



TOWN OF ARLINGTON

730 Massachusetts Avenue
Arlington, MA 02476

INVITATION FOR BIDS (IFB)

Foot of the Rocks

IFB #24-46

Designer:
Ray Dunetz Landscape Architecture, Inc.
179 Green St
Boston, MA 02130
617-524-6265

October 17, 2024

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**SECTION 00 10 00
INVITATION TO BID**

Sealed bids, in accordance with M.G.L. c.30 §39M, for:

**Foot of the Rocks
IFB #24-46**

(hereinafter the "Project"), and in accordance with the bid and contract documents prepared by:

Ray Dunetz Landscape Architecture, Inc.

(hereinafter the "Designer"),

will be received by the TOWN OF ARLINGTON acting through its Town Manager, hereinafter the "Town", at the Office of the Town Manager/Purchasing Department, Robbins Memorial Town Hall Annex – 2nd Floor, 730 Massachusetts Avenue, Arlington, MA 02476, no later than the time and date specified below, at which time and place they will be publicly opened and read aloud. Any bid received after the time and date specified will be set aside and not considered.

Bid and contract documents will be available for download beginning **October 17, 2024, at 11:00 a.m.** from www.arlingtonma.gov/purchasing. Bidding procedures and award of the contract shall be in accordance with the applicable provisions of M.G.L. c.30, §39M, as amended, and c.149, §§44A through 44L, inclusive, as amended.

A pre-bid conference and tour of the site will be held on Thursday, **October 24, 2024, at 3:00 p.m.** at the site, located on Massachusetts Avenue at Lowell Street, Arlington, MA. Bidders are encouraged but not required to attend.

Questions may be submitted in writing and sent via email to Mary Ellen De Natale, **Purchasing Agent for the Town of Arlington**, at mdenatale@town.arlington.ma.us and, to be given consideration, must be received at least **nine (9) calendar days** prior to the scheduled bid opening. A written addendum answering questions will be issued if necessary and posted to www.arlingtonma.gov/purchasing.

General Bids due: **November 7, 2024, 2:00 p.m.**

The Project consists in general of construction of a commemorative public plaza with retaining walls, permeable concrete unit pavers, granite seating and stairs, and planting and associated sidewalk and site amenities.

The project may be funded in part by the **American Rescue Plan Act** of 2021 (ARPA). The attention of Bidders is directed to the terms and conditions of the **ARPA Addendum to the Town of Arlington Standard Contract General Conditions**, provided in the bid and

contract documents, which contains supplemental contract provisions applicable to projects funded by ARPA.

It is the intention of the Town to award the contract to the responsive and responsible bidder offering the lowest price. The Town Manager reserves the right to accept or reject any and all bids, wholly or in part, or to waive minor informalities in any or all bids, if it be in the public interest so to do.

A bid deposit in an amount not less than five percent (5%) of the bid amount, including any and all alternates, shall be submitted with each bid. Bid deposits shall be in the form of a) cash, b) a Certified Check on, or a Treasurer's or Cashier's Check issued by, a responsible bank or trust company and payable to the Town of Arlington, or c) a bid bond in a form satisfactory to the Town, with a surety company qualified to do business in the Commonwealth of Massachusetts and conditioned upon faithful performance by the principal of the agreements contained in the Bid. Return of bid deposits will be in accordance with the provisions of the applicable General Laws.

The successful bidder will be required, within 10 days after presentation thereof, to execute a contract and furnish a **Labor and Materials or Payment Bond in an amount equal to 50%** of the total contract price. Such bond shall be of a surety company qualified to do business under the laws of the Commonwealth of Massachusetts.

Massachusetts Prevailing Wages, as determined by the Director of the Department of Labor Standards of the Commonwealth of Massachusetts in accordance with M.G.L. c.149, §§ 26 to 27H, inclusive, apply to the Project. The wage sheets applicable to the Project are included in the bid documents.

Attention of the bidders is directed to the requirements of Title I, Article 16, of the Town of Arlington's By-Laws with regard to Women Work Force Participation and Equal Employment Opportunity, all of which are incorporated into the Contract Documents by reference herein.

The Town of Arlington is exempt from sales tax, for which reason bidders should not include sales taxes in figuring or in reference to any bid.

No bidder may withdraw his bid for a period of thirty (30) days, Saturdays, Sundays and legal holidays excluded, after the actual date of the opening thereof.

James Feeney, Town Manager
TOWN OF ARLINGTON, MASSACHUSETTS
October 17, 2024

END OF INVITATION TO BID

SECTION 00 20 00
INSTRUCTIONS TO BIDDERS

A. PREPARATION OF BIDS

1. Sealed bids for project **#24-46 Foot of the Rocks**, Arlington, Massachusetts, will be received at the time and place as stated in the "**Invitation to Bid**" and in accordance with bid documents prepared by **Ray Dunetz Landscape Architecture, Inc.**
2. Bids must be submitted on the forms included in the bid documents and signed by the bidder. All blank spaces provided on the bid forms shall be filled in with ink or typewritten. Where space is provided, sums shall be expressed in both words and numerals. In case of discrepancy between the two, the written words shall govern.
3. Each bidder shall acknowledge any and all required alternates on the Form for General Bid by entering the dollar amount of addition or subtraction necessitated by each alternate.
4. Materials and equipment purchased for permanent installation in the project are exempt from Massachusetts Sales and Use Tax. The Town's exemption certificate number will be furnished to the selected contractor. Each bidder shall take this exemption into account in calculating his bid price.
5. No interlineations, additions, alterations, or erasures shall be made on the forms.
6. Every bid shall be accompanied by a bid deposit in the form of a) cash, b) a certified check on, or a treasurer's or cashier's check issued by, a responsible bank or trust company payable to Town of Arlington, or c) a bid bond in a form satisfactory to the Town, with a surety company qualified to do business in the Commonwealth of Massachusetts and satisfactory to the Town and conditioned upon faithful performance by the principal of the agreements contained in the bid. The amount of the bid deposit shall be not less than five per cent (5%) of the value of the bid.
7. All bid deposits of bidders, except those of the three lowest responsible and eligible bidders, shall be returned within five (5) days, Saturdays, Sundays, and legal holidays excluded, after the opening of the general bids. The bid deposits of the three lowest responsible and eligible bidders shall be returned upon the execution and delivery of the contract, or, if no award is made, upon the expiration of the time prescribed by Massachusetts General Law. If any general bidder fails to perform his agreement to execute a contract and furnish a labor and materials or payment bond as stated in his general bid, his bid deposit shall become and be the property of the Town of Arlington.
8. The bid form shall be properly executed and enclosed with the bid deposit in an envelope sealed and plainly marked with the bidder's name, address, and phone

number and the words “**#24-46 Foot of the Rocks**” and delivered to the Office of the Town Manager/Purchasing Department located at the Robbins Memorial Town Hall Annex, Second Floor, 730 Massachusetts Avenue, Arlington, MA, 02476.

9. If the bid is mailed, the aforementioned sealed envelope shall be enclosed in a second envelope identified with the above markings and mailed to the place of bid.
10. The Drawings, Specifications and Contract Documents will be available as stated in the "Invitation to Bid".

B. BIDDER'S REPRESENTATION

1. Each general bidder by making a bid represents that:
 - a. The bidder has carefully examined and understands the contract documents and the bid is made in accordance therewith.
 - b. The bidder has visited the site and locality where the work is to be performed and has made such independent investigations as the bidder deems necessary to identify the federal, state, and local laws, ordinances, rules, and regulations and the conditions affecting cost, progress, or performance of the work.
 - c. The bidder will assign to the Project a full-time project superintendent whose qualifications are acceptable to both the Town and Designer.
 - d. The bid includes all of the work delineated in the bid set drawings and specifications.
2. Failure of any bidder to thoroughly examine the contract documents, or to visit and examine the site, shall in no way relieve the bidder of any obligation with respect to his bid or of any responsibility assigned the bidder under the contract. No claim for additional compensation or extension of time will be allowed by the Town because of lack of contractor's full knowledge of existing conditions or difficulties attending the execution of this contract.

C. BIDDER'S QUALIFICATIONS

1. The Town may make such investigations as it deems necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish to the Town all such information and data for this purpose as the Town may request. The Town reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Town that such bidder is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein. Conditional bids will not be accepted.
2. In order to demonstrate the bidder's ability to complete the work in accordance with the bid and contract documents, each bid **must include**:

- a. any and all citations and/or violations issued by regulatory agencies and/or judgments against bidder from a court of law,
- b. all assessed penalties or liquidated damages, and the project in which they occurred,
- c. any and all contract terminations, and
- d. at least three references from similar projects completed in the past five (5) years.

D. NON-DISCRIMINATION IN EMPLOYMENT

1. The Contract for work under this proposal will obligate contractors and subcontractors not to discriminate in employment practices. Bidders must, if requested, submit a compliance report concerning their employment practices and policies in order to maintain their eligibility to receive the award of the contract.

E. PRE-BID CONFERENCE

1. An optional pre-bid conference will be held at the site on the date and time specified in the Invitation to Bid.

F. REQUESTS FOR INTERPRETATION

1. Bidders are urged to communicate to the Designer in writing any ambiguity, inconsistency, or error which they may discover upon examination of the Contract Documents, the site, and local conditions.
2. Interpretation of the provisions of the contract documents will be made by the Designer upon written request of any bidder, provided that such request is received at least **nine (9) calendar days prior to the date of the scheduled bid opening**, and that the Designer considers such interpretation to be of sufficient importance.
3. 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. Oral or telephone interpretations will not generally be made, and if made, shall be strictly informal and not legally valid or binding.
4. Interpretation, clarification, or change in the contract documents shall be in the form of an addendum which will become part of the contract documents. **Addenda will be posted electronically to the Town's website at www.arlingtonma.gov/purchasing.** 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 that have been issued and to secure any needed copies before submitting a bid.
5. **Bidders shall acknowledge each and every addendum in the spaces provided on the bid form.** Failure of a bidder to do so may result in rejection of that bidder's bid.

G. MODIFICATION OR WITHDRAWAL OF BIDS

1. Bidders may correct, modify, or withdraw a bid by written notice received by the Town prior to the time and date established for the bid opening. Bid modifications must be clearly written and easily understandable and submitted in a sealed envelope plainly labeled "Modification No.____." Each modification must be numbered in sequence and must reference the original Invitation for Bids.
2. No bidder shall withdraw his bid for a period of **thirty (30) days**, Saturdays, Sundays and legal holidays excluded, after the opening of bids.

H. SUB-CONTRACTS

1. Work shall be performed by the general contractor without recourse to sub-contracts whenever possible.

I. PAYMENT BOND

1. The successful bidder shall submit to the Town, within **ten (10) days** of notification of contract award, a **labor and materials or payment bond at least equal to 50%** of the contract price and of a surety company licensed by the Commonwealth of Massachusetts Division of Insurance and satisfactory to the Town, provided further, that if there is more than one surety company, the surety companies shall be jointly and severally liable. The premium on the bond(s) shall be included in the base bid.

J. TIME FOR CONSTRUCTION / PROJECT SCHEDULE

1. The contractor shall commence work under this contract upon issuance of a written Notice to Proceed.
2. Time is of the essence. Work shall begin at the site and continue, without interruption and with all practical dispatch and regularity, in order to reach substantial completion by **June 30, 2025**.
3. If the contractor shall fail to achieve the substantial completion date, the contractor shall be required to pay the Town, not as penalty but as liquidated damages, the sum of **\$100** per calendar day for each day extending beyond the date of substantial completion.

K. BUILDING PERMIT

1. A building permit is not required for this project.
2. The general bidder is responsible for any other permits, fees, inspections, etc., as may be required by State and local authorities.

L. GENERAL BID LAWS

1. Commonwealth of Massachusetts General Bid Laws Section 149, Sections 44A through 44J inclusive, and Chapter 30, Section 39M, are incorporated herein by reference. Any inconsistency between the Invitation to Bid, Instructions to Bidders, Bid Forms, Conditions of the Contract, and any other Contract Documents and these statutes, or any other applicable statutes, by-laws, or regulations existing as of the date on which the bids are received, shall not be grounds for invalidating the bidding procedures, but where required by law, such statute, by-law, or regulation shall be deemed to govern.

M. PREVAILING WAGES

1. Massachusetts Prevailing Wages, as determined by the Director of the Department of Labor Standards of the Commonwealth of Massachusetts in accordance with M.G.L. c.149, §§ 26 to 27H, inclusive, apply to the Project. The wage sheets applicable to the Project are included in the bid documents.

