install irrigation system in compliance with ASIC Standards.
1. The mechanical point of connection for the irrigation system shall branch off from the existing piping after the existing water meter, the existing backflow preventer will be reused. The water source will be from the city system, confirmed at 82psi". all other equipment will be new.
 2. Irrigation timer/clock will be a Rainbird TBOS (Battery Operated Timer Controller) (or equal) with matching solenoids thus no electrical connections needed.
- B. On-Site Conditions
1. Inspection of the Site: The Contractor shall acquaint himself with all on-site conditions. Should utilities not shown on the Drawings be found during excavations, the Contractor shall promptly notify the Owner for instruction as to further action. Failure to do so will make the Contractor liable for any and all damage thereto arising from his operations subsequent to discovery of such utilities not shown on the Drawings.
 2. Protection of Property: The Contractor shall be responsible for the preservation and protection of all site conditions to remain from damage due to this work. In the event damage does occur, all damage shall be completely repaired to its original condition at no additional cost to the Owner.
 3. Trenching: All trenching or other work under the leaf canopy of any and all trees shall be done by hand or by other methods so that no branches, and minimal root systems are damaged in any way.
 - a. Trenching around existing plant material shall be done by hand so as to minimize root disturbance.
 - b. Buildings, walks, walls, and other property shall be protected from damage. Open ditches left exposed shall be flagged and barricaded by the Contractor by approved means. The Contractor shall restore disturbed areas to their original condition.
 4. Protection and Repair of Underground Utilities: The Contractor shall be responsible for requesting the proper utility company to stake the exact location of any underground lines including but not limited to electric, gas, telephone service, water, and cable.
 - a. Call "DIGSAFE," at 811 at least 3 business days before you dig. Contractor shall verify the location of existing utilities in the field prior to commencing construction. No adjustments will be made after construction has commenced.

- b. The Contractor shall take whatever precautions are necessary to protect these underground lines from damage. In the event damage does occur, all damage shall be completely repaired to its original condition, at no additional cost to the Owner.

1.03 RELATED WORK

- A. Carefully examine all of the Contract Documents for requirements which affect the work of this Section. Other specification sections which directly relate to the work of this section include, but are not limited to the following:
1. Section 329200, LAWNS AND GRASSES; Lawns and grasses.
 2. Section 329300, TREES, PLANTS AND GROUND COVERS; New plantings.

1.04 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. American National Standards Institute (ANSI):

B16.26 Tubes	Cast Copper Alloy Fittings for Flared Copper
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2. American Society of Irrigation Consultants (ASIC):

Standards	Minimum Standards for Landscape Irrigation
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3. American Society for Testing and Materials (ASTM):

B 88	Seamless Copper Water Tube
D 1785	Poly (Vinyl Chloride)(PVC) Plastic Pipe, Schedules 40, 80, and 120
D 2239	Polyethylene (PE) Plastic Pipe (SLPR - PR) Based On Controlled Diameter.
D 2241	Poly(Vinyl Chloride) (PVC) Plastic Pipe (SDR- PR)
D 2464	Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
D 2466	Poly (Vinyl Chloride)(PVC) Plastic Pipe Fittings, Schedule 40
F 690	Underground Installation of Thermoplastic Pressure Piping Irrigation Systems

1.05 SUBMITTALS

- A. Submit a complete materials list indicating name of manufacturer, with model numbers

of proposed irrigation system equipment and accessories.

- B. After completion of installation, furnish complete As-built drawings showing locations of all sprinkler heads, valves, drains, and piping to scale, with dimensions where required or necessary.
 - 1. On or before the date of final field observation, deliver completed AutoCAD computer plots of "As-built record drawings on vellum and AutoCAD electronic files on disk to Owner as part of contract closeout. Delivery of plots will not relieve Contractor of the responsibility of furnishing required information that may have been omitted from the prints.

1.06 LAWS, CODES, AND ORDINANCES

- A. Irrigation system shall be installed in accordance with the latest laws, ordinances, rules, and regulations of all local, state, and federal authorities having jurisdiction.

1.07 GUARANTEE

- A. In addition to the manufacturer's guarantees, the Contractor shall warrant the entire irrigation system, both parts and labor for a period of two (2) years from the date of acceptance by the Owner.
 - 1. The Contractor will be held strictly responsible for all parts of his work. If failure in the irrigation system or appurtenances develop within two (2) years from the date of final approval and acceptance of the work, the Contractor will be required to replace all faulty materials at his full expense.
 - 2. Labor and materials to fulfill the requirements of this warranty shall be furnished by the Contractor at no additional cost to the Owner. All labor shall include premium time to correct any faulty material or workmanship.
 - 3. As part of the one-year warranty the Contractor shall perform the first year-end winterization and spring start-up for the irrigation system.

1.08 QUALITY ASSURANCE

- A. All applicable ANSI, AWWA, and ASTM Standards and Specifications, and all applicable building codes and other public agencies having jurisdiction upon the work.
- B. Protection of Existing Plants and Site Conditions: The Contractor shall take necessary precautions to protect site conditions to remain. Should damages be incurred, this Contractor shall repair the damage to its original condition at his own expense. Any disruption, destruction, or disturbance of any existing plant, tree, shrub, or turf, or any structure shall be completely restored to the satisfaction of the Owner, solely at the Contractor's expense.
- C. Permits and Fees: Obtain all permits and pay required fees to any governmental agency having jurisdiction over the work. Inspection required by local ordinances during the course of construction shall be arranged as required. On completion of the work, satisfactory evidence shall be furnished to Architect to show that all work has been installed in accordance with the ordinances and code requirements.
- D. The Contractor shall provide full coverage in all irrigated areas and shall be responsible for additional heads and components as required, installed at his own cost.

- E. On-Site Observation: At any time during the installation of the irrigation system by the Contractor, the Owner or Architect may visit the site to observe work underway. Upon request, the Contractor shall be required to uncover specified work as directed by the Owner or Architect without compensation. Should the material, workmanship or method of installation not meet the standards specified herein, the Contractor shall replace the work at his own expense.
- F. Workmanship: All work shall be installed by skilled personnel, proficient in the trades required, in a neat, orderly, and responsible manner with recognized standards of workmanship. The Contractor shall have had considerable experience and demonstrated ability in the installation of sprinkler irrigation systems of this type.

1.09 MAINTENANCE AND OPERATING INSTRUCTIONS

- A. Contractor shall include in their 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 (The Architect's 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 SPLAINE PARK IRRIGATION SYSTEM, shall be submitted to the Architect's 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 all 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. 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.

6. Winterization and spring start-up procedures.
7. Guarantee data.

PART 2 PRODUCTS

2.01 PIPE AND FITTINGS

- A. Polyvinyl chloride (PVC) plastic pipe shall be continuously and permanently marked with the following information: Manufacturer's name, pipe size, type of pipe and material, SDR number, ASTM number, and the NSF (National Sanitation Foundation) seal.
- B. Main Lines (irrigation line on the supply side of the system up to the zone control valves).
 1. Pipe 4 in. diameter and less shall be Schedule 40 polyvinyl chloride (PVC) plastic pipe 1120 or 1220, NSF approved, conforming to ASTM D 1785.
 2. Pipe larger than 4 in. diameter shall be polyvinyl chloride (PVC) plastic pipe, SDR 21, 1120 or 1220, conforming to ASTM D 2241, with a minimum pressure rating of 200 psi.
 3. Plastic pipe fittings shall be polyvinyl chloride (PVC) molded fittings manufactured of the same material as the pipe and shall be suitable for solvent weld or slip joint ringtite seal (Schedule 40) conforming to ASTM D 2466, or threaded connections (Schedule 80) conforming to ASTM D 2464.
 4. Slipfitting socket taper shall be sized so that a dry unsoftened pipe end conforming to these specifications can be inserted no more than halfway into the socket. Plastic saddle and flange fittings shall not be used. Only Schedule 80 pipe may be threaded.
- C. Lateral Lines (irrigation lines on the sprinkler head side of the system from the control valves to the sprinkler heads).
 1. Pipe 2 in. diameter and less shall be polyethylene (PE) pipe, SDR 9, Class 160, Type III, Grade 3, Class C conforming to ASTM D 2239, with a minimum pressure rating (PR) of 160 psi.
 2. Pipe larger than 2 in. diameter shall be polyvinyl chloride (PVC) plastic pipe, SDR 26 conforming to ASTM D 2241, with a minimum pressure rating (PR) of 160 psi.
 3. Polyethylene pipe fittings shall be insert PVC or nylon type fitting recommended by pipe manufacturer. Fittings shall conform to NSF Standards, and be attached with two (2) dog-eared stainless steel clamps supplied by Harvard, Liverpool, NY, or approved equal. Fittings shall be per ASTM D2609, manufactured by Dura, Lasco or approved equal
 4. 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.
- D. Copper tubing: Hard, straight lengths of domestic manufacture only Type "K" conforming to ASTM B 88. No copper tube of foreign extrusion or thin wall copper tubing shall be used.
 1. Where necessary, joints shall be made with cast brass three-part compression coupling or flared tube fittings conforming to ANSI B16.26.
- E. Sleeves
 1. For Control Wires: Schedule 40 PVC pipe or Schedule 40 galvanized steel pipe.
 2. For Water Lines: Schedule 40 PVC or Schedule 40 galvanized steel pipe.
 3. Sleeve size shall be at least twice the diameter of the pipe line.
- F. Adapters

1. All adapters shall be provided as required by the manufacturer, and are required to construct the proposed system.

2.02 WARNING AND DETECTOR TAPE

- A. Detector tape for identification of irrigation main locations shall be manufactured by Reef Industries, Inc., Houston, TX 77275-0218, or approved equal. Detector tape shall consist of a solid aluminum foil core running the full length and width of the tape and encased in a protective, high visibility, color coded inert plastic jacket.
1. Color of tape shall be "Safety Precaution Blue."
 2. Tape shall be imprinted with the following legend: "Caution Buried Irrigation Line Below".