N. AWARD OF CONTRACT

1. The contract will be awarded to the lowest responsible and eligible bidder in accordance with Massachusetts General Laws.
2. The Town reserves the right to accept or reject any and all bids, wholly or in part, or to waive minor informalities in any or all bids, if it be in the public interest so to do.
3. The Town reserves the right to reject any bid if it determines that such bid does not represent the bid of a person or firm competent to perform the work as specified, or if fewer than three bids are received, or if bid prices are not acceptable without further competition.
4. The Town may consider informal and may reject any bid which is not prepared and submitted in accordance with all requirements of the bid documents, or which contains erasures, alterations, additions, errors or irregularities of any kind, or which contains proposed prices for any class or item of work which are, in the judgment of the Town, substantially less or more than the actual cost to complete the work; provided, however, that the Town reserves the right to waive any and all informalities as to form. Matters as to substance shall not be waived.
5. Subject to the provisions of applicable laws, if the bid forms, specifications, or any other bid documents require submission of special information or data to accompany bids for any trade, if applicable, and any bidder neglects to furnish such information or data with its bid, the Town may reject the bid of such bidder as incomplete; provided, however, that the Town reserves the right to deem any such omission as an informality for which such bid will not be rejected, and to subsequently receive such information or data prior to award of the contract.

O. COMPLEMENTARY DOCUMENTS

1. The INVITATION TO BID, included herewith, is complementary to this document and shall be carefully reviewed by bidders for specific instructions which are not repeated herein.

P. FOREIGN CORPORATIONS

1. The attention of bidders is called to Massachusetts General Laws Chapter 30, Section 39L, as amended by The Acts of 1967, Chapter 3, under which an Awarding Authority may not enter into a contract with a foreign corporation (a corporation not organized under the Laws of Massachusetts), nor approve a foreign corporation as a contractor, unless the foreign corporation has filed with the Awarding Authority 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.

Q. PUBLIC SAFETY AND CONVENIENCE

1. If the work of this project is to be performed on TOWN properties which are utilized by pedestrians, the selected contractor shall furnish, install, maintain, and move all warning devices, barricades, signs, flares, bridging materials, special apparel, and other safety measures and controls necessary for the protection of motorists, pedestrians, and his own personnel. When, in the judgment of the Town, construction operations constitute a hazard to traffic in the area, the contractor may be required to suspend operations during certain hours.

R. OSHA TRAINING

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

S. MASSACHUSETTS SALES AND USE TAX

1. Materials purchased for permanent installation in the work will be exempt from the Massachusetts Sales and Use tax. Each bidder shall consider this exemption in calculating his bid for the work.

END OF INSTRUCTIONS TO BIDDERS

**SECTION 00 41 00
FORM FOR GENERAL BID**

#24-46 FOOT OF THE ROCKS

TOWN OF ARLINGTON, MASSACHUSETTS

Proposal of _____(hereinafter the "Bidder")

- () a corporation organized and existing under the laws of the State of _____
- () a joint venture _____
- () a limited liability company _____
- () a partnership _____
- () an individual doing business as _____

(indicate corporation, partnership, joint venture, limited liability company, or individual as applicable)

To the Town of Arlington (hereinafter the "Owner"):

The undersigned Bidder, having examined the Contract Documents, as prepared by **Ray Dunetz Landscape Architects**, and the site and being familiar with all of the conditions surrounding the construction of the proposed project, including the availability of materials and labor, hereby proposes to furnish all labor, materials, tools, and equipment necessary for the construction of site improvements, in accordance with the Contract Documents, within the time set forth therein, for **#24-46 Foot of the Rocks**, located at **Massachusetts Avenue at Lowell Street** in the Town of Arlington, Massachusetts.

The undersigned Bidder declares that the only parties interested in this Bid as principals are as stated; that the bid is made without collusion with any other person, firm, or corporation; and that no officer or agent is directly or indirectly interested in this Bid.

The undersigned Bidder understands that the information relative to existing structures, apparent and latent conditions, and natural phenomena as furnished to him on the Contract Drawings or in the Contract Documents or by the Owner or the Designer carries no guarantee expressed or implied as to its completeness or accuracy and he has made all due allowance therefor.

The undersigned Bidder agrees that the amount of the bid security deposited with this Bid fairly and reasonably represents the amount of damages the Owner will suffer due to failure of the Bidder to execute a Contract and furnish satisfactory bonds as stipulated herein, and he further understands that should he so fail, the Owner shall have the right to retain as liquidated damages the entire amount of the bid security.

In submitting this Bid the undersigned Bidder agrees to hold this Bid open for thirty (30) calendar days.

Bidder hereby agrees to commence and complete work under this contract on or before the dates to be specified in the written "Notice to Proceed" from the Owner, as stipulated in these Contract Documents. The undersigned Bidder further understands that the Contract Documents for which his bid is being submitted establish that liquidated damages in the amount of **\$100.00** per calendar day shall be applied for breach of Contract in accordance with the provisions of the CONTRACT AGREEMENT.

The Bidder intends to use the following subcontractors. Bidder acknowledges that the Town and Designer must be notified in writing of any change of subcontractors whether before commencement of work or during implementation of the Contract.

The undersigned Bidder acknowledges receipt of the following Addenda:

No.	_____	Date:	_____
No.	_____	Date:	_____
No.	_____	Date:	_____
No.	_____	Date:	_____
No.	_____	Date:	_____

PROPOSED BASE BID CONTRACT PRICE

The undersigned Bidder agrees to perform the Base Bid work described in the plans and specifications for the total price of:

_____ Dollars and _____ Cents
(in words)

\$ _____
(in figures)

Bid Prices to be shown in both words and figures. In case of discrepancy, the price shown in words will govern.

The undersigned offers the following information as evidence of its qualifications to perform the work as bid upon according to all the requirements of the plans and specifications.

1. Have been in business under the present name for _____ years and engaged in work similar in nature to the work of this contract for _____ years.
2. List any and all citations and/or violations issued by regulatory agencies and/or judgments against bidder from a court of law. **Type N/A if none.**
3. List any and all assessed penalties or liquidated damages, and the project in which they occurred. **Type N/A if none.**
4. List any and all contract terminations. **Type N/A if none.**
5. The names and addresses of all persons interested in the bid (if made by a partnership or corporation) as Principals are as follows: *(Attach additional sheets if necessary.)*

Name	Address
_____	_____
_____	_____
_____	_____
_____	_____

6. References: Provide at a minimum three references for completed work, one of which must be for a contract completed in the past five years that is similar, or larger, in size and scope to the work described in the bid documents. Include references for all contracts performed within the past two years that are similar in size and scope to the work specified in the bid documents. *Attach additional sheets if necessary.*

Owner Name:

Owner Address:

Contact Name:

Phone:

Email:

Description and date(s) of supplies and/or services provided:

Owner Name:

Owner Address:

Contact Name:

Phone:

Email:

Description and date(s) of supplies and/or services provided:

Owner Name:

Owner Address:

Contact Name:

Phone:

Email:

Description and date(s) of supplies and/or services provided:

Owner Name:

Owner Address:

Contact Name:

Phone:

Email:

Description and date(s) of supplies and/or services provided:

Owner Name:

Owner Address:

Contact Name:

Phone:

Email:

Description and date(s) of supplies and/or services provided:

If the Bidder is a foreign corporation and is selected for the work referred to above, it shall, in accordance with M.G.L. c.30, § 39L, furnish to the Owner a certificate of the Secretary of State stating that the corporation has complied with all requirements under M.G.L. c.156D and the date of such compliance, and that it has filed all required annual reports.

The undersigned certifies that, if selected as Contractor, he will within ten (10) days, Saturdays, Sundays, and legal holidays excluded, after presentation thereof by the Owner, execute the Contract and furnish the Owner with a satisfactory Labor and Materials/Payment Bond as set forth in the INSTRUCTIONS TO BIDDERS.

The undersigned certifies that he is able to furnish labor that can work in harmony with Owner's separate contractor(s) and all other elements of labor employed or to be employed on the work and that he will comply fully with all laws and regulations applicable to awards made subject to MGL c.149, § 44A.

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

The undersigned hereby certifies that all employees to be employed at the worksite shall have successfully completed a course in construction safety and health approved by the OSHA that is at least **10 hours** in duration at the time the employee begins work and that said undersigned shall furnish documentation of successful completion of said course with the first certified payroll report for each employee.

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

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

The undersigned Bidder also agrees to perform any extra work not covered by the Contract, such work and the prices for such work to be approved by the Designer and agreed in writing by the Owner, and the Contractor shall accept such prices as full compensation for any such extra work in accordance with the GENERAL CONDITIONS. Submitted by:

Date: _____

Bidder's Company/Firm Name

Signature of Person Authorized to Sign on Behalf of Bidder

*Affix Corporate Seal Here
(if a corporation)*

Printed Name & Title

Business Address

City, State, Zip

Business Phone/Fax

Contact Person/Email Address

CERTIFICATE OF NON-COLLUSION

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

Signature of individual submitting bid or proposal

Name of business

**THIS NON-COLLUSION FORM MUST BE SIGNED AND SUBMITTED WITH
THE BID OR PROPOSAL**

TAX COMPLIANCE CERTIFICATION

Pursuant to M.G.L. c. 62C, §49A, the undersigned, acting on behalf of the Contractor, certifies under the penalties of perjury that the Contractor is in compliance with all laws of the Commonwealth of Massachusetts relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

Signature of Individual submitting bid or proposal

Name of business

END OF FORM FOR GENERAL BID

SECTION 00 52 00

TOWN OF ARLINGTON STANDARD CONTRACT



TOWN OF ARLINGTON
STANDARD CONTRACT DOCUMENT

Contract ID:

Contractor Legal Name (and d/b/a):	Town Department: Department Head:
Contractor Address:	Town Department Mailing Address:
Contractor Vendor ID (if applicable):	Billing Address (if different):

Account	Fund	Department ID	Project	Not to Exceed Amount:	Actual Amount
				\$	\$

Scope of work and contract details

Contract Start Date	Contract End Date	Option to Renew (Y/N)	Renewal Years

<p style="text-align: center;">Town Comptroller</p> <p>APPROVED AS TO THE AVAILABILITY OF APPROPRIATION PURSUANT TO ARTICLE 12 OF THE GENERAL CONDITIONS</p>	<p style="text-align: center;">CONTRACTOR</p> <p>AGREES TO PROVIDE THE GOODS OR SERVICES IN ACCORDANCE WITH THE CONTRACT</p>	<p style="text-align: center;">Awarding Authority/Official (ATTACH LETTER OF AWARD)</p>
\$	Title:	
Signature:	Signature:	Signature:
Date:	Date:	Date:
APPROVED AS TO FORM		
Signature:		
Town Counsel		



TOWN OF ARLINGTON
STANDARD CONTRACT GENERAL CONDITIONS

Article 1. Definitions.

1.1 The following terms in these Contract Documents shall be construed as follows:

1.1.1 “Town” shall mean the Town of Arlington, Massachusetts.

1.1.2 “Contract” and “Contract Documents” shall include, in the following hierarchy of document precedence, as applicable: the Town’s Standard Contract Document; these Standard Contract General Conditions; the Invitations for Bids, Requests for Proposals, or other solicitations; the Contractor’s responses including Contractor Certifications and Applications, excluding any language stricken by Town as unacceptable and including any negotiated statements of work contemplated by the solicitation; and Performance Bonds, which documents are incorporated herein by reference.

1.1.3 “Contractor” shall mean the individual, partnership, corporation or other entity to which this Contract is awarded.

1.1.4 “Official” shall mean the awarding authority/officer acting on behalf of the Town in the execution of the Contract.

Article 2. Performance.

2.1 The Contractor shall conform to all determinations and directions, in accordance with provisions of this Contract, of the Official concerning all questions which may arise relating to the performance of services under this Contract.

2.2 The Contractor shall, upon written request of the Official, remove from Town premises and replace all individuals in the Contractor’s employ whom the Official determines to be disorderly, careless or incompetent or to be employed in violation of the terms of this Contract.

2.3 Town is entitled to ownership and possession of all deliverables purchased or developed with Contract funds. All work papers, reports, questionnaires and other written materials prepared or collected by the Contractor in the course of completing the work to be performed under this Contract shall at all times be the exclusive property of the Town. The Contractor shall not use such materials for any purposes other than the purpose of this Contract without the prior written consent of the Official. All Contractor proprietary rights shall be detailed in the Contract Documents.

2.4 Prior to beginning performance under this Contract, Contractor must receive a Purchase Order from Town.

Article 3. Acceptance of Goods and Services.

3.1 Performance under this Contract shall include services rendered, obligations due, costs incurred, and goods and deliverables provided to and accepted by Town. The Town shall have a reasonable opportunity to inspect all goods and deliverables, services performed by, and work product of the Contractor, and accept or reject such goods, deliverables, services, or work product.

Article 4. Time.

4.1 It is understood and agreed that Contractor's performance shall be timely and meet or exceed industry standards for the performance required.

Article 5. Compensation.

5.1 The Contractor may, in the absence of a payment schedule, periodically submit to the Official invoices, itemizing goods, services, labor and expenses for which compensation is due and requesting payment for goods received or services rendered by the Contractor during the period covered by the invoice.

5.2 Thereupon the Official shall estimate the value of goods or services accepted by the Town in accordance with the specific terms and conditions of a Contract, and Town shall pay to the Contractor such amount less sums retained under the provisions of Article 8 of these General Conditions.

5.3 The Town shall pay in full and complete compensation for goods received and accepted and services performed and accepted under this Contract in an amount not to exceed the amount shown on the face of this Contract paid in accordance with the rate indicated or in accordance with a prescribed schedule. Acceptance by the Contractor of any payment or partial payment, without any written objection by the Contractor, shall in each instance operate as a release and discharge of the Town from all claims, liabilities or other obligations relating to the performance of a Contract.

5.4 In the event that this Contract provides for reimbursement by the Town to the Contractor for travel or related expenses, the Contractor may submit such proposed expenses to the Official for approval prior to the incurrence of such expenses. Such expenses shall be reviewed on a case-by-case basis. Nothing herein shall be construed to require the Town to reimburse the Contractor for the expenses described in this Section.

5.5 The Contractor shall furnish any information, estimate or vouchers relating to the goods or services or to documentation of labor or expenses as may be requested by the Official.

Article 6. Relationship with the Town.

6.1 The Contractor is retained solely for the purposes set forth in this Contract. Contractor's relationship to the Town during the term of this Contract shall be that of an independent Contractor. The Contractor shall have no authority to involve the Town in any contract or to incur any liability on the part of the Town. The Contractor, its agents or employees shall not be considered as having the status or pension rights of an employee; provided that the Contractor shall be considered an employee for the purpose of General Laws c. 268A (the Conflict of Interest Law). The Town shall not be liable for any personal injury to or death of the Contractor, its agents or employees.

6.2 Unless all the terms and conditions for the delivery or provision of goods or services by the Contractor to the Town specified by this Contract are expressly set forth in a writing incorporated herein by reference, such delivery of goods or services shall require written approval of or direction by the Official prior to the incurrence of any liability by the Town. The Town has no legal obligation to compensate a Contractor for performance that is not requested and is intentionally delivered by a Contractor outside the scope of a Contract.

6.3 Any amendments to the terms and conditions of this Contract must be in writing and signed by the Official and Contractor and filed with the Town Comptroller. The Town's Standard Contract Document and Standard Contract General Conditions shall supersede any conflicting verbal or written agreements relating to the performance of a Contract, including contract forms, purchase orders, or invoices of the Contractor.

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

Article 7. Assumption of Loss and Liability.

7.1 The Contractor shall pay and be exclusively responsible for all debts for labor and material contracted for by Contractor for the rental of any appliance or equipment hired by Contractor and/or for any expense incurred on account of services to be performed under this Contract.

7.2 The Contractor shall bear the risk of loss for any Contractor materials used for a Contract and for all goods and deliverables, until possession, ownership and full legal title to the goods and deliverables are transferred to and accepted by the Town.

7.3 To the fullest extent permitted by law, the Contractor shall indemnify, hold harmless, and assume the defense of the Town, its officers, agents or employees, with counsel acceptable to Town, which acceptance shall not be unreasonably withheld, from all liabilities, suits, claims, losses, and costs or any other damages against them or any of them arising from any act or omission of the Contractor, its agents, officers, employees, or subcontractors in any way connected with performance under this Contract.

Article 8. Remedies of the Town.

8.1 If the Contractor provides goods and/or services that do not comply with Contract specifications and requirements as reasonably determined by the Official, the Official may request that the Contractor refurnish services or provide substitute goods at no additional cost to the Town

until approved by the Official. If the Contractor shall fail to provide satisfactory goods or services, the Official, in the alternative, may make any reasonable purchase or Contract to purchase goods or services in substitution for those due from the Contractor. The Town may deduct the cost of any substitute Contract or nonperformance of services together with incidental and consequential damages from the Contract price and shall withhold such damages from sums due or to become due to the Contractor. The Town otherwise retains all rights and remedies at law or in equity.

8.2 If the damages sustained by the Town as determined by the Official exceed sums due or to become due, the Contractor shall pay the difference to the Town upon demand.

8.3 The Contractor shall not be liable for any damages sustained by the Town due to the Contractor's failure to furnish goods or services under the terms of this Contract if such failure is in fact caused by the occurrence of a contingency the nonoccurrence of which was a basic assumption under which this Contract was made, including but not necessarily limited to a state of war, act of enemies, embargoes, expropriation or labor strike or any unanticipated federal, state, or municipal governmental regulation or order, provided that the Contractor has notified the Official in writing of such cause as soon as practicable.

8.4 The Town may terminate this Contract for cause if the Contractor has breached any material term or condition and has not corrected the breach within a reasonable period of time after written notice from the Town identifying the breach. This Contract may be terminated at any time for the convenience of the Town at the option of the Official by delivering or mailing to the Contractor at the Contractor's business address a written notice of termination setting forth the date, not less than seven (7) days after the date of such delivery or mailing, when such termination shall be effective. In the event of such termination for convenience, the Contractor shall be compensated for services rendered to the effective date of said termination in accordance with the rates of compensation specified in this Contract. The parties agree that if Town erroneously, improperly or unjustifiably terminates for cause, such termination shall be deemed a termination for convenience, which shall be effective thirty (30) days after such notice of termination for cause is provided.

Article 9. Remedies of the Contractor.

9.1 If damages, other than loss on nonconforming services or on services not performed, are actually sustained by the Contractor due to any act or material omission for which the Town is legally responsible, the Town may allow a sum equal to the amount of such damages sustained by the Contractor as determined by the Official in writing, provided the Contractor shall have delivered to the Official a detailed written statement of such damages and cause thereof within thirty (30) days after the act or material omission by the Town.

Article 10. Prohibition Against Assignment.

10.1 The Contractor shall not assign, delegate, subcontract or in any way transfer any interest in this Contract without prior written consent of the Official.

Article 11. Compliance with Law and Public Policy.

11.1 This Contract is made subject to all laws of the Commonwealth of Massachusetts. If the Contractor is a business, the Contractor certifies that it is listed under the Secretary of State's website as licensed to do business in Massachusetts, as required by law.

11.2 The Contractor shall provide, at its sole expense, all necessary licenses, permits or other authorizations required by the Town, the Commonwealth of Massachusetts or any other governmental agency with proper jurisdiction.

11.3 Where applicable, the Contractor shall take out and maintain during the term of this Contract such Worker's Compensation insurance as may be reasonably necessary to protect the Contractor from claims under General Laws c. 152 (the Worker's Compensation Law).

11.4 The Contractor shall maintain for the duration of the Contract professional, liability, and other insurance as required by the solicitation or as otherwise required by Town, but in no event less than the amount and type of insurance coverage sufficient to cover the performance. The Contractor shall name the Town as an additional insured on the policies described in this Section. The Town's insurance requirements are further described in the Insurance Addendum to this Contract.

11.5 The Contractor agrees and shall require any subcontractor to agree not to discriminate in connection with the performance of work under the Contract against any employee or applicant for employment because of sex, race, color, sexual orientation, gender identity or expression, marital status, parental status, sex-offender status, prior psychiatric treatment, military status, religious creed, disability, national origin, ancestry, source of income, or age, unless based upon a legally permissible and bona fide occupational qualification. The Contractor agrees and shall require any subcontractor to agree to post in conspicuous places notices to be provided by the Massachusetts Commission Against Discrimination, setting forth provisions of the Fair Employment Practice Law of the Commonwealth.

11.6 The Contractor's attention is called to General Laws c. 268A (the Conflict of Interest Law). The Contractor shall not act in collusion with any Town officer, agent, or employee, nor shall the Contractor make gifts regarding this Contract or any other matter in which the Town has a direct and substantial interest.

11.7 The Contractor shall keep himself fully informed of all Town Bylaws, any regulations, and State and Federal laws, which in any manner affect the work herein specified. The Contractor shall at all times observe and comply with said ordinances, regulations or laws, and shall defend, hold harmless, and indemnify the Town, its officers, agents and employees against any claim or liability arising from or based on the violations of such bylaws, regulations or laws, caused by the negligent actions or omissions of the Contractor, its agents, or employees.

11.8 The Contractor certifies that neither it nor any of its subcontractors are currently debarred or suspended by the U.S. government, the Commonwealth of Massachusetts, or any of its subdivisions.

11.9 The Contractor certifies that neither it nor any of its subcontractors have been subject to a federal or state criminal or civil judgment, administrative citation, final administrative

determination, order or debarment resulting from a violation of G.L. c.149, c.151, or the Fair Labor Standards Act within three (3) years prior to the date of the Contract; or certifies that it has provided copies of any and all of the above to the Official prior to the date of the Contract and any required wage bond or insurance; and certifies that while the Contract is in effect, it will report any instance of the above to the Official within five (5) days of Contractor's receipt. The Contractor agrees and shall require any subcontractor to post in conspicuous places notices to be provided by the Town, informing employees of the protections of applicable local, state, and federal law.

11.10 Contractor agrees that they shall comply fully with all state and federal laws and regulations regarding human trafficking and forced labor. Failure to do so will be considered a breach of this Contract.

11.11 If applicable, as determined by the Massachusetts Department of Labor Standards, the Contractor shall comply with the Massachusetts Prevailing Wage Law (M.G.L. c. 149, s.26, -27H) for public works projects, which establishes minimum wage rates for workers on such projects. The Contractor shall comply and shall cause its subcontractors to comply with M.G.L. c. 149, s. 27B, which requires that a true and accurate record be kept of all persons employed on a project for which the prevailing wage rates are required. The Contractor shall, and shall cause its subcontractors to, submit weekly copies of their weekly payroll records to the Town, to the extent the Prevailing Wage Law is applicable.

11.12 The Contractor shall comply with the Town's Bylaws for any contract awarded pursuant to M.G.L. c.149 or M.G.L. c.30, sec. 39M et. seq., and as may be amended from time to time.

Article 12. Contract Subject to Appropriation.

12.1 This Contract and payments hereunder are subject to the availability of an appropriation therefor. Any oral or written representations, commitments, or assurances made by the Official or any other Town representatives are not binding. Contractors should verify funding prior to beginning performance.

12.2 If the Contract is funded under a grant with the Federal Government, it is being executed without further appropriation pursuant to General Laws c. 44, s.53A.

12.3 When the amount of the Town Comptroller's certification of available funds is less than the face amount of the Contract, the Town shall not be liable for any claims or requests for payment by the Contractor which would cause total claims or payments under this Contract to exceed the amount so certified.

12.4 Unless otherwise expressly provided in a writing incorporated herein by reference, the amount certified by the Town Comptroller as available funds under this Contract may be increased or decreased by the Official with the written approval of such change by the Town Comptroller. In the event of any decrease in the amount certified, the Contractor shall be compensated for services

rendered to the effective date of such reduction, in accordance with the rates of compensation specified in this Contract.

Article 13. Release of Town on Final Payment.

13.1 Acceptance by the Contractor of payment from the Town for final services under this Contract shall be deemed to release forever the Town from all claims and liabilities, except those which the Contractor notifies the Official in writing within six (6) months after such payment.

Article 14. Public Records and Access.

14.1 This Contract is subject to the Commonwealth's Public Records Law, M.G.L. ch. 66. s. 10. Any documents related to this Contract shall be retained according to the Secretary of State's Municipal Retention Schedule or as required by the Town for a period not shorter than required said Municipal Retention Schedule.

14.2 The Contractor shall provide full access to records related to performance and compliance to the Town for seven (7) years beginning on the first day after the final payment under this Contract or such longer period necessary for the resolution of any litigation, claim, negotiation, audit or other inquiry involving this Contract. Access to view Contractor records related to any breach or allegation of fraud, waste and/or abuse may not be denied and Contractor cannot claim confidentiality or trade secret protections solely for viewing but not retaining documents. Routine Contract performance compliance reports or documents related to any alleged breach or allegation of non-compliance, fraud, waste, abuse or collusion may be provided electronically and shall be provided at Contractor's own expense. Reasonable costs for copies of non-routine Contract related records shall not exceed the rates for public records under 950 C.M.R. 32.00.

Article 15. State Taxation Certification.

15.1 Pursuant to M.G.L. c. 62C, s. 49A, the Contractor certifies under penalties of perjury, that to the best of Contractor's knowledge and belief, Contractor has complied with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting of child support. (NOTE: The Taxpayer Identification Number will be furnished to the Massachusetts Department of Revenue to determine compliance with the above- referenced law).

Article 16. Monies Owed to Town.

16.1 Pursuant to M.G.L. c. 60, s. 93, the Contractor agrees that the Town Treasurer and Collector may withhold from amounts owing and payable to the Contractor under this Contract any sums owed to any department or agency of the Town of Arlington which remain wholly or partially unpaid. This shall include but not be limited to unpaid taxes and assessments, police details, and any other fees and charges until such sums owed have been paid in full, and the Town Treasurer and Collector may apply any amount owing and payable to the Contractor to satisfy any monies owed to the Town.