2.03 SPRINKLERS AND RISER ASSEMBLY

- A. Sprinklers: Manufacturer's standard sprinklers designed for uniform coverage over entire spray area indicated, at available water pressure.
1. Flush, Surface Sprinklers: Fixed pattern, with screw-type flow adjustment.
 2. Bubblers: Fixed pattern, with screw-type flow adjustment.
 3. Pop-up, Spray Sprinklers: Fixed pattern, with screw-type flow adjustment and stainless-steel retraction spring.
 4. Pop-up, Rotary, Spray Sprinklers: Gear drive, full-circle and adjustable part-circle types.
 5. Pop-up, Rotary, Impact Sprinklers: Impact drive, full-circle and part-circle types.

2.04 DRIP SYSTEM COMPONENTS

- A. Dripperline and Integral Dripperline Components: The dripperline shall be Techline CV or Techline pressure compensating dripperline or 8mm Techlite non-pressure compensated dripperline, manufactured by Netafim Irrigation, Inc., or approved equal. Dripper flow rate and spacing shall be as recommended by drip system component manufacturer based on specific plant material to be irrigated.
1. Techline CV/Techline/8mm Techlite Fittings: All Techline CV/Techline/8mm Techlite connections shall be made with approved Techline CV/Techline/8mm Techlite insert fittings.
 2. Soil Staples: All on-surface/under mulch Techline CV/Techline/8mm Techlite installations shall be held in place with Techline Soil Staples spaced evenly every 3' - 5' on center, and with two staples on each change of location.
 3. Line Flushing Valves: All Techline/Techlite systems shall be installed with Netafim Automatic Line Flushing Valves. Techline CV zones do not require an automatic line flushing valve but must have a manual flushing port(s) in the position that an automatic flush valve would be positioned.
 4. Air/Vacuum Relief Valves: Each independent Techline subsurface irrigation zone shall be installed with an Air/Vacuum Relief Valve at the zone's highest point(s). Techline CV zones do not require an Air/Vacuum Relief Valve.
 5. Pressure Regulator: A pressure regulator shall be installed at each zone valve or on the main line to ensure operating pressures do not exceed system requirements. The pressure regulator shall be a Netafim Pressure Regulator.

6. Disc Filter: A disc filter shall be installed at each zone valve or on the main line to ensure proper filtration. The filter shall be a Netafim Disc Filter.
7. Reduced Pressure or other Backflow Prevention Units: Reduced pressure backflow prevention units or any unit as required by local codes shall be provided as indicated on drawings and shall comply with local codes.

2.05 SOIL MOISTURE SENSOR

- A. Soil moisture sensor shall sense soil moisture status by measuring the conductivity of a soil volume between two stainless steel probes. Moisture sensor device shall interrupt programmed irrigation cycles until the soil moisture matrix potential has reached a predetermined state. Soil moisture sensor shall be "Baseline Watertec S100" Soil Moisture Sensor, manufactured by Baseline LLC, 2700 E Lanark St. Ste. 100, Meridian, ID 83642 USA; Tel. Day Time Voice (208) 323-1634; Fax (208) 323-1834; Toll Free (866) 294-5847, or approved equal.
 1. Soil moisture sensor shall be electrically isolated from other electrical potentials, and be wired from the sensor controller to the probes with water tight materials and connections.

2.06 AUTOMATIC REMOTE CONTROL VALVE AND BOX

- A. Automatic remote control valves shall be pressure regulating electric remote control valves. Valve size shall not be less than the size of the lateral served.
- B. Each remote control valve shall have a valve box.
 1. Valve box shall be impact resistant cyclac plastic with locking cover, similar to those manufactured by Ametek, Sheboygan, WI 53081. Cover color shall be green.
- C. Remote control valve tags shall be yellow with thermofused numbers.

2.07 GATE VALVE AND BOX

- A. Gate valves 2 in. and smaller shall be cast iron body, bronze mounted with non-rising stem and working pressure rating of 200 psi.
- B. Gate valves larger than 2 in. shall be mechanical joint or flanged cast iron with non-rising stem and working pressure rating of 200 psi.
- C. Gate valves for above grade or pit use shall be supplied with wheel handles.
- D. Gate valve for underground use shall be supplied with 2 in. square operating nut.
- E. Each gate valve shall have a valve box.
 1. Valve box shall be impact resistant cyclac plastic with locking cover, similar to those manufactured by Ametek, Sheboygan, WI 53081. Cover color shall be green.

2.08 DRAIN VALVE AND BOX

- A. Drain valves shall be all bronze construction manual angle valves installed at low points in system.
- B. Each drain valve shall have a valve box.

1. Valve box shall be impact resistant cycolac plastic with locking cover, similar to those manufactured by Ametek, Sheboygan, WI 53081. Cover color shall be green.

2.09 CONTROL AND GROUND WIRE

- A. Control and ground wiring shall be minimum Type "UF", #12 wire, 600 volt, solid copper, single conductor wire with PVC insulation and shall bear UL approval for direct underground burial feeder cable.
- B. A minimum of one extra wire for each direction of run to last valve shall be supplied. Extra wire shall be a fugitive color, loop at each valve.
- C. Wire types, connectors, splices, and installation procedures shall conform to applicable local codes.
- D. Multi conductor cable will not be acceptable.
- E. Wire splices shall be made with "scotch lock connectors" or "snip snap caps" (per title connectors) or other approved method.

2.10 QUICK COUPLING VALVES

- A. Quick coupling valves shall be 1 in. heavy duty brass construction one-piece body design, with locking rubber cover. Furnish to the Owner the following additional items: three hollow coupler keys and three swivel hose ell adapters.
 1. For use on systems using non-potable water, locking rubber cover shall have molded-in warnings of "DO NOT DRINK" in English and Spanish

2.11 BACKFLOW PREVENTER

- A. Backflow preventer shall be required at all cross-connections between irrigation system and potable water.
- B. Backflow preventer, based upon prevailing local codes, shall be of the following type:
 1. Double check valve backflow preventer

2.12 AUTOMATIC CONTROLLER

- A. Automatic controller shall be a battery operated timer controller type similar to Rainbird TBOS. Controller shall have the following features:
 1. Convenient temporary option for providing uninterrupted irrigation while repairs are made to an AC-powered system.
 2. 365-day calendar (adjusts for leap year).
 3. AM/PM or 24-hour display.
 4. Basic programming (standard mode) includes 3 independent programs, each with 8 start times per day. Run time is from 1 minute to 12 hours in 1-minute increments on a 7-day calendar.

5. Additional cycles (turbo mode) include even, odd, odd-31 and 1-6 day program cycles for maximum flexibility.
 6. The low battery indicator warns of failing batteries in the TBOS field transmitter or TBOS control module.
 7. Independent station operation allows simultaneous start times or sequential start times based on system hydraulic capacity.
 8. The TBOS field transmitter has a large Liquid Crystal Display (LCD), with self-explanatory function icons. Each function is indicated by an easy-to-understand symbol.
 9. The 7-key keypad is equipped with a 'beep' sound to confirm that a key has been pressed for fast and sure programming.
 10. One TBOS field transmitter programs an unlimited number of TBOS and UNIK Control Modules
 11. Fully backward compatible - operates in standard mode with all components of Rain Bird's UNIK controller line.
 12. The field transmitter and control module have external optical connectors for easy plug-in.
 13. It is possible to transmit information even if the module is under water.
 14. The TBOS potted latching solenoid will mount on all Rain Bird valves in the DV, DVF, ASVF, PGA, PEB, PESB, GB, EFB-CP, BPE and BPES series.
 15. The TBOS solenoid adapters will adapt the potted latching solenoid for use in retrofit applications with selected Irritrol® (Hardie/Richdel) and Buckner® valves or Champion® and Superior® valve actuators
- B. Controller shall be Rain Bird Series, Hunter Industries series, or approved equal. Controller shall be UL listed and tested.
- C. Location of controller unit and type of mounting will be determined by the Owner and Architect.
- D. Controller shall be equipped with a valve output lightning/electrical surge protection kit.
- E. Exterior Controller Enclosure: NEMA 250, Type 4, weatherproof, with locking cover and 2 matching keys; include provision for grounding.
1. Material: Stainless-steel.
 2. Mounting: Surface type for wall mounting.
- 2.13 THRUST BLOCKS
- A. Concrete for thrust blocks shall be 2500 psi, minimum, air-entrained concrete.
- PART 3 EXECUTION
- 3.01 GENERAL
- A. Coordinate all installation/repair work with landscape planting work, especially fine grading, and soil preparation for lawn areas per Section 329200, LAWNS AND GRASSES.
- B. Excavation required for the installation of the irrigation system shall conform to ASTM F 690.
- 3.02 PIPE, CONTROL VALVE, AND CONTROL WIRE INSTALLATION
- A. Plastic pipe shall be delivered to the site in manufacturer's packaging, stacked in such

- a manner as to provide adequate protection from compression and deformation of the pipe ends. Pipe shall be protected from exposure to direct sunlight.
- B. Pipe interior shall be thoroughly cleaned of all dirt or foreign matter before lowering pipe into trenches. Pipe interiors shall be kept clean during pipe installation by plugs or other approved methods. Piping shall not be installed in water or mud. Ends of pipe shall be securely closed when work is not in progress to prevent water and foreign matter from entering the lines.
- C. PVC pipe shall be cut with a hand saw or hack saw with the assistance of a square in sawing vise, or other manner to ensure a square cut. Burrs at cut ends shall be removed prior to installation so that a smooth unobstructed flow will be obtained.
- D. Installation of plastic pipe shall conform strictly to manufacturer's recommendations and to ASTM F 690.
1. Metallic fittings shall not be supported by PVC pipe. Metallic fittings shall be supported by a concrete block or cradle.
 2. When damaged, plastic pipe shall be replaced by cutting out entire damaged area and replacing with same Schedule, Class, and type of pipe, or heavier, at no additional cost. Plastic pipe shall be thoroughly dry when this replacement is made.
- E. Snake pipe in trench from side to side to allow for expansion and contraction.
- F. Threaded Joints for Plastic Pipes:
1. Use Teflon tape on the threaded PVC fittings except where Marlex fittings are used.
 2. Use strap-type friction wrench only: Do not use metal-jawed wrench.
 3. When connection is plastic to metal, male adapters shall be used. Male adapter shall be hand tightened, plus one turn with a strap wrench. Joint compound shall be Teflon tape or equal upon approval.
- G. Threaded Joints for Galvanized Steel Pipes:
1. Factory-made nipples shall be used wherever possible. Field-cut threads in pipes will be permitted only where absolutely necessary and approved by Architect; when field threading, cut threads accurately on axis with sharp dies.
 2. Use pipe joint compound or Teflon tape to male threads only.
- H. Joints for Polyethylene Pipes:
1. Double-clamp all connections 1-1/4 in. diameter and greater.
 2. Make all connections between polyethylene pipes and metal valves or pipes with threaded fittings using male adapters.
- I. Connections between plastic pipe and metal valves or steel pipe shall be made with threaded fittings using plastic toe nipples or shall be made with adapters and a non-hardening pipe compound applied to male threads.
- J. Solvent weld joints shall be made according to manufacturer's instructions. Joints shall be tight and inseparable. Joints shall be allowed to cure 24 hours at temperatures over 40oF. before testing.
1. Solvent shall be compatible with plastic material of heads, pipe, and fittings.