Article 17. Prohibition Against Bid Collusion.

17.1 The Contractor certifies under penalties of perjury that his/her bid or proposal has been made and submitted in good faith and without collusion, fraud, or unfair trade practice with any other person. As used in this article, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity or group of individuals. Any actions to avoid or frustrate fair and open competition are prohibited by law, and shall be grounds for rejection or disqualification of a Response or termination of this Contract.

Article 18. Choice of Law.

18.1 Any actions arising out of this Contract shall be governed by the laws of Massachusetts, and shall be brought and maintained in a State or federal court in Massachusetts which shall have exclusive jurisdiction thereof.

Article 19. Effective Date and Signatures.

19.1 This Contract shall be effective upon the date signed by the parties on the Town's Standard Contract Document.



INSURANCE ADDENDUM

THIS INSURANCE ADDENDUM (“Insurance Addendum”) is hereby incorporated by reference into the Town’s Standard Contract General Conditions.

1. Scope and term.

- a. The Contractor shall maintain for the duration of the Contract professional, liability, and other insurance as required by the solicitation or as otherwise required by Town, but in no event less than the amount and type of insurance coverage sufficient to cover the performance.
- b. The Contractor shall name the Town as an additional insured on the policies required and shall specifically refer in the certificates to this Contract and shall state that insurance is as required by this Contract. The description of each coverage listed on the certificates shall include an appropriate means of identification. The Contractor shall not commence the work until proof of compliance with this Section has been furnished to the Town.
- c. Not later than the commencement date of the Contract, and annually thereafter for the term of this Contract or any extension thereof, Contractor shall furnish the Town with certificates of insurance evidencing coverages described in the Contract and any associated documents, and evidencing the Town’s additional insured status. Such certificates shall contain a provision providing the Town thirty (30) days advance written notice by registered mail of any change in or cancellation of coverage or ten (10) days’ notice if cancellation is due to nonpayment of premiums.

2. Requirements. The Contractor shall maintain the above-mentioned policies consistent with addendum with carriers having an A.M. Best credit rating of A-VIII (or better). The required insurance policies shall include all major divisions of coverage and shall be on a comprehensive general basis including premises and operations (including X-C-U), and owned, non-owned, and hired motor vehicles. Such insurance shall be written for not less than the limits of liability required by law, or the limits set forth below, whichever are greater.

3. Remedies. The Town reserves the right to pursue any remedies available at law or in equity for the Contractor’s failure to comply with the requirements set forth in this addendum.

4. Waiver. The Contractor agrees to waive all claims against the Town, its officers, agents or employees for any injury or death sustained by Contractor’s officers or employees, or for damage to its vehicles or equipment arising out of work contemplated by this Contract. The Contractor and all subcontractors shall waive subrogation rights against the Town for all losses.

5. **Notice of Occurrence.** Notice of Occurrence shall be given to the Town at the following addresses:

Town of Arlington
c/o Town Manager
730 Massachusetts Avenue
Arlington, MA 02476

With a copy to:

Town Counsel
50 Pleasant Street
Arlington, MA 02476

AMERICAN RESCUE PLAN ACT (ARPA)
ADDENDUM
to the
TOWN OF ARLINGTON STANDARD CONTRACT GENERAL CONDITIONS

INTRODUCTION

Notice: The Contract / Agreement to which this addendum is attached is made using federal assistance provided to the Town of Arlington ("Town" or "Owner"). The following contractual provisions are hereby incorporated into the Contract. In the event of any conflict between the below provisions and other provisions of this Contract / Agreement, the provisions in this Addendum shall control. In the event of any inconsistency between the Davis-Bacon Wage Rates and any prevailing wage rates published by the Commonwealth of Massachusetts and applicable to this Contract / Agreement, the higher of the two wages shall apply.

BREACH OF CONTRACTUAL AGREEMENT: ADMINISTRATIVE CONTRACTUAL, AND LEGAL REMEDIES; SANCTIONS AND PENALTIES

It is hereby understood and mutually agreed, by and between the Contractor and the Owner, that the date of beginning and the time for completion of the work to be done hereunder are ESSENTIAL CONDITIONS of the Contract; and it is further mutually understood and agreed that the work embraced in this Contract shall be commenced on a date to be specified in the "Notice to Proceed".

The Contractor agrees that said work shall be prosecuted regularly, diligently, and uninterruptedly at such rate of progress as will ensure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for the completion of the work described herein is a reasonable time for the completion of the same, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

If the said Contractor shall neglect, fail or refuse to complete the work within the time herein specified, or any extension thereof granted by the Owner, then the Contractor does hereby agree, as a partial consideration for the awarding of this Contract, to pay 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 the Contractor shall be in default after the time stipulated in the Contract for completing the work.

The said amount of liquidated damages 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 sustain in such event and said amount shall be retained from time to time by the Owner from current periodic estimates.

It is further agreed that time is of the essence of each and every portion of this Contract and of any specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the Contract as 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 or any excess cost when the Owner determines that the Contractor is without fault and the Contractor's reasons for the time extensions are acceptable to the Owner; provided further, that the Contractor shall not be charged with liquidated damages or an excess cost when the delay in completion of the work is due to:

- A. Any preference, priority or allocation order duly issued by the government;
- B. Unforeseeable cause beyond the control and without fault or negligence of the Contractor, including, but not restricted to, acts of God or 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; OR

- C. Any delays of subcontractors or suppliers occasioned by any of the causes specified in subsections (a) and (b) of this article.

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. The amount of liquidated damages for this project shall be Five Hundred Dollars (\$100.00) per consecutive calendar day.

TERMINATION FOR CAUSE AND CONVENIENCE

Where Contract exceeds \$10,000.00, the Owner may terminate this Contract by providing the Contractor and the Surety with ten (10) days written notice specifying the reasons for termination, as outlined below:

- A. Violation of any of the provisions of this Contract by the Contractor or any of their subcontractors;
- B. A determination by the Owner that the Contractor has engaged in fraud, waste, mismanagement, misuse of funds, or criminal activity with any funds provided by this Contract;
- C. Failure of the Contractor, for any reason, to fulfill in a timely and proper manner their obligations under this Contract, including compliance with applicable Federal, State and/or local law or regulations, and such procedures or guidelines as may be established.

In the event of any such termination, the Surety shall have the right to take over and perform the Contract; provided, however, that if the Surety does not commence performance within ten (10) days from the date of the mailing to such Surety of notice of termination, the Owner may take over the work and prosecute the same to completion at the expense of the Contractor, and the Contractor and their Surety shall be liable to the Owner for any excess cost occasioned by the Owner thereby, and in such event the Owner may take possession of and utilize in completing the work such materials, appliances and plants as may be on the site of the work and necessary therefore.

If the Owner determines that a continuation of work on the project would endanger the life, health or safety of those working or living at or near the project site, or that immediate action is necessary to protect public funds and/or property, the Owner may suspend work or terminate this agreement by providing notice to the Contractor in the form of a telegram, mailgram, hand-carried letter, or other appropriate written means.

In addition, notwithstanding anything to the contrary in the Contract, the Owner may also terminate this Contract for its conveniences, including due to the lack of sufficient funds to complete the work. In such event, the Owner shall provide written notice of termination to the Contractor, and the Contractor shall thereupon cease all work other than work that is required to make the work and surrounding property safe, and the Owner shall pay the Contractor for all work performed in accordance with the terms of the Contract up to the date of the Contract, provided the Contractor shall not be entitled to any termination (or similar) damages or other costs and expenses that may be associated with a termination for convenience.

EQUAL EMPLOYMENT CLAUSE

During the performance of this Contract, the Contractor agrees as follows:

- A. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to, the following:
 1. Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

2. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
 - B. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.
 - C. The Contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the Contractor's legal duty to furnish information.
 - D. The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitments under this section and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
 - E. The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
 - F. The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
 - G. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
 - H. The Contractor will include the portion of the sentence immediately preceding paragraph (A) and the provisions of paragraphs (A) through (H) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance; provided, however, that in the event a Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

CLEAN AIR ACT

Contractor shall comply with all applicable standards, order regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251-1387). Contractor further acknowledges and understands that Contractor shall be required to report any violations of said acts to the Federal awarding agency and the Regional Office of the Environmental Protection Agency.

CONTRACT WORK HOURS AND SAFETY STANDARDS ACT (40 U.S.C. § 3701-3708)

Where the Contract: (1) is awarded for a sum exceeding \$100,000; and (2) will involve the employment of mechanics or laborers, the Contractor shall comply with the Contract Work Hours and Safety Standards Act, 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5).

Pursuant to 40 U.S.C 3702 of the Contract Work Hours and Safety Standards Act, Contractor shall be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 shall apply to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

DEBARMENT AND SUSPENSION (EXECUTIVE ORDERS 12549 AND 12689)

Contractor certifies that neither Contractor nor any employer or subcontractor is a party listed on the government wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (3 CFR part 1986 Comp., p. 189) and 12689 (3 CFR part 1989 Comp., p. 235), "Debarment and Suspension." SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared in-eligible under statutory or regulatory authority other than Executive Order 12549.

BYRD ANTI-LOBBYING; COPELAND "ANTI-KICKBACK" ACT (40 U.S.C. § 3145)

A. BYRD ANTI-LOBBYING AMENDMENT

Contractor certifies that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Contractor further understands and acknowledges that it shall disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures shall be forwarded from tier to tier up to the non-Federal award.

B. COPELAND "ANTI-KICKBACK" ACT

Contractor acknowledges and understands that the awarding of this contract is conditioned upon Contractor's compliance with the Federal Copeland "Anti-Kickback" Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"). The Act provides that each Contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency.

C. BYRD ANTI-LOBBYING AMENDMENT: REQUIRED CERTIFICATION FOR AWARDS EXCEEDING \$100,000

The undersigned certifies, to the best of their knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this

Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all contractors shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

Bidder certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the bidding party understands and agrees that the provisions of 31 U.S.C. Ch. 38, Administrative Remedies for False Claims and Statements, apply to this certification and disclosure, if any.

Signature of Contractor's authorized official

Date

Name (printed)

Date (printed)

PROCUREMENT OF RECOVERED MATERIALS (2 C.F.R. § 200.323)

Contractor acknowledges and understands that, in performing the work specified under this contract, Contractor shall be required to comply with Section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds \$10,000 or the value of the quantity acquired during the preceding fiscal year exceeded \$10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT (2 C.F.R. § 200.216);

Contractor certifies that it shall not procure or obtain equipment, services, or systems that use covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in Public Law 115-232, section 889, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).

- i. For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities);
- ii. Telecommunications or video surveillance services provided by such entities or using such equipment;

- iii. Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

DOMESTIC PREFERENCES FOR PROCUREMENTS (2 C.F.R. § 200.322)

- A. As appropriate and to the extent consistent with law, the non-Federal entity should, to the greatest extent practicable under a Federal award, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products). The requirements of this section must be included in all subawards including all contracts and purchase orders for work or products under this award.
- B. For purposes of this section:
 - 1. "Produced in the United States" means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.
 - 2. "Manufactured products" means items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

END OF ADDENDUM to GENERAL CONTRACT

SECTION 00 70 00

GENERAL CONDITIONS

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared By



Endorsed By



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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The document prepared by Contractor, in a form acceptable to Engineer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The Advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document 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, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*
 - a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the

- requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.
- b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.
 - c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.
 - d. A demand for money or services by a third party is not a Claim.
11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
 12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.
 13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
 14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.
 15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
 16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
 17. *Cost of the Work*—See Paragraph 13.01 for definition.
 18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
 19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
 20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.
 21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the

recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

22. *Engineer*—The individual or entity named as such in the Agreement.
23. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.
 - a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.
 - b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.
 - c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.
25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.
28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
29. *Notice to Proceed*—A written notice 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.
30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.
32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.
34. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals.
36. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
38. *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, and such other lands or areas furnished by Owner which are designated for the use of Contractor.
39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
40. *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.
41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers’ instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.
42. *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 of such Work.

43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.
44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
45. *Supplier*—A manufacturer, fabricator, supplier, distributor, 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 a Subcontractor.
46. *Technical Data*
- a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.
 - b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.
 - c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.
47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.
48. *Unit Price Work*—Work to be paid for on the basis of unit prices.
49. *Work*—The entire 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; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.
50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:* The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, 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 exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the 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 is not intended to and 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 Article 10 or any other provision of the Contract Documents.
- C. *Day:* The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:* The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - 1. does not conform to the Contract Documents;
 - 2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - 3. 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 15.03 or Paragraph 15.04).
- E. *Furnish, Install, Perform, Provide*
 - 1. The word “furnish,” when used in connection with services, materials, or equipment, means 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, means 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, means to furnish and install said services, materials, or equipment complete and ready for intended use.
 - 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

- F. *Contract Price or Contract Times*: References to a change in “Contract Price or Contract Times” or “Contract Times or Contract Price” or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term “or both” is not expressed.
- G. Unless stated otherwise in the Contract Documents, words or phrases that 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 Performance and Payment Bonds; Evidence of Insurance*

- A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.
- C. *Evidence of Owner’s Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for 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;
 - 2. a preliminary Schedule of Submittals; 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.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, 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 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will 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 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 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 the component parts of the Work.
 - 4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.
- B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required 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.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.
- F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.
- G. Nothing in the Contract Documents creates:
 - 1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or
 - 2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

- A. *Standards Specifications, Codes, Laws and Regulations*
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract 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, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer 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 part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
3. 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 had actual knowledge thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); 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 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.

- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. 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 its consultants, including electronic media versions, or reuse any 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 adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract 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 Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work may be done at the Site prior to such date.

4.03 *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.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 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 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 - 1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 - 2. Abnormal weather conditions;
 - 3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and
 - 4. Acts of war or terrorism.

- D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:
1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.
 2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.
 3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.
- E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:
1. The circumstances that form the basis for the requested adjustment;
 2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;
 3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;
 4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and
 5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.
- Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.
- F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.
- G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor in writing 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.

- 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 permanent improvements are to be made 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.

5.02 *Use of Site and Other Areas*

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

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all 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 directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.
 - C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas 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 of 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 structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

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

1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;
2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and
3. Technical Data contained in such reports and drawings.

- B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

- C. *Reliance by Contractor on Technical Data:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.

- D. *Limitations of Other Data and Documents:* Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, 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;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;
3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or
4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;
 2. is of such a nature as to require a change in the Drawings or Specifications;
 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 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- E. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, 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 fall within any one or more of the categories described in Paragraph 5.04.A;
 - 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 Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
- a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;
 - b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice required by Paragraph 5.04.A.
3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.
- F. *Underground Facilities; Hazardous Environmental Conditions:* Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:
1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 2. complying with applicable state and local utility damage prevention Laws and Regulations;

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;
 4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then 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 7.15), notify Owner and Engineer in writing regarding such Underground Facility.
- C. *Engineer's Review:* Engineer will:
1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;
 2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;
 3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and
 4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.

During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- F. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown

or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. 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 Paragraph 13.03;
 - b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and
 - c. Contractor gave the notice required in Paragraph 5.05.B.
2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.
 4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

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

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;
2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, 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;
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 removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) 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. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.
- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. 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, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.
- H. 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, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, 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, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, 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 failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.
- B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.
- C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or

- Regulations, and must be issued and signed by a surety named in “Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies” as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual’s authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.
 - E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.
 - F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner’s termination rights under Article 16.
 - G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.
 - H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Alternative forms of insurance coverage, including but not limited to self-insurance and “Occupational Accident and Excess Employer’s Indemnity Policies,” are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.
- D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by

- Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.
- E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.
 - F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
 - G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.
 - H. Contractor shall require:
 - 1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and
 - 2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.
 - I. If either party does not purchase or maintain the insurance required of such party by the Contract, 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.
 - J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.
 - K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

- L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.
- M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.
- N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 *Contractor's Insurance*

- A. *Required Insurance:* Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.
- B. *General Provisions:* The policies of insurance required by this Paragraph 6.03 as supplemented must:
 - 1. include at least the specific coverages required;
 - 2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;
 - 3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;
 - 4. apply with respect to the performance of the Work, whether such performance is 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; and
 - 5. include all necessary endorsements to support the stated requirements.
- C. *Additional Insureds:* The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:
 - 1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;
 - 2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;
 - 3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

4. not seek contribution from insurance maintained by the additional insured; and
5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

- A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.
- B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.
- C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.
- D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.
- E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

- A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against

Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, 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, risks, 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 Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
 2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.
1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.
- C. The waivers in this Paragraph 6.05 include the waiver of rights 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 insured peril, risk, or cause of loss.
- D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

- A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *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 the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall maintain good discipline and order at the Site.

- B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.
- C. 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 will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, 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, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will 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.
- C. All materials and equipment must 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.

7.05 *"Or Equals"*

- A. *Contractor's Request; Governing Criteria:* Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item 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 is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that the proposed item:
 - 1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

- 2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) has a proven record of performance and availability of responsive service; and
 - 4) is not objectionable to Owner.
- b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:
- 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense:* Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer's Determination:* Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 Substitutes

- A. *Contractor's Request; Governing Criteria:* Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.
1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.
 2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:
 - a. will certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design;
 - 2) be similar in substance to the item specified; and
 - 3) be suited to the same use as the item specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;
 - 2) whether 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 other work on the Project) to adapt the design to the proposed substitute item; and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from the item specified; and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

- E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.
- B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.
- E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.
- F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

- H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.
- J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.
- K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.
- L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.
- M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *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 an 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 will be disclosed in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors, 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 specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, 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 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.

7.09 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. 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 the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.10 *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.

7.11 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, 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 such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.
- C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.
- B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.
- C. 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, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.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 at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer 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).
- E. 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.
- F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
- G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.
- H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

- I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).
- J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of safety data sheets (formerly known as 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.

7.15 *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 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 by an emergency, or are required as a result of Contractor's response to an emergency. If Engineer determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

- 1. Before submitting a Shop Drawing or Sample, Contractor shall:
 - a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determine and verify:
 - 1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;
 - 2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - 3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;
 - c. confirm that the Submittal is complete with respect to all related data included in the Submittal.
- 2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.
- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.
1. *Shop Drawings*
 - a. Contractor shall submit the number of copies required in the Specifications.
 - b. Data shown on the Shop Drawings must 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 7.16.C.
 2. *Samples*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.
 3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, 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.
- C. *Engineer's Review of Shop Drawings and Samples*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. 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, comply with the requirements of 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, or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
 4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.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. Engineer will

document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. Resubmittal Procedures for Shop Drawings and Samples

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.
2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:
 - a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.
 - b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.
 - c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

- d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.
- 2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03, 2.04, and 2.05.
- F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 Contractor's General Warranty and Guarantee

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.
- B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:
 - 1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and
 - 2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.
- C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, or improper modification, 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.
- D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:
 - 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 review and approval of a Shop Drawing or Sample submittal;
 - 6. The issuance of a notice of acceptability by Engineer;
 - 7. The end of the correction period established in Paragraph 15.08;
 - 8. Any inspection, test, or approval by others; or

9. Any correction of defective Work by Owner.
- E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (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 from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused 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.
- B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, 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 7.18.A will 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.

7.19 *Delegation of Professional Design Services*

- A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.
- B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.
- C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

- D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.
- E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:
 - 1. Checking for conformance with the requirements of this Paragraph 7.19;
 - 2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and
 - 3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.
- F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.
- G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.
- D. 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 such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

- E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, 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.
- F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. An itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. The extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.
 - 1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.
 - 2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.
- C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all 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 damage, delay, disruption, or interference.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents will be that of the former Engineer.

9.03 *Furnish Data*

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

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

- 9.05 *Lands and Easements; Reports, Tests, and Drawings*
- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
 - B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
 - C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.
- 9.06 *Insurance*
- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.
- 9.07 *Change Orders*
- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.
- 9.08 *Inspections, Tests, and Approvals*
- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.
- 9.09 *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.
- 9.10 *Undisclosed Hazardous Environmental Condition*
- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.
- 9.11 *Evidence of Financial Arrangements*
- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).
- 9.12 *Safety Programs*
- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
 - B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *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.

10.02 *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 10.07. 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.

10.03 *Resident Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.
- B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

- A. Engineer has the authority to reject Work in accordance with Article 14.
- B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.
- C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.
- D. Engineer's authority as to changes in the Work is set forth in Article 11.

E. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.05 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

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

A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, 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, will 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 Contractor under Paragraph 15.06.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 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs of which Engineer has been informed.

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

- A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
- B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.
- C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
 - 1. Changes in 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;
 - 2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 - 3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and
 - 4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

- A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.

- B. If Owner has issued a Work Change Directive and:
 - 1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.
 - 2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

- A. Engineer may authorize minor changes in the Work if the changes 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. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.
- B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.
- B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.
- C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *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, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.
- B. 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, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);
 2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or
 3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).
- C. *Contractor's Fee:* When applicable, the Contractor's fee for overhead and profit will 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 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;
 - b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 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 Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;
 - d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and
 - f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

11.08 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.
- B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

A. *Purpose and Content:* Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

B. *Change Proposal Procedures*

1. *Submittal:* Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.
2. *Supporting Data:* The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.
 - a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.
 - b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

3. *Engineer's Initial Review:* Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.
4. *Engineer's Full Review and Action on the Change Proposal:* Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change

Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.
- D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety 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), 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.

ARTICLE 12—CLAIMS

12.01 *Claims*

- A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:
 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;
 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and
 4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.
- B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge

and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

- C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.
 - 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13—COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 - 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:
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 in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will 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 accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will 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, which 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 will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
 4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.
 5. Other costs consisting of 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, 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.

- 1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

c. *Construction Equipment Rental*

- 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.
- 2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.
- 3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.

- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as 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 builder's risk or other property insurance established in accordance with Paragraph 6.04), 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 include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will 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 communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

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

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals, 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 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
- 2. The cost of purchasing, renting, or furnishing small tools and hand tools.
- 3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 5. 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.
- 6. Expenses incurred in preparing and advancing Claims.
- 7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*

- 1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:
 - a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.
 - b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:
 - 1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.
 - 2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.
- 2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

- E. *Documentation and Audit:* Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 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 and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances:* Contractor agrees that:
 - 1. the cash 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, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.
- C. *Owner's Contingency Allowance:* Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 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.
- B. 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. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. 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.
- D. 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, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.
2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.
3. Adjusted unit prices will apply to all units of that item.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.
- 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, obtaining, and paying for all inspections and tests required:
1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 3. by manufacturers of equipment furnished under the Contract Documents;
 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. 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, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt written notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs,

losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then 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, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages 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 pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, 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, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *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, then 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 will 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.

14.07 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 defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or 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, 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 incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. 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 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 14.07.

ARTICLE 15—PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments*
 - 1. At least 20 days before the date established in the Agreement 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.
 - 2. 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 must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation

establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, 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 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, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and 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:
 - a. 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; or
 - b. 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:
 - a. to supervise, direct, or control the Work;
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or
 - e. 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 stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
 - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

- b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. The Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. The Contract Price has been reduced by Change Orders;
 - i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;
 - j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. 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; or
 - l. Other items entitle Owner to a set-off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, 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, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
 3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *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 and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

- B. Promptly after Contractor's notification, 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.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy 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, subject to the following conditions:

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.
2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. 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 15.03 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.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *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, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *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, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.
2. The final Application for Payment must be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

- d. a list of all duly pending Change Proposals and Claims; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, 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, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.
- B. *Engineer's Review of Final Application and Recommendation of Payment:* 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 have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. 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. *Notice of Acceptability:* In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.
- D. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.
- E. *Final Payment Becomes Due:* Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

- A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim,

appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such adjacent areas;
 - 2. correct such defective Work;
 - 3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.
- B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.
- C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written 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. Contractor shall pay all 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). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.
- D. 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.
- E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, 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.

- F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *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 written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and 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);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, 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 complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects,

- attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds 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.
- F. 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, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
 - G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

- A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. 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. 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; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 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 16.03.
- B. 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, 7 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 are not intended to preclude Contractor from submitting a Change Proposal 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 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this article:
1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and
 2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this article, Owner or Contractor may:
1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;
 2. agree with the other party to submit the dispute to another dispute resolution process; or
 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:
1. in person, by a commercial courier service or otherwise, to the recipient's place of business;
 2. by registered or certified mail, postage prepaid, to the recipient's place of business; or
 3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract 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.

18.03 *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. 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.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision will not constitute a waiver of that provision, nor will it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Assignment of Contract*

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party to this Contract of any rights under or interests in the Contract will be binding on the other party without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract.

18.09 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

18.10 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SECTION 00800

SUPPLEMENTARY CONDITIONS

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SUPPLEMENTARY CONDITIONS

AMENDMENTS TO GENERAL CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC C-700, 2018 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 1. DEFINITIONS AND TERMINOLOGY

Delete the words "The individual or entity named as such in the Agreement" in 1.01.A.22 of the General Conditions, "Engineer", 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."

ARTICLE 2. PRELIMINARY MATTERS

SC-2.02

Delete paragraph 2.02A of the General Conditions in its entirety.

SC-2.03

Delete paragraph 2.03 A.3 of the General Conditions.

SC-2.05

Delete paragraph 2.05 A.3 of the General Conditions.

ARTICLE 3. CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

SC-3.01

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."

SC-3.03

Delete the last phrase of paragraph 3.03 A.3 of the General Conditions starting with “had”, and substitute the following:

“knew or reasonably should have known thereof.”