- K. Remote control valve shall be installed in a valve box with a locking lid.
1. Clearance between the highest part of the valve and the bottom of the valve box lid shall be 2 in., minimum, and 4 in., maximum. The lid shall not rest on any part of the valve.
 2. Clearance between the top of the piping and the bottom of the valve box or the valve box knock-outs shall be 2 in., minimum. Valve box shall not rest on piping.
 3. Clearance between the valve body and the sides of the valve box shall be 3 in., minimum.
- L. Control wire splices shall be made at electric valve locations. Make no splices between the controller and the remote control valve. Lay to the side of pipeline. Provide looped slack at valves and snake wires in trench to allow for contraction. Tie wires in bundles at 10 ft. intervals. Control wires crossing under pavements shall be installed in conduit.
1. Install a minimum of one extra control wire to the control valve located the greatest distance from the controller in each direction and label each end.
 2. Install tag to valve wire before making final connection.
 3. Separate color coding of control wires by satellite if required.

3.03 INSTALLATION OF SPRINKLER HEADS

- A. After irrigation piping and risers are in place and connected, and prior to installation of sprinkler heads, the control valves shall be opened and a full head of water used to flush out the system. Sprinkler heads shall be installed only after flushing of the system has been completed.
- B. Sprinklers shall be set plumb and perpendicular to finish grade.
- C. Sprinklers and valve box covers adjacent to walls, curbs, and other paved areas, shall be set to finish grade unless otherwise noted on Drawings.

3.04 INSTALLATION OF DRIP SYSTEM

- A. Dripperline Installation:
1. Install all dripperline as indicated on Drawings. Dripperline shall be installed in areas designated, by hand under the mulch, and shall have an average depth of 4 inches unless otherwise indicated on the Drawings. Tubing should not be visible through the mulch. All in-line emitter tubing shall be installed on the high side of the plant material being watered to help insure dispersion of the water. Use only Teflon tape on all threaded connections.
 - a. In-line emitter tubing is to be installed 4 inches from all planter edges, curbs and walls. Spacing of in-line emitter tube is to be 18 inches center-to-center in all irrigated areas.
 - b. All in-line tubing shall have a minimum incoming pressure of not less than 5-PSI of the pressure regulator, 45-PSI, to assure a maximum linear length of 280 feet at zero elevation lift.
 2. Clamp Techline/Techlite fittings with Oetiker clamps when operating pressure exceeds specific dripperline fitting requirements.
 3. When installing Techline CV, Techline, or 8mm Techlite dripperlines on-surface, install soil staples as listed below:
 - a. Sandy Soil - One staple every three (3') feet and two (2) staples on each change of direction (tee, elbow, or cross).
 - b. Loam Soil - One staple every four (4') feet and two (2) staples on each change

- of direction (tee, elbow, or cross).
 - c. Clay Soil - One staple every five (5') feet and two (2) staples on each change of direction (tee, elbow, or cross).
 - 4. Cap or plug all openings as soon as lines have been installed to prevent the intrusion of materials that would obstruct the pipe. Leave in place until removal is necessary for completion of installation.
 - 5. Thoroughly flush all water lines before installing valves.
- B. Pressure regulator shall assure a 45-PSI downstream pressure entering drip supply header. Pressure shall be verified by contractor to assure proper operating pressure for the in-line emitter tubing at maximum linear run of 280 feet. Contractor may need to manifold pressure regulators to reach the mid-range flow of the regulator.
- C. n-line drip tubing shall be secured with stakes. Stakes shall be spaced to ensure that tubing does not shift location in presence of foot traffic, operations, gravity on slope installations, or environmental effects. Stake in-line drip tubing at minimum 5-foot intervals to prevent movement.
- D. Air relief valves shall be installed in the emitter tubing, at high elevation points as indicated on the drawing.

3.05 GATE VALVES

- A. Install isolation and branch gate valves directly on main as required.
- B. Where gate valves isolate branch mains of a smaller size, size valve to largest main and add reducing fittings downstream of valves.
- C. Install valve and valve box to finish grade as indicated on the Drawings.

3.06 TESTING AND COMPLETION

- A. Flushing:
 - 1. After all piping, valves, sprinkler bodies, pipe lines 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, flush caps and riser nozzles shall be installed only after flushing of the system has been accomplished to the full satisfaction of the Owner's Representative.
 - 3. Contractor shall be responsible for flushing the entire system after installation is complete and will be responsible for any clogged nozzles for thirty (30) days after substantial completion of this portion of the landscape irrigation system.
- B. Irrigation system shall be tested for leakage prior to backfilling of piping. Leakage test shall be at 100 psi pressure at furthest point of system being tested for a minimum period of one hour. System is acceptable if no leakage or loss of pressure occurs.
- C. When the irrigation system is completed, perform a coverage test in the presence of the Architect to determine if the coverage of water for all areas is completely adequate. All valves, and the alignment and coverage of all sprinkler heads shall be adjusted, prior to final inspection, for required coverage. Correct inadequacies of coverage as directed by Architect.
- D. All testing shall be at the expense of the Contractor.

- E. Instruct Owner's designated personnel in proper operation of irrigation system, including programming controller; valves; adjustment of sprinkler heads.

3.07 BACKFILL AND COMPACTING

- A. After system is operating and required tests and inspections have been made, backfill excavations and trenches with clean soil, free of debris.
- B. Backfill for all trenches, regardless of the type of pipe covered, shall be compacted to minimum 95% density under pavements, 85% under planted areas.
- C. Dress off all areas to finish grades.

3.08 PRESSURE SETTING

- A. Prior to final inspection Contractor shall adjust each remote control valve to an agreed operating pressure by installing temporary pressure gauge on schrader valve and making necessary adjustments while valve is operating.

3.09 CLEAN UP

- A. Upon completion of all installation work, Contractor shall remove all leftover materials and equipment from the site in a safe and legal manner.
- B. Contractor shall remove all debris resulting from work of this section.
- C. Contractor shall regrade, lightly compact, and replant around sprinkler heads where necessary to maintain proper vertical positioning in relation to established grade.
- D. Contractor shall 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.

3.10 WINTERIZATION

- A. Winterization: The irrigation system is designed to be completely drained to protect pipe from bursting prior to freezing temperatures. To adequately drain the system the following procedure must be followed:
 - 1. Air blow-out
 - a. Set automatic controller stations to 3 minutes timing.
 - b. Attach hose from portable air compressor to 1-inch air inlet installed on main line at back flow prevention device in basement.
 - c. Operate compressor at 100 cubic feet per second at 60-80 psi.
 - 2. Manual drain valves: Open manual drain valves located at low points on the main line to drain main completely after air blow-out has been completed.

END OF SECTION

SECTION 329119
LANDSCAPE GRADING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the site grading work of this Section, in accordance with the Drawings and Specifications.

1.3 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; Excavation, backfill, compaction and establishment of subgrade elevations.
 - 2. Section 329200, LAWNS AND GRASSES.
 - 3. Section 329300, TREES, PLANTS AND GROUND COVERS.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. American Society for Testing and Materials (ASTM):
 - D 1556 Density of Soil in Place by the Sand-Cone Method
 - D 2167 Density and Unit Weight of Soil In Place by the Rubber-Balloon Method.

1.5 EXISTING CONDITIONS

- A. By submitting a bid, the Contractor affirms that he has carefully examined the site and all conditions affecting work under this Section. No claim for additional costs will be allowed because of lack of full knowledge of existing conditions.

1.6 QUALITY CONTROL

- A. The Architect reserves the right to perform on-site observation during the grading operations. The observations may include, but not be limited to the following:
 - 1. Observation of subgrade preparation for slab-on-grade and paved areas.
 - 2. Observation of rough and finish grading operations.

- B. Contractor shall set grade string lines for Architect's review and approval. All grade breaks shall be staked with grade stakes at each end, any change of direction, and at 20' centers along the length for Architect's review during grading operations.
- C. Perform field density tests in accordance with ASTM D 1556 or ASTM D 2167.
 - 1. Make at least one field density test of the subgrade for every 2000 sq. ft. of paved area, but in no case less than three tests.
 - 2. In each compacted fill layer, make one field density test for every 2000 sq. ft. of overlying paved area, but in no case less than three tests.
 - 3. Make at least one field density test of the planting soil for every 2000 sq. ft. of plant bed area, but in no case less than three tests.
 - 4. Make at least one field density test of the planting soil for every 2000 sq. ft. of lawn area, but in no case less than three tests.
- D. If, in the opinion of the Architect, based on reports of the testing service and inspection, the subgrade or fills which have been placed are below the specified density, additional compaction and testing will be required until satisfactory results are obtained.
 - 1. The results of density tests of soil-in-place will be considered satisfactory if the average of any four consecutive density tests which may be selected are in each instance equal to or greater than the specified density, and if not more than one density test out of five has a value more than 2% below the required density.
- E. The Architect's presence does not include supervision or direction of the actual work by the Contractor, his employees, or agents. Neither the presence of the Architect, nor any observations and testing performed by him shall excuse the Contractor from defects discovered in his work.

1.7 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

- A. The work shall be executed in such manner as to prevent any damage to adjacent property and any other property and existing improvements such as, but not limited to: streets, curbs, paving, utility lines and structures, monuments, bench marks and other public and private property.
- B. In case of any damage or injury caused in the performance of the grading work, the Contractor shall, at his 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 grading work shall be repaired or replaced to their original condition at the completion of operations. The Contractor shall replace, at his own cost, existing bench marks, monuments, and other reference points which are disturbed or destroyed.

1.8 COORDINATION

- A. Prior to start of grading operations, the Contractor shall arrange an on-site meeting with the Architect for the purpose of establishing Contractor's schedule of operations and scheduling inspection procedures and requirements.
- B. As construction proceeds, the Contractor shall be responsible for notifying the Architect prior to start of grading operations requiring inspection and/or testing.
- C. The Contractor shall be responsible for obtaining test samples of soil materials proposed to be used and transporting them to the site sufficiently in advance of time planned for use of these materials for testing of materials to be completed. Use of these proposed materials by the Contractor prior to testing and approval or rejection, shall be at the Contractor's risk.

PART 2 - PRODUCTS

2.1 SOURCE OF MATERIALS

- A. Material shall be obtained from required on-site excavation, to the extent that suitable material is available, and from off-site sources, to the extent that suitable material is not available from on-site excavation. Refer to Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING for fill materials, and Section 329200, LAWNS AND GRASSES and Section 329300, TREES, PLANTS AND GROUND COVERS for Planting Soil.

PART 3 - EXECUTION

3.1 COMPACTION

- A. Refer to Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING for required levels of subgrade compaction at paved areas.
 - 1. Unless otherwise indicated, scarified subgrade in landscape areas shall be compacted to 86% - 88% compaction ASTM D698 Standard Proctor.
 - 2. Planting Soil – Planting Pits and Beds: shall be spread in lifts not greater than twelve inches and compacted to a density between 82 and 86 percent Standard Proctor Maximum Dry Density.
 - 3. Planting Soil - Lawn Areas: shall be spread over the area and shall be compressed to a density of 86 to 88% Standard Proctor maximum dry density. No vibratory compaction of the subgrade or the planting medium shall take place. No rubber-tired equipment or heavy equipment except for a small bulldozer shall pass over soils after they have been loosened or planting medium spread.

3.2 GRADING – GENERAL

- A. Uniformly grade areas within the limits of site grading under this section, including adjacent transition areas. Smooth finished surfaces within specified tolerances, and between points where elevations are shown, or between such points and existing grades.
- B. The degree of finish required will be that ordinarily obtainable from either blade-grader or scraper operations.
 - 1. Ditches: Finish ditches to ensure proper flow and drainage. Conduct final rolling operations to produce a hard, uniform, and smooth cross-section.
 - 2. Grade Breaks located on the plans indicate crisp transitions, not blended or rounded edges. These should be clean, sharp, and uniform in line and curve as indicated on the plans.

3.3 ROUGH GRADING

- A. General: Rough grading shall include the shaping, trimming, rolling and refinishing of all surfaces of the subbase, shoulders, earth embankments and the preparation of grades as shown on the Drawings. The grade of shoulders and sloped areas may be done by machine methods.
- B. Do all cutting, filling and grading to lines and grades indicated on the Drawings. Grade evenly to within the dimensions required for grades shown on the Drawings and specified herein. No stones larger than 4 in. shall be placed in upper 6 in. of fill. Fill shall be left in compacted state at the end of work day and sloped to drain.

1. Architect may make such adjustments in grades and alignments as are found necessary to avoid special conditions encountered.
 2. Provide a smooth transition between adjacent existing grades and new grades.
 3. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- C. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
1. Lawn or Unpaved Areas: Plus or minus 1 inch (25 mm).
 2. Walks and Pavements: Plus or minus 1/2 inch (13 mm).
 3. Up to 2 in. in 10 ft. – 0 in. tolerance shall be permitted on slopes provided the slopes are uniform in appearance and without any abrupt changes.
 4. Traffic of men and equipment across soil subgrade areas shall be prohibited following excavation to the required lines and grades.

3.4 FINE GRADING

- A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
1. Provide a smooth transition between adjacent existing grades and new grades.
 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Finish Grading:
1. Lawn or Unpaved Areas: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
 2. Walks: Shape the surface of areas under walks to line, grade and cross-section, with the finish surface not more than 0.00 ft. above or 0.10 ft. below the required subgrade elevation, compacted as specified, and graded to prevent ponding of water after rains.
 3. Pavements: Shape the surface of the areas under pavement to line, grade and cross-section, with the finish surface not more than 1/2 in. above or below the required subgrade elevation, compacted as specified, and graded to prevent ponding of water after rains. Include such operations as plowing, discing, and any moisture or aerating required to provide the optimum moisture content for compaction. Fill low areas resulting from removal of unsatisfactory soil materials, obstructions, and other deleterious materials, using satisfactory soil material. Shape to line, grade, and cross-section as shown on the Drawings.

3.5 MAINTENANCE

- A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Repair and re-establish grades in settled, eroded, and rutted areas to the specified tolerances.
- C. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, re-shape, and compact to the required density prior to further construction.

3.6 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Remove waste materials, including excavated material classified as unsatisfactory soil material, trash and debris, and dispose of it legally off the Owner's property.

END OF SECTION

SECTION 329200
LAWNS AND GRASSES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following: the seeding and sodding of lawns, including furnishing and placing planting soil, as indicated on the Drawings and as specified.

1.3 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Section 312300, SITE EXCAVATING, BACKFILLING AND COMPACTING; Establishment of subgrade elevation.
 - 2. Section 329119, LANDSCAPE GRADING.
 - 3. Section 329300, TREES, PLANTS AND GROUND COVERS.

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. American Society for Testing and Materials (ASTM):
 - C 136 Sieve Analysis of Fine and Coarse Aggregates
 - D 422 Particle-Size Analysis of Soils
 - E 11 Wire-Cloth Sieves for Testing Purposes

1.5 SUBMITTALS

- A. Samples: The following samples shall be submitted:

Material	Quantity (lb.)
Fertilizer	1
Lime	1
Compost	1
Seed, each mix	1
Loam borrow	1
- B. Manufacturer's Product Data: Manufacturer's product data shall be submitted for the following materials: Fertilizer
- C. Certificates: Labels from the manufacturer's container certifying that the product meets the specified requirements shall be submitted for the following materials:
 - Commercial fertilizer

Grass seed
Ground limestone

1.6 OWNER'S INSPECTION AND TESTING

- A. Work will be subject to inspection at all times by the Architect. The Owner reserves the right to engage an independent testing laboratory in accordance with requirements of Section 014320, QUALITY CONTROL AND TESTING SERVICES to analyze and test materials used in the construction of the work. Where directed by the Architect, the testing laboratory will make material analyses and will report to the Architect whether materials conform to the requirements of this specification.
1. Cost of tests and material analyses made by the testing laboratory will be borne by the Owner when they indicate compliance with the specification, and by the Contractor when they indicate non-compliance.
 2. Testing equipment will be provided by and tests performed by the testing laboratory. Upon request by the Architect, shall provide such auxiliary personnel and services needed to accomplish the testing work.
 3. Gradation of granular materials shall be determined in accordance with ASTM C 136. Sieves for determining material gradation shall be as described in ASTM E 11.

1.7 CONTRACTOR'S INSPECTION AND TESTING

- A. The Contractor shall engage an independent testing agency, experienced in the testing of agricultural soils and acceptable to the Architect, to perform the topsoil/planting soil tests and analyses specified herein. All costs associated with testing shall be the Contractor's responsibility.
1. Particle size analysis shall include the following gradient of mineral content:

USDA Designation	Size in mm
Gravel	+ 2 mm
Very coarse sand	1-2 mm
Coarse sand	0.5-1 mm
Medium sand	0.25-0.5 mm
Fine sand	0.1-0.25 mm
Very fine sand	0.05-0.1 mm
Silt	0.002-0.05 mm
Clay	< 0.002 mm
 2. Chemical analysis shall include the following:
 - a. pH and buffer pH.
 - b. percentage of organic content by oven-dried weight. Nutrient levels by parts per million, including phosphorus, potassium, magnesium, manganese, iron, zinc, and calcium.
 - c. Nutrient test shall include testing laboratory recommendations for supplemental additions to the soil, if necessary, based on the requirements for ornamental horticultural plants. Recommendations shall include rates at which additives are to be applied.
 - d. Soluble salt by electrical conductivity of a 1:2 soil/water sample. .

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Digging Sod:

1. Sod shall not be dug at the nursery or approved source until ready to transport sod to the site of the work or acceptable storage location.
2. Before stripping, sod shall be mowed at a uniform height of 2 in.
3. Cut sod to specified thickness and to standard width and length desired.

B. Transportation of Sod:

1. Sod transported to the Project in open vehicles shall be covered with tarpaulins or other suitable covers securely fastened to the body of the vehicle to prevent injury. Closed vehicles shall be adequately ventilated to prevent overheating of the sod.
2. Evidence of inadequate protection following the digging, carelessness while in transit, or improper handling shall be cause for rejection.
3. Sod shall be kept moist, fresh, and protected at all times. Such protection shall encompass the entire period during which the sod is in transit, being handled, or are in temporary storage.
4. Upon arrival at the temporary storage location or the site of the work, sod material shall be inspected for proper shipping procedures. Should the sod be dried out, the Architect will reject the sod. When sod has been rejected, the Contractor shall at once remove it from the area of the work and replace it with acceptable material.
5. Unless otherwise authorized by the Architect, the Contractor shall notify the Architect at least two working days in advance of the anticipated delivery date of sod material. Certificate of Inspection when required shall accompany each shipment.

C. Handling and Storage of Sod:

1. Sod material shall be handled with extreme care to avoid breaking or tearing strips.
2. Sod shall not be stored for longer than 30 hours prior to installation. Sod shall be stored in a compact group and shall be kept moist. Sod shall be prevented from freezing.
3. Sod that has been damaged by poor handling or improper storage will be rejected by the Architect.