ARTICLE 4. COMMENCEMENT AND PROGRESS OF THE WORK

SC-4.01

Add a new paragraph immediately after paragraph 4.01A of the General Conditions which is to read as follows:

“B. Notwithstanding the time limitations provided in paragraph 4.01A, the OWNER may desire to commence the Contract Times later than the sixtieth day after the bid opening. The OWNER and CONTRACTOR, upon mutual agreement, may extend the commencement of the Contract Times to any date that they elect. OWNER must obtain CONTRACTOR’s approval for extending the time beyond the dates/times stated in the Contract Documents.”

SC-4.03

Add a new paragraph immediately after paragraph 4.03A 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-4.05

Delete Article 4.05A in its entirety and replace with the following:

“A. 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 or performance of any of the work or any delay or suspension of any portion of the work, whether such delay is caused by the Owner, the Engineer, or otherwise except as provided for within the prevailing statutes. 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 the Contract Documents. The Contractor will under no circumstances be eligible for additional compensation on account of any delay even if an extension of time is granted by the Owner.

Add the following to the paragraph that follows 4.05E.5:

“ Accumulating the amount of time required to complete a series of additional work items or delays and adding this time to the original Contract Time will not be considered

justification for an extension of time. To justify an extension of Contract Time, the Contractor must prove clearly and convincingly that the critical path for construction has been impacted by circumstances beyond the control of the Contractor and that the CPM schedule cannot be revised to eliminate the need for the requested time extension.”

Add the following new paragraphs after paragraph 4.05G of the General Conditions:

“4.06 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 if 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 thirty (30) 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 5. SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

SC-5.03

Delete the term "Supplementary Conditions" of paragraph 5.03A of the General Conditions and replace it with "Contract Documents".

Delete the term "Supplementary Conditions" of paragraph 5.03C line 2 of the General Conditions and replace it with "Contract Documents".

SC-5.05

Delete the following words from line 3 of paragraph 5.05 F.1 of the General Conditions:

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

SC-5.06

Delete the term "Supplementary Conditions" in paragraph 5.06A of the General Conditions and replace it with "Contract Documents".

Add the following to the first sentence of paragraph 5.06C:

"or unless Contractor caused or contributed to such Hazardous Environmental Condition."

ARTICLE 6. BONDS 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-2.01 B of the General Conditions.

SC-6.01

Insert these sentences following SC-6.01.A of the General Conditions:

"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-6.02

Add the following paragraph to paragraph 6.02N:

“The Contractor shall immediately stop work on the Project and shall not resume work until the Contractor provides evidence, to the Owner and Engineer, in the form of an acceptable insurance certificate, of new insurance coverage that replaces all cancelled coverage that is required for the Project.”

SC-6.03

Add the following paragraphs to SC-6.03B of the General Conditions:

- “6. If the aggregate limits of liability indicated in Contractor's insurance provided in accordance with paragraph 6.03 are not sufficient to cover all claims for damages arising from its operations under this Contract and from any other work performed by it or if the commercial general liability insurance policy of insurance does not provide that the general aggregate limits apply on a per project and per location basis, Contractor shall have the policy 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.
- 7. Include by endorsement that the insurer shall waive all rights of subrogation in favor of the Owner, Engineer and any other party named in the written contract against whom the insurer must agree to waive rights of subrogation.”

Insert “railroad protective liability” in line 2 of paragraph 6.03C.

Insert “except employer’s liability” after the word “insureds” in line 1 of paragraph 6.03C.1.

Add the following paragraphs after 6.03C:

- “D. *Workers’ Compensation and Employer’s Liability:* Contractor shall purchase and maintain workers’ compensation and employer’s liability insurance, including, as applicable, United States Longshoreman and Harbor Workers’ Compensation Act, Jones Act, stop-gap employer’s liability coverage for monopolistic states, and foreign voluntary workers’ compensation (from available sources, notwithstanding the jurisdictional requirement of Paragraph 6.02.B of the General Conditions).

Workers’ Compensation and Related Policies	Policy limits of not less than:
Workers’ Compensation	
State	Statutory
Applicable Federal (e.g., Longshoreman’s)	Statutory
Foreign voluntary workers’ compensation (employer’s responsibility coverage), if applicable	Statutory
Jones Act (if applicable)	
Bodily injury by accident—each accident	\$N/A

Workers' Compensation and Related Policies	Policy limits of not less than:
Bodily injury by disease—aggregate	\$N/A
Employer's Liability	
Each accident	\$100,000
Each employee	\$100,000
Policy limit	\$500,000
Stop-gap Liability Coverage	
For work performed in monopolistic states, stop-gap liability coverage must be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of:	\$N/A

E. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against claims for:

1. damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees,
2. damages insured by reasonably available personal injury liability coverage, and
3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.

F. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage.
 - a. Such insurance must be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
2. Blanket contractual liability coverage, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
3. Severability of interests and no insured-versus-insured or cross-liability exclusions.
4. Underground, explosion, and collapse coverage.
5. Personal injury coverage.

6. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10, CG 20 33 and CG 20 37 or insurer's endorsement offering similar coverage. If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.
7. For design professional additional insureds, ISO Endorsement CG 20 32 or insurer's endorsement offering similar coverage.
8. Independent Contractors Coverage.

G. *Commercial General Liability—Excluded Content:* The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:

1. Any modification of the standard definition of "insured contract" (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).
2. Any exclusion for water intrusion or water damage.
3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.
4. Any exclusion of coverage relating to earth subsidence or movement.
5. Any exclusion for the insured's vicarious liability, strict liability, or statutory liability (other than worker's compensation).
6. Any limitation or exclusion based on the nature of Contractor's work.
7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.

H. *Commercial General Liability—Minimum Policy Limits*

Commercial General Liability	Policy limits of not less than:
General Aggregate	\$2,000,000
Products—Completed Operations Aggregate	\$2,000,000
Personal and Advertising Injury	\$1,000,000
Bodily Injury and Property Damage—Each Occurrence	\$1,000,000

I. *Automobile Liability:* Contractor shall purchase and maintain automobile liability insurance 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. The automobile liability policy must be written on an occurrence basis.

Automobile Liability	Policy limits of not less than:
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage)	\$1,000,000

- J. *Umbrella or Excess Liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer’s liability, commercial general liability, and automobile liability insurance described in the Paragraphs above. The coverage afforded must be at least as broad as that of each and every one of the underlying policies.

Excess or Umbrella Liability	Policy limits of not less than:
Each Occurrence	\$5,000,000
General Aggregate	\$5,000,000

- K. *Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements:* Contractor may meet the policy limits specified for employer’s liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policy’s policy limits and partial attribution of the policy limits of an umbrella or excess liability policy that is at least as broad in coverage as that of the underlying policy, as specified herein. If such umbrella or excess liability policy was required under this Contract, at a specified minimum policy limit, such umbrella or excess policy must retain a minimum limits equivalent to those required in paragraph 6.03J after accounting for partial attribution of its limits to underlying policies, as allowed above.

- L. *Contractor’s Pollution Liability Insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage, including cleanup costs, as a result of pollution conditions arising from Contractor’s operations and completed operations. This insurance must be maintained for no less than three years after final completion.

Contractor’s Pollution Liability	Policy limits of not less than:
Each Occurrence/Claim	\$2,000,000
General Aggregate	\$2,000,000

- M. *Contractor’s Professional Liability Insurance:* If Contractor will provide or furnish professional services under this *Contract*, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance must cover negligent acts, errors, or omissions in the performance of professional design or related services by the insured or others for whom the insured is legally liable. The insurance must be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. The retroactive date on the policy must pre-date the commencement of furnishing services on the Project.

Contractor's Professional Liability	Policy limits of not less than:
Each Claim	\$1,000,000
Annual Aggregate	\$1,000,000

- N. *Railroad Protective Liability Insurance:* Prior to commencing any Work within 50 feet of railroad-owned and controlled property, Contractor shall (1) endorse its commercial general liability policy with ISO CG 24 17, removing the contractual liability exclusion for work within 50 feet of a railroad, (2) purchase and maintain railroad protective liability insurance meeting the following requirements, (3) furnish a copy of the endorsement to Owner, and (4) submit a copy of the railroad protective policy and other railroad-required documentation to the railroad, and notify Owner of such submittal.

Railroad Protective Liability Insurance	Policy limits of not less than:
Each Claim	\$N/A
Aggregate	\$N/A

- O. *Unmanned Aerial Vehicle Liability Insurance:* If Contractor uses unmanned aerial vehicles (UAV—commonly referred to as drones) at the Site or in support of any aspect of the Work, Contractor shall obtain UAV liability insurance in the amounts stated; name Owner, Engineer, and all individuals and entities identified in the Supplementary Conditions as additional insureds; and provide a certificate to Owner confirming Contractor's compliance with this requirement. Such insurance will provide coverage for property damage, bodily injury or death, and invasion of privacy.

Unmanned Aerial Vehicle Liability Insurance	Policy limits of not less than:
Each Claim	\$500,000
General Aggregate	\$1,000,000

SC-6.04

Delete Article 6.04 of the General Conditions in its entirety.

SC-6.05

Amend the last sentence of paragraph 6.05A of the General Conditions by striking out the words "held by Owner or Contractor as trustee or fiduciary, or."

SC-6.07

Add the following paragraph 6.07 after paragraph 6.06 of the General Conditions:

“6.07 Owner’s Objections to Contractor’s Insurance Coverage

- 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 6 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 6.02D. Contractor will provide such additional information in respect of insurance provided by him as Owner may reasonably request."

ARTICLE 7. CONTRACTOR'S RESPONSIBILITIES

SC-7.02

Delete paragraph 7.02B 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 or foreman shall be as binding as if given to the Contractor."

SC-7.08

Delete the second sentence in paragraph 7.08A of the General Conditions.

SC-7.13

In line 3 of paragraph 7.13G of the General Conditions change "Supplementary Conditions" to "Contract Documents".

SC-7.16

In paragraph 7.16C.1 of the General Conditions, delete the word "timely" from the first line.

In paragraph 7.16E.1.b of the General Conditions, delete the word "timely" from the first line.

SC-7.18

Change the phrase "negligent act or omission" to "negligent or wrongful act or omission" in line 11 of paragraph 7.18A of the General Conditions.

Add the following to the end of paragraph 7.18A of the General Conditions:

"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."

ARTICLE 9. OWNER'S RESPONSIBILITIES

SC-9.02

Delete the phrase “provided Contractor makes no reasonable objection to the replacement engineer” in paragraph 9.02A of the General Conditions.

SC-9.06

Delete paragraph 9.06A of the General Conditions in its entirety.

SC-9.09

Insert the following after the first sentence of paragraph 9.09A of the General Conditions:

“However, the Owner shall have the right to direct the Contractor to perform the Work according to any sequence schedule set forth in the Contract Documents or established pursuant thereto.”

ARTICLE 10. ENGINEER'S STATUS DURING CONSTRUCTION

SC-10.01

Add a new paragraph 10.01B after paragraph 10.01A 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 Engineer's duties."

SC-10.02

Insert the following at the end of paragraph 10.02B of the General Conditions:

“However, the Engineer shall have the right to direct the Contractor to perform the Work according to any sequence schedule set forth in the Contract Documents or established pursuant thereto.”

SC-10.03

Delete the last sentence of paragraph 10.03B.

SC-10.07

Insert the following after the first sentence of paragraph 10.07B of the General Conditions:

“However, the Engineer shall have the right to direct the Contractor to perform the Work according to any sequence schedule set forth in the Contract Documents or established pursuant thereto.”

ARTICLE 13. COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

Delete Article 13 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 12 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 14. TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

SC-14.03

Delete the word “Prompt” at the beginning of paragraph 14.03C of the General Conditions.

SC-14.07

Revise paragraph 14.07A of the General Conditions as follows:

A. Delete the word “seven” and replace it with the word “ten” so that it reads “after ten days’ written notice to Contractor.”

ARTICLE 15. PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

SC-15.01

Delete paragraph 15.01B.4 of the General Conditions and insert the following in its place:

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

Delete the word "immediate" from line 2 of subparagraph 15.01E.2 of the General Conditions.

Delete subparagraph 15.01E.3 of the General Conditions in its entirety.

SC-15.02

Delete paragraph 15.02A 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."

SC-15.03

Delete the third sentence of paragraph 15.03C of the General conditions and replace it with the following:

"Owner shall review the preliminary certificate and make written objection to Engineer as to any provisions of the certificate or attached punch list."

In the same paragraph, delete the phrase "within 14 days after submission of the preliminary certificate to Owner" in the fourth sentence; delete the phrase "within said 14 days" in the fifth sentence.

SC-15.06

Delete from lines 5 and 6 of paragraph 15.06B of the General Conditions the phrase "within 10 days after receipt of the final Application for Payment," in the first sentence.

SC-15.08

Delete paragraph 15.08A 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 within ten (10) days of receipt of written notification and promptly comply with the terms of Owner's written instructions, or in an emergency where 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.”