D. Deliver seed in original sealed containers, labeled with analysis of seed mixture, percentage of pure seed, year of production, net weight, date of packaging, location of packaging, and name of seed grower. Damaged packages will not be accepted .

E. Seed shall be stored under cool and dry conditions so that the endophytic seed in the mixture is capable of maintaining a high level of endophytes.

F. Deliver fertilizer in sealed waterproof bags, printed with manufacturer's name, weight, and guaranteed analysis.

1.9 PLANTING SEASON

A. Planting season shall be as follows:

Seeding and sodding	
Spring:	3/15 to 5/15
Fall:	8/15 to 10/15

B. Planting shall only be performed when weather and soil conditions are suitable for planting the material specified in accordance with locally accepted practice.

C. Planting season may be extended with the written permission of the Architect.

1.10 ACCEPTANCE

A. Acceptance:

- 1. The Architect will inspect all work for Substantial Completion upon written request of the Contractor. The request shall be received at least ten calendar days before the anticipated date of inspection.
- 2. Acceptance of material by the Architect will be for general conformance to specified requirements, and shall not relieve the Contractor of responsibility for full conformance to the Contract Documents.
- 3. Upon completion and reinspection of all repairs or renewals necessary in the judgement of the Architect, the Architect will recommend to the Owner that the work of this Section be accepted.

B. Sod and seed areas will be accepted when in compliance with all the following conditions:

- 1. Roots are thoroughly knit to the soil
- 2. Absence of visible joints (sodded areas)
- 3. All areas show a uniform stand of specified grass in healthy condition
- 4. At least 60 days have elapsed since the completion of work under this Section

PART 2 - PRODUCTS

2.1 GENERAL

- A. Materials shall be extracted or recovered and manufactured from within 500 miles of project site.

2.2 SEED

- A. Seed mixture: Standard grade seed of the most recent season's crop. Seed shall be dry and free of mold. Seed shall be inoculated with endophytes. Seed mixture shall be as follows: SEED MIX

Name of Seed	% by Weight in Mixture	Minimum % Purity	Minimum % Germination
Chewings Fescue	30	98	85
Shademaster Creeping Red Fescue	30	98	85
Commander Perennial Ryegrass	30	98	85
Kentucky Bluegrass	10	98	90

- B. Certified Fescue Turfgrass Sod: Superior sod grown from certified, high quality seed of known origin or from plantings of certified grass seedlings or stolons. It shall be inspected by the certification agency of the state in which it is grown to assure satisfactory genetic identity and purity, overall high quality and freedom from noxious weeds as well as excessive quantities of other crop and weedy plants at time of harvest. All seed or original plant material in mixture must be certified. Turfgrass sod shall meet the published state standards for certification.

- 1. Sod shall be a Fescue sod grown from a blend of fescues free of bluegrass.

- C. Sod shall be nursery grown on cultivated mineral agricultural soils. Sod shall have been mowed regularly and carefully, and otherwise maintained from planting to harvest.
- D. Thickness of Cut: Sod shall be machine cut at a uniform soil thickness of 5/8 in., plus or minus 1/4 in., at the time of cutting. Measurement for thickness shall exclude top growth and thatch.
- E. Strip Size: Individual pieces of sod shall be cut to the supplier's standard width and length. Maximum allowable deviation from standard widths and lengths shall be plus or minus 1/2 in. on width, and plus or minus 5% on length. Broken strips and torn and uneven ends will not be acceptable.
- F. Strength of Sod Strips: Standard size sections of sod shall be strong enough to support their own weight and retain their size and shape if suspended vertically when grasped in the upper 10% of the section.
- G. Moisture Content: Sod shall not be harvested or transplanted when moisture content (excessively dry or wet) may adversely affect its survival.
- H. Time Limitations: Sod shall be harvested, delivered, and transplanted within a 36 hour period unless a suitable preservation method is approved prior to delivery. Sod not transplanted within this period shall be inspected and approved by the Architect prior to its installation.
- I. Thatch: Sod shall be relatively free of thatch. A maximum of 1/2 in. (uncompressed) thatch will be permitted.
- J. Diseases, Nematodes, and Insects: Sod shall be free of diseases, nematodes, and soil-borne insects. State Nursery and Plant Materials Laws require that all sod be inspected and approved for sale. The inspection and approval must be made by the State Agricultural Department, Office of the State Entomologist.
- K. Weeds: Sod shall be free of objectionable grassy and broad leaf weeds. Turfgrass sod shall be considered free of such weeds if less than five such plants are found per 100 sq. ft. of area.
 - 1. Turfgrass sod shall not be acceptable if it contains any of the following weeds: common bermudagrass (wiregrass), quackgrass, johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel and brome grass.

2.3 SOD FARM GROWING MEDIUM

- A. Soil in which sod was grown shall be classified as loam or sandy loam (silt loam is not acceptable) and shall conform to the following grain size distribution for material passing the #10 sieve:

U.S. Sieve No.	% Passing by Weight	
	Minimum	Maximum
10	100	---
20	75	100
40	30	85
100	12	45
270	5	25
0.002 mm	1	4

- 1. The maximum retained on the #10 sieve shall be 15% by weight of the total sample.
- 2. Tests shall be by combined hydrometer and wet sieving in compliance with ASTM D422.
- 3. The organic content shall be between 3.0 and 8.0 percent.

2.4 PLANTING SOIL

A. Existing Topsoil

- Existing topsoil from on-site source(s) may be used for planting soil, to the extent available, if it meets the requirements of this Section for planting soil, or if approved by the Architect.

B. Planting Soil

- Planting soil shall be composed of a natural, fertile, friable soil typical of cultivated topsoils of the locality, suitable for the germination of seeds and support of vegetative growth, with additives, if required, to achieve particle distribution and organic content specifications. Topsoil shall be taken from a well-drained, arable site, free of subsoil, large stones, earth clods, sticks, stumps, clay lumps, roots, other objectionable, extraneous matter or debris nor contain toxic substances. Planting soil shall have a pH value between 5.5 and 6.5 and organic matter content of 5 to 10% of total dry weight.
- Planting soil shall have the following mechanical analysis (see paragraph 1.6 for particle sizes):

<u>Approximate Particle Distribution</u>	
Gravel	Less than 10%
Coarse to medium sand	55 – 65%
Fine to very fine sand	15 – 25%
Silt	10– 20%
Clay	15 – 20%
- Minimum planting soil nutrient levels shall be: Nitrogen @ 5% average of organic matter, Phosphorus @ .02 to .05% average of total soil content, Potassium @ 1.2% average of total soil content.
- The Contractor shall provide the Architect with planting soil test results, as specified in Paragraph 1.6, before the start of planting operations. If planting soil does not fall within the required particle distribution, organic content, or pH range, it shall be adjusted to meet the specifications through the addition of sand, compost, limestone, or aluminum sulfate to bring it within the specified limits.

2.5 COMPOST

- Compost shall be derived from organic wastes such as food and agricultural residues, animal manures, mixed solid waste and biosolids (treated sewage sludge) 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.
 - Compost shall have the following properties:

Parameters	Range
pH	5.5 – 8.0
Moisture Content	35% - 55%
Soluble Salts	less than or equal to 4.0 mmhos (dS)
C:N ratio	15 – 30:1
Particle Size	< 1"
Organic Matter Content	> 50%
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.

3. Compost shall be "AllGro", distributed by AllGro, 4 Liberty Lane West, Hampton, NH 03842; "Agresoil", distributed by Agresource, 100 Main Street, Amesbury, MA 01913; or approved equal.
4. Guidelines for quantity of compost required to achieve suitable soil organic content in soil mixes for ornamental horticultural planting shall be as recommended by the compost manufacturer

2.6 LIMESTONE

- A. Ground limestone shall be an agricultural limestone containing a minimum of 85% total carbonates, by weight. Ground limestone shall be graded within the following limits:

Sieve Size	% Passing by Weight
No. 10	100
No. 20	90
No. 100	60

2.7 WATER

- A. Water shall be suitable for irrigation and free from ingredients harmful to seeded or sodded areas.

2.8 COMMERCIAL FERTILIZER

- A. Starter fertilizer shall be HD Scotts Starter Fertilizer or approved equal.
- B. Fertilizer shall conform to the following:
 1. When applied as a topsoil amendment, fertilizer shall have an analysis that will deliver appropriate amounts of nitrogen, phosphorus, and potassium as required to remedy deficiencies revealed by testing the topsoil.
 - a. 50% of nitrogen shall be derived from natural organic source of ureaform .
 - b. Available phosphorus shall be derived from superphosphate, bone meal, or tankage.
 - c. Potassium shall be derived from muriate of potash containing 60% potash.
- C. Fertilizer shall be delivered in manufacturer's standard container printed with manufacturer's name, material weight, and guaranteed analysis.

2.9 SUPERPHOSPHATE

- A. Superphosphate shall be composed of finely ground phosphate rock as commonly used for agricultural purposes, and containing not less than 20% available phosphoric acid. The superphosphate shall be delivered to the site in the original unopened containers, each bearing the manufacturer's guaranteed analysis. Any superphosphate which becomes caked or otherwise damaged making it unsuitable for use, will be rejected.

2.10 CELLULOSE FIBER MULCH

- A. Cellulose fiber mulch shall be composed of virgin wood, contain a green color additive, be weed free, and non-polluting, containing no germination or growth - inhibiting factors, similar to Hydro Mulch, manufactured by Conwed Corporation, St. Paul, Minnesota 55113.

2.11 WEED CONTROL

- A. Weed control for stockpiled topsoil shall be a non-selective weed killer for control of grassy and broadleaf weeds; weed control shall have short residual, allowing seeding and sodding operations to occur within 7 days of application.

PART 3 - EXECUTION

3.1 PREPARATION OF SUBGRADE

- A. Subgrade shall be examined to ensure that rough grading and all other subsurface work in lawn areas and other areas to be seeded or sodded is done prior to start of seeding or sodding.
- B. Existing subgrade shall be loosened or scarified to a minimum depth of 3 in. prior to spreading topsoil. Subgrade shall be brought to true and uniform grade, and shall be cleared of stones greater than 3 in., sticks, and other extraneous material.

3.2 SPREADING OF PLANTING SOIL

- A. Planting soil shall not be spread until it is possible to follow immediately or within 24 hours with seeding or sodding operations. If topsoil is spread prior to this time it shall be cultivated to loosen soil prior to seeding or sodding.
- B. Planting soil shall not be placed when subgrade or topsoil material are frozen, excessively wet, or excessively dry.
- C. Planting soil shall be spread in a uniform layer, to a thickness which will compact to the depth required to bring final lawn and grass surfaces to required elevation. Unless otherwise indicated minimum depth of topsoil for seeded and sodded areas shall be 6 in.
 - 1. Place approximately 1/2 the thickness of planting soil mixture required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil mixture.
- D. Grade lawn and grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future. Remove trash, debris, stones larger than 1-1/2 inches (38 mm) in any dimension, and other objects that may interfere with planting or maintenance operations.
- E. Moisten prepared lawn areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.

3.3 APPLICATION OF FERTILIZER AND CONDITIONERS

- A. Fertilizer and conditioners shall be applied at the following rates:
 - 1. Compost - as required by test results of topsoil.
 - 2. Limestone - as required by test results of topsoil.
 - 3. Fertilizer - as required by test results of topsoil.

B. Mixing with planting soil:

1. Fertilizer and conditioners shall be spread over the entire lawn areas at the application rates indicated above.
2. Materials shall be uniformly and thoroughly mixed into the top 4 in. of planting soil by discing, rototilling, or other approved method.

3.4 FINISH GRADING

A. Refer to Section 329119, LANDSCAPE GRADING.

B. Contractor shall set grade lines for Architect's review and approval.

1. Final surface of topsoil immediately before seeding and sodding shall be within + 1/2 in. of required elevation, with no ruts, mounds, ridges, or other faults, and no pockets or low spots in which water can collect. Stones, roots, and other debris greater than 1 in. in any dimension, which are visible at the surface, shall be removed and the resulting holes filled with topsoil, leaving a uniform planar surface.

C. Finish grade surface with a drag or rake. Round out all breaks in grade, smooth down all lumps and ridges, fill in all holes and crevices. Rolling with a light roller is acceptable, if the surface is scarified afterward.

1. Lawn: Compaction of topsoil for finish grade shall be 85% to 88%.

D. In the event of settlement, the Contractor shall readjust the work to required finished grade.

3.5 SEED APPLICATION

A. Seed shall be applied in two applications; by mechanical spreader.

B. First Application: Seed shall be broadcast by means of an approved mechanical spreader, to give a uniform application at the following rates:

<u>Seed Application</u>	<u>Rate lb./1,000 s.f.</u>
Seed Mixture	4.0 (unless otherwise recommended by seed supplier)

1. Seed shall be applied in two equal applications for uniform coverage; direction of travel of spreader for second pass shall be perpendicular to that of the first pass. Seeding shall not be done when it is raining or snowing, or when wind velocity exceeds 5 mph.
2. Following seeding the area shall be lightly raked to mingle seed with top 1/8 to 1/4 in. of soil. Area shall then be fine graded. Stones and other debris greater than 1 in. in any dimension which are visible on surface shall be removed.

C. Following seeding and raking, entire area shall be rolled with a hand roller having a weight of 60 to 90 lb./ft. of width, and a minimum diameter of 2 ft. Entire area shall then be watered by use of lawn sprinklers, or other approved means. Initial watering shall continue until the equivalent of a 2 in. depth of water has been applied to entire seeded surface, at a rate which will not dislodge the seed. Watering shall be repeated thereafter as frequently as required to prevent drying of the surface, until the grass attains an average height of 1/4 in. Watering methods and apparatus which may cause erosion of the surface shall not be permitted.

D. Rope off entire seeded area to prevent vehicles and pedestrians from entering area.

3.6 SODDING

- A. Edges of the sodded areas shall be smooth, and all sodded areas shall conform to the design cross sections and grade. At edges adjacent to curbs, paved areas, etc., top surface of earth in sod shall be 1/2 in. below adjacent hard surface.
- B. Sod shall be placed and all sodding operations completed within 72 hours following stripping from sod source bed.
- C. On slopes steeper than 2 to 1, sod shall be fastened in place with suitable wood pins or other approved methods, spaced at not less than 1 pin per square foot.
- D. Surface of completed sodded area shall be smooth. Sod shall be laid edge-to-edge, with tight-butted, staggered joints. Sod shall be carefully placed to insure that it is neither stretched or overlapped. Immediately after laying sod shall be pressed firmly into contact with sod bed by tamping or rolling, to eliminate air pockets. Following compaction, topsoil shall be used to fill all cracks, and excess soil shall be worked into grass with rakes or other suitable equipment. Sod shall not be smothered with excess fill soil.
- E. Immediately after sodding operations have been completed, entire surface shall be compacted with a cultipacker roller or other approved equipment weighing 100 to 160 lb./ft. of roller.
- F. Completed sod shall immediately be watered sufficiently to uniformly wet the soil to at least 1 in. below the bottom of sod bed.

3.7 CONTRACTOR MAINTENANCE

- A. Except as otherwise specified below, maintenance shall include all operations required to produce an established lawn, including but not limited to:
 - Fertilizing
 - Mowing
 - Replanting
 - Watering
 - Weeding
- B. Maintenance of seeded areas shall begin upon completion of seeding and shall continue until acceptance of the building, or until mowing as specified below is completed, or until average height of grass is 1-1/2 in., whichever occurs later.
 - 1. Watering
 - a. Week No. 1: Provide all watering necessary to keep seed bed moist at all times. Perform watering daily or as necessary to maintain moist soil to a depth of 4 in.
 - b. Week No. 2 and until acceptance of the building, or until mowing as specified below is completed, or until average height of grass is 1-1/2 in., whichever occurs later: Water as necessary to maintain adequate moisture in the upper 4 in. of soil to promote seed germination.
 - 2. Mowing
 - a. Not more than 40% of the grass leaf shall be removed during the first or subsequent mowings.
 - b. Cool season grasses shall be maintained between 1-1/2 in. and 2-1/2 in.
 - c. All clippings shall be removed.

C. Maintenance of sodded areas shall begin upon completion of sodding and shall continue for 45 days thereafter, unless sodding is not completed until after September 15, in which case maintenance shall continue until the June 15 following.

1. Watering

- a. Week No. 1: Provide all watering necessary for rooting of sod. Soil on sod pads shall be kept moist at all times. Perform watering daily or as necessary to maintain moist soil to a depth of 4 in. Watering shall be done during the heat of the day to prevent wilting
- b. Week No. 2 and Subsequent Weeks: Water as necessary to maintain adequate moisture in the upper 4 in. of soil to promote deep root growth.

2. Mowing

- a. Mowing shall not be attempted until the sod is firmly rooted and securely in place. Not more than 40% of the grass leaf shall be removed during the first or subsequent mowings.
- b. Cool season grasses shall be maintained between 1-1/2 in. and 2-1/2 in.
- c. All clippings shall be removed.
- d. After 2 mowings, the Contractor shall top dress the sod with an application of fertilizer at the rate of 1 pound of actual nitrogen per 1000 square feet.

D. After grass has sprouted, seeded areas which fail to show a uniform stand of grass shall be replanted as often as necessary to establish an acceptable stand of grass.

- 1. Scattered bare spots, shall not exceed 15 sq. in. Each.

E. Weeds and growth other than varieties of grass named in grass seed formula shall be removed. Removal may be accomplished by use of suitable herbicides or by physical removal, in which case top growth and roots shall both be removed, and bare spots exceeding specified limits shall be reseeded.

F. If lawn or grass is established in the fall and maintenance is required to continue into spring months, lawn and grass shall receive an application of lime and fertilizer in the spring. Lime and fertilizer shall be spread in a uniform layer over the entire lawn surface, at the following rates.

<u>Material</u>	<u>Application Rate</u>
Lime	100 lb./1000 sq. ft.
Fertilizer	20 lb./1000 sq. ft.

G. Remove rope barricades only after second cutting of lawns.

END OF SECTION

SECTION 329300

TREES, PLANTS, AND GROUND COVERS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
 - 1. Planting.
 - 2. Planting Soil.
- B. Alternatives: Not Applicable

1.3 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Section 329119 – LANDSCAPE GRADING
 - 2. Section 329200 – LAWNS AND GRASSES

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. American National Standards Institute, Inc. (ANSI): Z60.1 American Standard for Nursery Stock (Sponsor: American Association of Nurserymen, Inc.)
 - 2. American Society for Testing and Materials (ASTM):
 - C 136 Sieve Analysis of Fine and Coarse Aggregates
 - D 422 Particle-Size Analysis of Soils
 - E 11 Wire-Cloth Sieves for Testing Purposes
 - F 405 Corrugated Polyethylene (Pe) Tubing and Fittings
 - 3. "Hortus Third", A Concise Dictionary of Plants Cultivated in the United States and Canada, Cornell University, L.H. Bailey Hortorium, MacMillian Publishing Co., New York, NY.

1.5 SUBMITTALS

- A. Samples: The following samples shall be submitted:

<u>Material</u>	<u>Sample Size or Quantity</u>
Mulch	1 ft.3
Compost	1 ft.3
Planting soil	1 ft.3
Loam borrow	1 ft.3
Tree stake	36 in. length

- B. Manufacturer's Product Data: Manufacturer's product data shall be submitted for the following materials:

Aluminum sulfate
 Antidessicant
 Fertilizer
 Fungicide
 Herbicide
 Insecticide
 Compost
 Gator Bags

- C. Certificates: Labels from the manufacturer's container certifying that the product meets the specified requirements shall be submitted for the following materials:

Commercial fertilizer
 Limestone Certificates: Labels

- D. Test Reports: Test reports from an approved testing agency indicating compliance with the specifications shall be submitted for topsoil, peat moss, planting soil mixture, and any other materials designated by the Architect.

1.6 OWNER'S INSPECTION AND TESTING

- A. Work will be subject to inspection at all times by the Architect. The Owner reserves the right to engage an independent testing laboratory in accordance with requirements of Division 01, GENERAL REQUIREMENTS to analyze and test materials used in the construction of the work. Where directed by the Architect, the testing laboratory will make material analyses and will report to the Architect whether materials conform to the requirements of this specification.