ARTICLE 16. SUSPENSION OF WORK AND TERMINATION

SC-16.02

Add a new paragraph immediately after paragraph 16.02 A.4 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 18. MISCELLANEOUS

SC-18.08

Replace paragraph 18.08A with the following:

“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.”

SC-18.11, 18.12, 18.13, 18.14

Add the following new paragraphs after paragraph 18.10 of the General Conditions:

“18.11 Liability

It is understood and agreed that members of the Owner 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.

18.12 State Statutes and Regulations

See Section 00830 of these Specifications for further modifications of the General Conditions due to state statutes and regulations.

18.13 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

SECTION 00830

STATE STATUTES AND REGULATIONS
COMMONWEALTH OF MASSACHUSETTS

A. REVISIONS TO GENERAL CONDITIONS

1. Definitions
2. Subsurface Conditions Found Different
3. Proprietary Specifications
4. Substitutions and “Or Equals” – Contractor’s Expense
5. Subcontracting
6. Permits
7. Massachusetts Sales and Use Tax
8. Contractor Records
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ATTACHMENT A

Prevailing Wage Rates

ATTACHMENT B

Excerpts from Chapter 149, Chapter 30 and Chapter 82 of the Massachusetts General Law

ATTACHMENT C

Goals for Participation by Minority Business Enterprises (MBE) and Women Business Enterprises (WBE) - NOT APPLICABLE TO THIS CONTRACT

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.42 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 (MGL) c. 30, §39G or 39K as appropriate."

2. Subsurface Conditions Found Different

Add the following sentence to the end of paragraph 5.04A of the General Conditions:

"...to do so. Adjustments resulting from subsurface or latent physical conditions will be in accordance with MGL c. 30, §39N."

3. Proprietary Specifications

Revise the third sentence of Paragraph 7.05A of the General Conditions to read as follows:

"Unless the specification indicates that a proprietary item is called for, 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, and in accordance with MGL c. 30, §39M."

4. Substitutions and "Or Equals" – Contractor's Expense

Insert the following at the beginning of Paragraphs 7.05B and 7.06E of the General Conditions:

"Except as required by and indicated in the specifications and contract documents pursuant to MGL. c. 149, §44F,".

5. Subcontracting

Add the following language at the end of paragraph 7.06J of the General Conditions:

", except as required otherwise by MGL c. 149, §44F, for Work governed by MGL c. 149, §44A through 44H."

6. Permits

Delete paragraph 7.09A of the General Conditions in its entirety and insert the following in its place:

"A. Unless otherwise provided for in Section 00890 PERMITS, 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 its 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."

7. Massachusetts Sales and Use Tax

Add the following paragraph after paragraph 7.10A of the General Conditions:

"B. The materials 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."

8. Contractor Records

Add a new paragraph immediately after paragraph 7.11C 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."

9. Engineer's Decisions on Requirements of Contract Documents and Acceptability of Work

Add the following language at the end of paragraph 10.06A of the General Conditions:

"The Engineer's interpretation will be made in accordance with the requirements of MGL c. 30, §39P."

10. Change of Contract Price

Delete paragraphs 11.07, 13.01, 13.02 and 13.03 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 00830 and Article 13 in the Supplementary Conditions.

11. Payments

Add the following paragraph after Paragraph 15.01B.4 of the General Conditions:

“5. The Contractor shall submit Weekly Payroll Records Report and Statement of Compliance verifying compliance with the Minimum Prevailing Wage Law, MGL c. 149, §26-27H. These Statements of Compliance shall be submitted as a condition of payment for work performed during the period the reports apply.”

Delete paragraph 15.01C.1 of the General Conditions in its entirety and insert the following in its place:

“1. Progress Payments will be made in accordance with MGL c. 30, §39G, or §39K, as applicable.”

Delete paragraph 15.01D.1 of the General Conditions in its entirety and replace it with the following:

“1. Payment shall be made in accordance with MGL c. 30, §39G, or §39K, as applicable.”

Add the following new paragraph following paragraph 15.01D.1 of the General Conditions:

“2. The Contractor shall make payments to Subcontractors in accordance with the requirements of MGL c. 30, §39F.”

Delete paragraph 15.06B of the General Conditions in its entirety and insert the following in its place:

"Engineer's Review of Final Application and Recommendation of Payment: 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 its 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 15.07. 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 provisions of the Massachusetts General Laws, make payment to the Contractor."

Delete paragraph 15.06E of the General Conditions in its entirety and replace it with the following:

“1. Payment shall be made in accordance with MGL c. 30, §39G, or §39K, as applicable.”

12. Suspension of Work and Termination

Delete paragraph 16.01A 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 MGL c. 30, §39O."

13. Special Requirements for Hazardous Wastes Contracts

Add the following at the end of the first sentence of Paragraph 18.14 of the General Conditions:

“, and to the “Rules and Regulations for the Prevention of Accidents in Construction Operations Chapter 454 CMR (Code of Massachusetts Regulations) 10.00 et seq.”

14. Labor Classifications and Prevailing Wage Rates

Add the following paragraphs under the heading "Prevailing Wage Rates" after paragraph 18.14 of the Supplementary Conditions:

"18.15 Prevailing Wage Rates

- A. Prevailing Wage Rates as determined by the Director of the Executive Office of Labor and Workforce Development under the provisions of MGL c. 149, §26-27H apply to this project. A copy of the wage schedule is included in Attachment A of Section 00830. 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 Director. Such approved minimum rate shall be retroactive 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, except in the case of the duration of this Agreement exceeding one year, when the Contractor will be responsible for requesting and

obtaining updated prevailing wage rates from the Owner before the one-year anniversary of the project's start date, 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 for a minimum of three years.”

15. Contractor's Surety

Add the following sentences at the end of paragraph 6.01A:

“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.”

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 broadband 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.

3. OSHA 10 Hour Certification Requirements

All employees of the Contractor who work at the jobsite must have received OSHA 10 Hour safety training, and have proof, at the jobsite, of being certified by OSHA as having received the training. The Contractor must provide written proof (copy of OSHA card each employee

is required to carry is preferred) of this certification for every employee with submission of the first certified payroll report for each employee.

END OF SECTION

SECTION 00 83 00

ATTACHMENT A

PREVAILING WAGE RATES

THE MASSACHUSETTS PREVAILING WAGE LAW

M.G.L. C. 149, §§26-27

NOTICE TO AWARDING AUTHORITIES

- A. The enclosed wage schedule applies only to the specific project listed at the top of the schedule, and these rates will remain in effect for the duration of the project, except in the case of multi-year projects. For projects lasting longer than one year, awarding authorities must request updated rates.
- B. You should request an updated wage schedule from the Department of Labor Standards if you have not opened bids or selected a contractor within 90 days of the date of issuance of the enclosed wage schedule.
- C. The wage schedule shall be incorporated in any advertisement or call for bids for the project for which it has been issued.
- D. Once a contractor has been selected by the awarding authority, the wage schedule shall be made a part of the contract for that project.

NOTICE TO CONTRACTORS

- E. The enclosed wage schedule must be posted in a conspicuous place at the work site during the life of the project.
- F. The wages listed on the enclosed wage schedule must be paid to employees on public works projects regardless of whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- G. The enclosed wage schedule applies to all phases of the project, including the final clean-up. Contractors whose only role is to perform final clean-up must pay their employees according to this wage schedule.
- H. All apprentices must be registered with the Massachusetts Division of Apprenticeship Standards (DAS) in order to be paid at the lower apprentice rates. All apprentices must keep his/her apprentice identification card on his/her person during all work hours. If a worker is not registered with DAS, they must be paid the "total rate" listed on the wage schedule regardless of experience or skill level. For further information, please call 617-626-5409, or write to:

DAS
19 Staniford Street, 1st Floor
P.O. Box 146759
Boston, MA 0211

WEEKLY STATEMENT OF COMPLIANCE

In accordance with Massachusetts General Law c. 149, §27B, a true and accurate record must be kept of all persons employed on the public works project for which the enclosed rates have been provided. A Payroll Form is available from the Department of Labor Standards (DLS) at mass.gov/dols/pw and includes all the information required to be kept by law. Every contractor or subcontractor is required to keep these records and preserve them for a period of three years from the date of completion of the contract.

On a weekly basis, every contractor and subcontractor is required to submit a certified copy of their weekly payroll records to the awarding authority; this includes the payroll forms and the Statement of Compliance form. The certified payroll records must be submitted either by regular mail or by e-mail to the awarding authority. Once collected, the awarding authority is required to preserve those records for three years from the date of completion of the project.

Each such contractor and subcontractor shall furnish weekly **and** within 15 days after completion of its portion of the work, to the awarding authority directly by first-class mail or email, a statement, executed by the contractor, subcontractor or by any authorized officer thereof who supervised the payment of wages, this form, accompanied by their payroll:

WEEKLY STATEMENT OF COMPLIANCE

_____, 20____

I, _____, _____,
(Name of signatory party) (Title)

do hereby state:

That I pay or supervise the payment of the persons employed by
_____ on the _____
(Contractor, subcontractor or public body) (Building or project)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty nine of the General Laws.

Signature _____

Title _____

Prevailing Wage Sheets to be Provided via Addendum

SECTION 00 83 00

ATTACHMENT B

EXCERPTS FROM CHAPTERS 30, 82, AND 149 OF THE
MASSACHUSETTS GENERAL LAWS

ATTACHMENT B

Excerpts from Chapters 30, 82 and 149 of the Massachusetts General Laws

***NOTICE** - These are **NOT** the official versions of the Massachusetts General Laws (MGL). While reasonable efforts have been made to assure the accuracy of the excerpts provided, do not rely on this information without first checking an official edition of the MGL. If you are in need of legal advice or counsel, consult a lawyer. These excerpts include amendments to the General Laws passed before January 4, 2023. For laws enacted since that time, see the 2023 Session Laws.*

CERTAIN EXCERPTS FROM THE MASSACHUSETTS GENERAL LAWS ARE APPLICABLE TO CONSTRUCTION CONTRACTS. ATTENTION IS DIRECTED TO THE FOLLOWING SECTIONS OF CHAPTER 149 AS AMENDED.

Section 25. LODGING, BOARD AND TRADE OF PUBLIC EMPLOYEES; STATUTE PART OF EMPLOYMENT CONTRACT.

"Every employee in public work shall lodge, board, and trade where and with whom he elects; and no person or his agents or employees under contract with the commonwealth, a county, city or town, or with a department, board, commission or officer acting therefor, for the doing of public work shall directly or indirectly require, as a condition of employment therein, that the employee shall lodge, board or trade at a particular place or with a particular person. This section shall be made a part of the contract for such employment."

Section 26. PUBLIC WORKS; PREFERENCE TO VETERANS AND CITIZENS; WAGES.

"In the employment of mechanics and apprentices, teamsters, chauffeurs and laborers in the construction of public works by the commonwealth, or by a county, town, authority or district, or by persons contracting or subcontracting for such works, preference shall first be given to citizens of the commonwealth who have been residents of the commonwealth for at least six months at the commencement of their employment who are veterans as defined in clause Forty-third of section 7 of chapter 4 and who are qualified to perform the work to which the employment relates and, within such preference, preference shall be given to service-disabled veterans; and secondly, to citizens of the commonwealth generally who have been residents of the commonwealth for at least six months at the commencement of their employment, and if they cannot be obtained in sufficient numbers, then to citizens of the United States, and every contract for such work shall contain a provision to this effect..."

Section 34. PUBLIC CONTRACTS; STIPULATION AS TO HOURS AND DAYS OF WORK; VOID CONTRACTS.

"Every contract, except for the purchase of material or supplies, involving the employment of laborers, workmen, mechanics, foremen or inspectors, to which the commonwealth or any county or any town, subject to section thirty, is a party, shall contain a stipulation that no laborer, workman, mechanic, foreman or inspector working within the commonwealth, in the employ of the contractor, subcontractor or other person doing or contracting to do the whole or 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 more than forty-eight hours in any one week, or more than six days in any one week, except in cases of emergency, or, in case any town subject to section thirty-one is a party to such a contract, more than eight hours in any one day, except as aforesaid..."

Section 34A. CONTRACTS FOR PUBLIC WORKS; WORKERS' COMPENSATION INSURANCE; BREACH OF CONTRACT; ENFORCEMENT AND VIOLATION OF STATUTE.

"Every contract for the construction, alteration, maintenance, repair or demolition of, or addition to, any public building or other public works for the commonwealth or any political subdivision thereof shall contain stipulations requiring that the contractor shall, before commencing performance of such contract, provide by insurance for the payment of compensation and the furnishing of other benefits under chapter one hundred and fifty-two to all persons to be employed under the contract, and that the contractor shall continue such insurance in full force and effect during the term of the contract. No officer or agent contracting in behalf of the commonwealth or any political subdivision thereof shall award such a contract until he has been furnished with sufficient proof of compliance with the aforesaid

stipulations. Failure to provide and continue in force such insurance as aforesaid shall be deemed a material breach of the contract and shall operate as an immediate termination thereof. No cancellation of such insurance, whether by the insurer or by the insured, shall be valid unless written notice thereof is given by the party proposing cancellation to the other party and to the officer or agent who awarded the contract at least fifteen days prior to the intended effective date thereof, which date shall be expressed in said notice. Notice of cancellation sent by the party proposing cancellation by registered mail, postage prepaid, with a return receipt of the addressee requested, shall be a sufficient notice..."