1. Cost of tests and material analyses made by the testing laboratory will be borne by the Owner when they indicate compliance with the specification, and by the Contractor when they indicate non-compliance.
2. Testing equipment will be provided by and tests performed by the testing laboratory. Upon request by the Architect, shall provide such auxiliary personnel and services needed to accomplish the testing work.
3. Gradation of granular materials shall be determined in accordance with ASTM C 136. Sieves for determining material gradation shall be as described in ASTM E 11.

1.7 CONTRACTOR'S INSPECTION AND TESTING

- A. The Contractor shall engage an independent testing agency, experienced in the testing of agricultural soils and acceptable to the Architect, to perform the topsoil/planting soil tests and analyses specified herein. All costs associated with testing shall be the Contractor's responsibility.

1. Particle size analysis shall include the following gradient of mineral content.

<u>USDA Designation</u>	<u>Size in mm</u>
Gravel	+ 2 mm
Very coarse sand	1-2 mm
Coarse sand	0.5-1 mm
Medium sand	0.25-0.5 mm
Fine sand	0.1-0.25 mm
Very fine sand	0.05-0.1 mm
Silt	0.002-0.05 mm
Clay	< 0.002 mm

2. Chemical analysis shall include the following:

- a. pH and buffer pH
- b. percentage of organic content by oven-dried weight
- c. Nutrient levels by parts per million, including phosphorus, potassium, magnesium, manganese, iron, zinc, and calcium. Nutrient test shall include testing laboratory recommendations for supplemental additions to the soil, if necessary, based on the requirements for ornamental horticultural plants. Recommendations shall include rates at which additives are to be applied.
- d. Soluble salt by electrical conductivity of a 1:2 soil/water sample

1.8 SOURCE QUALITY CONTROL

- A. Identification of plant materials shall be as named in "Hortus Third".
- B. Selection of Plant Materials: Submit to the Architect the names and locations of nurseries proposed as sources of acceptable plant material. Inspect all nursery materials to determine that the materials meet the requirements of this section. Proposed materials shall be flagged at the nurseries by the Contractor prior to viewing by the Architect.

1. Schedule with the Architect a time for viewing plant material at the nursery. Trips to nurseries shall be efficiently arranged to allow Architect to maximize viewing time. A

minimum of six weeks shall be allowed for this viewing prior to time that plants are to be dug.

2. Architect may choose to attach seal to each plant, or representative samples.
3. Where requested by the Architect, photographs of plant material or representative samples of plants shall be submitted.
4. Viewing and/or sealing of plant materials by the Architect at the nursery does not preclude the Architect's right to reject material at the site of planting

1.9 AVAILABILITY OF PLANT MATERIAL

- A. Before changes or substitutions can be made due to unavailability of plant material, submit satisfactory evidence that the Contractor has advertised for a one month period in a trade journal such as the "American Nurseryman", with no response, or has undertaken other methods of locating plant material acceptable to the Architect.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Digging Plant Material: Plants shall not be dug at the nursery or approved source until the Contractor is ready to transport them from their original locations to the site of the work or acceptable storage location.
- B. Transportation of Plant Material: Plants transported to the project in open vehicles shall be covered with tarpaulins or other suitable covers securely fastened to the body of the vehicle to prevent injury to the plants. Closed vehicles shall be adequately ventilated to prevent overheating of the plants. Plants shall not remain in darkened enclosed trailer for more than 48 hours cumulative.
 1. Plants shall be kept moist, fresh, and protected at all times. Such protection shall encompass the entire period during which the plants are in transit, being handled, or are in temporary storage.
 2. Unless otherwise authorized by the Architect, notify the Architect at least three working days in advance of the anticipated delivery date of any plant material. A legible copy of the bill of lading, showing the quantities, kinds, and sizes of materials included for each shipment shall be furnished to the Architect.
- C. Storage: Unless specific authorization is obtained from the Architect, plants shall not remain on the site of work longer than three days prior to being planted.
 1. Plants that are not planted immediately shall be protected as follows:
 - a. Earth balls shall be kept appropriately moist and their solidity carefully preserved.
 - b. Plants shall not be allowed to dry out or freeze.
 2. Both the duration and method of storage of plant materials shall be subject to the approval of the Architect
- D. Handling of Plant Materials: Exercise care in handling plant materials to avoid damage or stress.

1.11 REJECTION OF MATERIALS

- A. Evidence of inadequate protection following digging, carelessness while in transit, or improper handling or storage, shall be cause for rejection.
- B. Upon arrival at the temporary storage location or the site of the work, plants shall be inspected for proper shipping procedures. Should the roots be dried out, large branches be broken, balls of earth broken or loosened, or areas of bark be torn, the Architect will reject the injured plant.
- C. When a plant has been rejected, remove it from the area of the work within 3 days and replace it with one of the required size and quality.

1.12 PLANTING SEASON

- A. Planting: Planting may commence as soon as the ground has thawed at the nursery and at the site of planting, and weather conditions make it practicable to work both at the nursery and at the site.
 - 1. Spring planting shall not occur any later than the following:
 - a. Deciduous Trees and Shrubs: July 15
 - b. Evergreen Trees and Shrubs: June 30
 - 2. Fall Planting: Fall planting will be permitted with the exception of oak trees. Oak trees shall not be planted in the fall.
- B. Regardless of the dates specified above, planting shall only be performed when weather and soil conditions are suitable for planting the material specified in accordance with locally accepted practice.
- C. Planting season may be extended only with the written permission of the Architect. Plant material guarantee shall be honored regardless of extended planting season.

1.13 ACCEPTANCE

- A. The Architect will inspect all work for Substantial Completion upon written notice of completion. The request shall be received at least ten calendar days before the anticipated date of inspection
- B. Acceptance of plant material by the Architect will be for general conformance to specified size, character, and quality, and shall not diminish responsibility for full conformance to the Contract Documents.
- C. Upon completion and reinspection of all repairs or renewals necessary in the judgement of the Architect, the Architect will recommend to the Owner that acceptance of the work of this Section be given.
- D. Acceptance in Part
 - 1. The work may be accepted in parts when it is deemed to be in the Owner's best interest to do so, and when permission is given to the Contractor in writing to complete the work in parts.

2. Acceptance and use of such areas by the Owner shall not waive any other provisions of this Contract.

1.14 MAINTENANCE

- A. Contractor shall maintain plant material until the completion of 12-month guarantee period and Final Acceptance of work, as described in Part 3 of this Section.

1.15 GUARANTEE

- A. Plants shall be guaranteed for a period of 12-months after the date of Acceptance by the Owner. When the work is accepted in parts, the guarantee periods shall extend from each of the partial acceptances to the terminal date of the last guarantee period. Thus, all guarantee periods terminate at one time.
- B. Plants shall be healthy, free of pests and disease, and in flourishing condition at the end of the guarantee period. Plants shall be free of dead and dying branches and branch tips, and shall bear foliage of normal density, size, and color.
- C. Replace dead plants and all plants not in a vigorous, thriving condition, as determined by the Architect during and at the end of the guarantee period, without cost to the Owner, as soon as weather conditions permit and within the specified planting period.
 1. Replacements shall closely match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this Specification.
 2. Make all necessary repairs due to plant replacements. Such repairs shall be done at no extra cost to the Owner.
 3. The guarantee of all replacement plants shall extend for an additional 12-month period from the date of their acceptance after replacement. In the event that a replacement plant is not acceptable during or at the end of the said extended guarantee period, the Owner may elect one more replacement or credit for each item.
- D. At the end of the guarantee period, and no less than five days prior to final inspection, staking and guying materials, and tree wrap and ties shall be removed from the site.

1.16 FINAL INSPECTION AND FINAL ACCEPTANCE

- A. At the end of the 12-month guarantee period, the Architect will, upon written notice of end of guarantee period inspect the work for Final Acceptance. Request shall be received at least ten calendar days before the anticipated date for Final Inspection.
- B. Upon completion and reinspection of full repairs or replacements necessary in the judgment of the Architect at that time, the Architect will recommend to the Owner that Final Acceptance of the Work of this Section be given.

PART 2 - PRODUCTS

2.1 PLANTS

- A. Except as otherwise specified, size and grade of plant materials shall conform to ANSI Z60.1. In no case shall ball size be less than 11 in. in diameter for each inch of caliper.
- B. Plants shall have outstanding form; symmetrical, heavily branched with an even branch distribution, densely foliated and/or budded, and a strong, straight, distinct leader where this is characteristic of species. Plants shall possess a normal balance between height and spread. The Architect will be the final arbiter of acceptability of plant form.
- C. Plants shall be healthy and vigorous, free of disease, insect pests and their eggs, and larvae.
- D. Plants shall have a well-developed fibrous root system.
- E. Plants shall be free of physical damage such as scrapes, broken or split branches, scars, bark abrasions, sunscalds, fresh limb cuts, disfiguring knots, or other defects. These defects shall not interrupt more than 25% of the circumference of the plant cambium.
- F. Plants shall meet the sizes indicated on the Plant List. Plants larger or smaller than specified may be used only if accepted by the Architect.
- G. Where a size or caliper range is stated, at least 50% of the material shall be closer in size to the top of the range stated.
- H. Plants shall not be pruned before delivery.
- I. All trees and shrubs shall be labeled. Labels shall be durable and legible, stating the correct plant name and size in weather-resistant ink or embossed process. Labels shall be securely attached to all plants prior to delivery to the site, being careful not to restrict growth.
- J. Plants indicated as "B&B" shall be balled and burlapped.
- K. Container grown plants shall be well rooted and established in the container in which they are growing.
- L. Perennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom.

2.2 PLANTING SOIL

- A. Existing Topsoil
 - 1. Existing topsoil from on-site source(s) may be used for planting soil, to the extent available, if it meets the requirements of this Section for planting soil, or if approved by the Architect.
- B. Planting Soil
 - 1. Planting soil shall be composed of a natural, fertile, friable soil typical of cultivated topsoils of the locality, suitable for the germination of seeds and support of vegetative

growth, with additives, if required, to achieve particle distribution and organic content specifications. Topsoil shall be taken from a well-drained, arable site, free of subsoil, large stones, earth clods, sticks, stumps, clay lumps, roots, other objectionable, extraneous matter or debris nor contain toxic substances. Planting soil shall have a pH value between 5.5 and 6.5 and organic matter content of 5 to 10% of total dry weight

2. Planting soil shall have the following mechanical analysis (see paragraph 1.06 for particle sizes):

Approximate Particle Distribution

Gravel	Less than 10%
Coarse to medium sand	55 – 65%
Fine to very fine sand	15 – 25%
Silt	10 – 20%
Clay	15 – 20%

3. Minimum planting soil nutrient levels shall be: Nitrogen @ 5% average of organic matter, Phosphorus @ .02 to .05% average of total soil content, Potassium @ 1.2% average of total soil content.
4. The Contractor shall provide the Architect with planting soil test results, as specified in Paragraph 1.06, before the start of planting operations. If planting soil does not fall within the required particle distribution, organic content, or pH range, it shall be adjusted to meet the specifications through the addition of sand, compost, limestone, or aluminum sulfate to bring it within the specified limits.
5. Planting soil for ericaceous shrubs shall have a pH value range of 4.5 to 5.0

2.3 COMPOST

- A. Compost shall be derived from organic wastes such as food and agricultural residues, animal manures, mixed solid waste and biosolids (treated sewage sludge) 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.

1. Compost shall have the following properties:

<u>Parameters</u>	<u>Range</u>
pH	5.5 – 8.0
Moisture Content	35% - 55%
Soluble Salts	<4.0 mmhos (dS)
C:N ratio	15 – 30:1
Particle Size	< 1"
Organic Matter Content	> 50%
Bulk Density	< 1000 lbs./cubic yard
Foreign Matter	< 1% (dry weight)

2. Compost generator shall also provide minimum available nitrogen and other macro and micro nutrients to determine fertilizer requirements.

3. Compost shall be "AllGro", distributed by AllGro, 4 Liberty Lane West, Hampton, NH 03842; "Agresoil", distributed by Agresource, 100 Main Street, Amesbury, MA 01913; or approved equal.
4. Guidelines for quantity of compost required to achieve suitable soil organic content in soil mixes for ornamental horticultural planting shall be as recommended by the compost manufacturer.

2.4 WATER

- A. Water shall be suitable for irrigation and shall be free from ingredients harmful to plant life.

2.5 FERTILIZER

- A. Commercial grade complete fertilizer of neutral character, consisting of fast and slow release nitrogen, 50% of nitrogen shall be derived from natural organic source of ureaform phosphorus and potassium in the following composition.
- B. Controlled-release fertilizer shall be granular consisting of 50% water and insoluble nitrogen, phosphorus and potassium.

2.6 MULCH

- A. Mulch shall be a 100% fine-shredded pine bark, of uniform size.

2.7 STAKING AND GUYING MATERIALS

- A. As indicated on Drawings.

2.8 ANTIDESICCANT

- A. Antidesiccant shall be an emulsion specifically manufactured for plant protection which provides a protective film over plant surfaces which is permeable enough to permit transpiration. Antidesiccant shall be delivered in manufacturer's sealed containers and shall contain manufacturer's printed instructions for use.

PART 3 - EXECUTION

3.1 EXAMINATION OF SUBGRADE

- A. Examine subgrade and rough grading before planting. Alert Architect to unacceptable rough grading or subgrade.

3.2 DRAINAGE OF SOILS

- A. Test drainage of five plant beds and pits chosen by the Architect shall be done by filling with water twice in succession. The time at which water is put into the pit or bed for a second filling

shall be noted. Architect shall then be notified of the time it takes for pit or bed to drain completely. Planting operations shall not proceed until Architect has reviewed test drainage results.

- B. Notify the Architect in writing of all soil or drainage conditions that he considers detrimental to growth of plant material. Submit proposal and cost estimate for correction of the conditions for Architect's approval before starting work.

3.3 LAYOUT OF PLANTING AREAS

- A. Individual trees shall be located in the field as indicated on the Drawings for Architect's approval prior to planting. Contractor shall provide one foreman, one loader with operator and two laborers to work with Architect in the field to determine the final location and orientation of each tree prior to planting. It is anticipated that this process may take several days to complete. Contractor shall plan to have this layout crew available to work with Architect at a slow and deliberate pace in order to achieve the desired results.
- B. Individual shrub locations and outlines of shrub and ground cover areas to be planted shall be staked by the Contractor in ample time to allow inspection by the Architect.
- C. Individual vines and groundcovers to be planted shall be laid out in plant beds by the Contractor in ample time to allow inspection by the Architect.
- D. Digging shall not begin until locations are approved by the Architect.
- E. Location of trees shall be staked using color coded stakes. A different stake color shall be used for each tree species.

3.4 PREPARATION OF SUBGRADE

- A. Subgrade of planting areas shall be loosened or scarified to a minimum depth of 3 in. prior to spreading planting soil. Subgrade shall be brought to true and uniform grade and shall be cleared of stones greater than 2 in., sticks, and other extraneous material.

3.5 PLANT PIT EXCAVATION

- A. Planting pits for trees and shrubs shall be excavated to the depth and dimension indicated on the Drawings.
- B. Excavation shall not begin until locations are approved by the Architect.

3.6 SPREADING OF PLANTING SOIL

- A. Planting soil shall be spread and placed to required depths.
- B. Surfaces shall be graded and smoothed, eliminating all sharp breaks by rounding, scraping off bumps and ridges, and filling in holes and cuts.

3.7 PLANTING

- A. Walls of plant pits shall be dug so that they are sloped and scarified.
- B. Plants shall be set as indicated on Drawings. Plants shall have same relationship to finished grade as in the nursery.
- C. Plants shall be turned to the desired orientation when required by Architect.
- D. Containerized plants shall be removed from container taking care not to damage roots. The side of the root ball shall be scarified to prevent root-bound condition and plant positioned in planting pit.
- E. Planting shall be positioned in center of planting pit, set plumb, and rigidly braced in position until all planting soil has been tamped solidly around the ball.
- F. Pits shall be backfilled with planting soil. Soil shall be worked carefully into voids and pockets, tamping lightly every 6 in.
 - 1. When pit is two-thirds full, plants shall be watered thoroughly, and water left to soak in before proceeding.
 - 2. At this time, ropes or strings on top of ball shall be cut and shall be pulled back. Burlap or cloth wrapping shall be left intact around ball except that portions of wrap that are exposed at top of ball shall be turned under and buried. Non-biodegradable ball wrapping and support wire shall be totally removed from ball and planting pit.
 - 3. Wire baskets shall be completely cut away from sides of root ball, and removed from pit. Bottom of basket may remain.
 - 4. Remove nursery plant identification tags.
- G. Backfilling and tamping shall then be finished and a saucer formed around plant pits as indicated on the Drawings.
- H. Saucer shall be filled with water and water left to soak in. Saucer shall then be filled with water again.

3.8 APPLICATION OF FERTILIZER

- A. Fertilizer shall be applied when planting pits are backfilled two-thirds full. Fertilizer application shall be of the type, rate, and timing recommended by fertilizer manufacturer.

3.9 STAKING AND GUYING

- A. Each tree shall be staked or guyed immediately following planting. Plants shall stand plumb after staking or guying. Staking or guying shall not be used as a means to straighten trees.

3.10 MULCHING

- A. Mulch shall be applied as follows (entire area listed shall be mulched):

<u>Plant Type</u>	<u>Mulch Area</u>	<u>Mulch Depth, in.</u>
Tree	Saucer	2
Shrub	Saucer or Bed	2
Perennial	Bed	2
Ground Cover	Bed	2

3.11 PRUNING

- A. Each tree and shrub shall be pruned to preserve the natural character of the plant. Pruning shall be done after delivery of plants and after plants have been inspected and approved by the Architect. Pruning procedures shall be reviewed with Architect before proceeding.

3.12 MAINTENANCE OF PLANTING

- A. Maintenance shall begin immediately after each plant is planted and shall continue through 12-month guarantee period until Final Acceptance.
1. The maintenance of all replacement plants shall continue for an additional 12-month period from the date of their acceptance after replacement.
 2. Maintenance includes all plants and turf installed within the scope of the project, regardless of property lines, including but not limited to street tree planting within grates, planting within the MWRA property, and within the DCR site.
- B. Maintenance shall consist of pruning, watering, cultivating, weeding, mulching, removal of dead material, repairing and replacing of tree stakes, tightening and repairing of guys, repairing and replacing of damaged tree wrap material, resetting plants to proper grades and upright position, and furnishing and applying such sprays as are necessary to keep plantings free of insects and disease, and in a healthy growing condition.
1. Watering for establishment- contractor to be responsible for watering for all plants including monitoring and filling of gator bags on trees, hand watering trees and turf in areas not covered by the irrigation system as needed, and monitoring and adjusting the irrigation system as needed.
- C. Planting areas shall be kept free of weeds, grass, and other undesired vegetative growth.

END OF SECTION

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

Add Alternate No. 1

Add Alternate No. 2

Deduct Alternate No.

(this space intentionally left blank)

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 a subcontractor has title and has authorized to Contractor to transfer title to the Owner, less (1) a retention based an 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 substantial 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 the fair value of its claim against the Contractor and of the cost of the 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 effect 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 which 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 payments 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 the extent of any such payment.
- J. The Owner shall not include in any direct payment made 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 Welfare and Pension Fund Contributions as determined by the Commissioner under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 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 individual 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:

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

Contractor

By: _____

(Name/Title)

Approved as to Matter of Form:

Juliana deHaan Rice, Town Counsel

Certification: I hereby certify that an Appropriation in the amount of the Contract is available.

Ruth Lewis, Comptroller

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 _____ 19____, 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 _____, 19__.

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

LABOR AND MATERIALS PAYMENT 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

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 _____, 19____, a copy of which is hereto attached and made a part hereof for the construction of:

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 _____ 19__.

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

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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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

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Article Number	Title
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6	CONTRACTOR'S RESPONSIBILITIES
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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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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