Section 34B. CONTRACTS FOR PUBLIC WORKS; WAGES FOR RESERVE POLICE OFFICER.

"Every contract for the construction, alteration, maintenance, repair or demolition of, or addition to, any public works for the commonwealth or any political subdivision thereof shall contain stipulations requiring that the contractor shall pay to any reserve police officer employed by him in any city or town the prevailing rate of wage paid to regular police officers in such city or town."

Whenever general bids are invited for a contract subject to Section 44A, the following provision applies:

Section 44E. FILING OF BIDS; FORMS; MODULAR BUILDINGS. Second paragraph of subdivision (2), clause E.

"The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work; that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that he will comply fully with all laws and regulations applicable to awards made subject to section 44A."

For projects estimated to cost more than \$25,000, the following provision applies to sub-bidders:

Section 44F. PLANS AND SPECIFICATIONS; SUB-BIDS; FORM; CONTENTS. First paragraph of clause I of subdivision (2) of section 44F.

"The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work; that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that he will comply fully with all laws and regulations applicable to awards of subcontracts subject to section 44F."

Section 44G. ALLOWANCES; ALTERNATES; WEATHER PROTECTION DEVICES.

"(A) "Allowance" as used herein means a sum of money covering one or more items of labor or labor and materials which is designated in bid documents and which general bidders are required to use in computing their bids. The use of such allowances shall be prohibited in the award of any contract subject to the provisions of section forty-four A. Whenever the designer is unable to supply specifications for any item prior to the solicitation of bids, such item shall not be included in any contract subject to the provisions of section forty-four A. The awarding authority shall solicit bids for every such item separately pursuant to the provisions of section forty-four A after specifications for that item are prepared.

(B) Every alternate contained in the form for general bids shall be listed in a numerical sequence in order of priority. When the awarding authority decides to consider alternates in determining the lowest eligible and responsible bidder, the awarding authority shall consider the alternates in descending numerical sequence, such that no single alternate shall be considered unless every alternate preceding it on the list has been added to or subtracted from the base bid price.

(C) The use of options other than alternates in bid documents or bid forms subject to section forty-four A shall be prohibited under all circumstances.

(D) Every contract subject to section forty-four A shall include specifications for the installation of weather protection and shall require that the contractor shall install the same and that he shall furnish adequate heat in the area so protected during the months of November through March. Standards for such specifications shall be established by the commissioner or his designee.”

Section 44J. INVITATIONS TO BID; NOTICE; CONTENTS; VIOLATIONS; PENALTY.

"(1) No public agency or authority of the commonwealth or any political subdivision thereof shall award any contract for which competitive bids are required pursuant to section forty-four A of this chapter or section thirty-nine M of chapter thirty, or for which competitive proposals are required pursuant to subsection (4) of section forty-four E of this chapter or section eleven C of chapter twenty-five A, unless a notice inviting bids or proposals therefor shall have been posted no less than one week prior to the time specified in such notice for the receipt of said bids or proposals in a conspicuous place in or near the offices of the awarding authority, and shall have remained posted until the time so specified, and unless such notice shall also have been published at least once not less than two weeks prior to the time so specified in the central register published by the secretary of state pursuant to section twenty A of chapter nine and in a newspaper of general circulation in the locality of the proposed project, and on the COMMBUYS system administered by the operational services division. Said notice shall also be published at such other times and in such other newspapers or trade periodicals as the commissioner of capital asset management and maintenance may require, having regard to the locality of the work involved.

(2) Said notice shall specify the time and place where plans and specifications of the proposed work may be had; the time and place of submission of general bids; and the time and place for opening of the general bids. For contracts subject to the provisions of section forty-four A to H, inclusive, of this chapter, said notice shall also specify the time and place for submission of filed sub-bids, where required pursuant to section forty-four F; and the time and place for opening of said filed sub-bids.

Said notice shall also provide sufficient facts concerning the nature and scope of such project, the type and elements of construction, and such other information as will assist applicants in deciding to bid on such contract.

(3) No contract or preliminary plans and specifications shall be split or divided for the purpose of evading the provisions of this section.

(4) General bids and filed sub-bids for any contract subject to this section shall be in writing and shall be opened in public at the time and place specified in the posted or published notice, and after being so opened shall be open to public inspection.

(5) The provisions of this section shall not apply to any transaction between the commonwealth and any public service corporation.

(6) The provisions of this section may be waived in cases of extreme emergency involving the health and safety of the people and their property, upon the written approval of said commissioner. The written approval shall contain a description of the circumstances and the reasons for the commissioner's determination.

(7) Whoever violates any provision of this section shall be punished by a fine of not more than ten thousand dollars or by imprisonment in the state prison for not more than three years or in a jail or house of correction for not more than two and one-half years, or by both said fine and imprisonment; and in the event of final conviction, said person shall be incapable of holding any office of honor, trust or profit under the commonwealth or under any county, district of municipal agency.

Each and every person who shall cause or conspire to cause any contract or preliminary plans and specifications to be split or divided for the purpose of evading the provisions of this section shall forfeit and pay to the commonwealth, a political subdivision thereof or other awarding authority subject to this section, the sum of not more than five thousand dollars and, in addition, such person or persons shall pay, apportioned among them, double the amount of damages

which the commonwealth or political subdivision thereof or other awarding authority may have sustained by reason of the doing of such act, together with the costs of the action.

(8) If an awarding authority rejects all general bids or does not receive any general bids, and advertises for a second opening of general bids with the original filed sub-bids as set forth in subsection (1) of section forty-four E the notice for receipt of such general bids may be published in the central register and elsewhere as required not less than one week prior to the time specified for such second opening of general bids.

(9) No request for proposals or invitation for bids issued under sections 38A ½ to 38O, inclusive, of chapter 7, section 11C of chapter 25A, section 39M of chapter 30, this section and sections 44A to 44H, inclusive, shall be advertised if the awarding authority's cost estimate is greater than 1 year old."

Attention is directed to the following sections of Chapter 30 of the General Laws of Massachusetts as amended to date.

Section 38A. PRICE ADJUSTMENT CLAUSE IN CONTRACTS FOR ROAD, BRIDGE, WATER AND SEWER PROJECTS AWARDED UNDER SEC. 39M

"Contracts for road and bridge projects awarded as a result of a proposal or invitation for bids under section 39M shall include a price adjustment clause for each of the following materials: fuel, both diesel and gasoline; asphalt; concrete; and steel. Contracts for water and sewer projects awarded as a result of a proposal or invitation for bids under said section 39M shall include a price adjustment clause for fuel, both diesel and gasoline; liquid asphalt; and portland cement contained in cast-in-place concrete. A base price for each material shall be set by the awarding authority or agency and shall be included in the bid documents at the time the project is advertised. The awarding authority or agency shall also identify in the bid documents the price index to be used for each material. The price adjustment clause shall provide for a contract adjustment to be made on a monthly basis when the monthly cost change exceeds plus or minus 5 per cent."

Section 39F. CONSTRUCTION CONTRACTS; ASSIGNMENT AND SUBROGATION; SUBCONTRACTOR DEFINED; ENFORCEMENT OF CLAIM FOR DIRECT PAYMENT; DEPOSIT; REDUCTION OF DISPUTED AMOUNTS.

"(1) Every contract awarded pursuant to sections forty-four A to L inclusive, of chapter one hundred and forty-nine shall contain the following subparagraphs (a) through (i) and every contract awarded pursuant to section thirty-nine M of chapter thirty shall contain the following subparagraphs (a) through (h) and in each case those subparagraphs shall be binding between the general contractor and each subcontractor.

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

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

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

subcontractor as provided in subparagraphs (a) and (b), the awarding authority shall act upon the demand as provided in this section.

(d) If, within seventy days after the subcontractor has substantially completed the subcontract work, the subcontractor has not received from the general contractor the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, the subcontractor may demand direct payment of that balance from the awarding authority. The demand shall be by a sworn statement delivered to or sent by certified mail to the awarding authority, and a copy shall be delivered to or sent by certified mail to the general contractor at the same time. The demand shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of 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 awarding authority and delivered or so mailed a copy to the general contractor, the general contractor may reply to the demand. The reply shall be by a sworn statement delivered to or sent by certified mail to the awarding authority and a copy shall be delivered to or sent by certified mail to the subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor and of the amount due for each claim made by the general contractor against the subcontractor.

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

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

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

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

(i) If the subcontractor does not receive payment as provided in subparagraph (a) or if the general contractor does not submit a periodic estimate for the value of the labor or materials performed or furnished by the subcontractor and the subcontractor does not receive payment for same when due less the deductions provided for in subparagraph (a), the subcontractor may demand direct payment by following the procedure in subparagraph (d) and the general

contractor may file a sworn reply as provided in that same subparagraph. A demand made after the first day of the month following that for which the subcontractor performed or furnished the labor and materials for which the subcontractor seeks payment shall be valid even if delivered or mailed prior to the time payment was due on a periodic estimate from the general contractor. Thereafter the awarding authority shall proceed as provided in subparagraph (e), (f), (g), and (h).

(2) Any assignment by a subcontractor of the rights under this section to a surety company furnishing a bond under the provisions of section twenty-nine of chapter one hundred forty-nine shall be invalid. The assignment and subrogation rights of the surety to amounts included in a demand for direct payment which are in the possession of the awarding authority or which are on deposit pursuant to subparagraph (f) of paragraph (1) shall be subordinate to the rights of all subcontractors who are entitled to be paid under this section and who have not been paid in full.

(3) "Subcontractor" as used in this section (i) for contracts awarded as provided in sections forty-four A to forty-four H, inclusive, of chapter one hundred forty-nine shall mean a person who files a sub-bid and receives a subcontract as a result of that filed sub-bid or who is approved by the awarding authority in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the general contractor, (ii) for contracts awarded as provided in paragraph (a) of section thirty-nine M of chapter thirty shall mean a person approved by the awarding authority in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the general contractor, and (iii) for contracts with the commonwealth not awarded as provided in forty-four A to forty-four H, inclusive, of chapter one hundred forty-nine shall also mean a person contracting with the general contractor to supply materials used or employed in a public works project for a price in excess of five thousand dollars.

(4) A general contractor or a subcontractor shall enforce a claim to any portion of the amount of a demand for direct payment deposited as provided in subparagraph (f) of paragraph 1 by a petition in equity in the superior court against the other and the bank shall not be a necessary party. A subcontractor shall enforce a claim for direct payment or a right to require a deposit as provided in subparagraph (f) of paragraph 1 by a petition in equity in the superior court against the awarding authority and the general contractor shall not be a necessary party. Upon motion of any party the court shall advance for speedy trial any petition filed as provided in this paragraph. Sections fifty-nine and fifty-nine B of chapter two hundred thirty-one shall apply to such petitions. The court shall enter an interlocutory decree upon which execution shall issue for any part of a claim found due pursuant to sections fifty-nine and fifty-nine B and, upon motion of any party, shall advance for speedy trial the petition to collect the remainder of the claim. Any party aggrieved by such interlocutory decree shall have the right to appeal therefrom as from a final decree. The court shall not consolidate for trial the petition of any subcontractor with the petition of one or more subcontractors or the same general contract unless the court finds that a substantial portion of the evidence of the same events during the course of construction (other than the fact that the claims sought to be consolidated arise under the same general contract) is applicable to the petitions sought to be consolidated and that such consolidation will prevent unnecessary duplication of evidence. A decree in any such proceeding shall not include interest on the disputed amount deposited in excess of the interest earned for the period of any such deposit. No person except a subcontractor filing a demand for direct payment for which no funds due the general contractor are available for direct payment shall have a right to file a petition in court of equity against the awarding authority claiming a demand for direct payment is premature and such subcontractor must file the petition before the awarding authority has made a direct payment to the subcontractor and has made a deposit of the disputed portion as provided in part (iii) of subparagraph (e) and in subparagraph (f) of paragraph (1).

(5) In any petition to collect any claim for which a subcontractor has filed a demand for direct payment the court shall, upon motion of the general contractor, reduce by the amount of any deposit of a disputed amount by the awarding authority as provided in part (iii) of subparagraph (e) and in subparagraph (f) of paragraph (1) any amount held under a trustee writ or pursuant to a restraining order or injunction."

Section 39G. COMPLETION OF PUBLIC WORKS; SEMI-FINAL AND FINAL ESTIMATES; PAYMENTS; EXTRA WORK; DISPUTED ITEMS.

"Upon substantial completion of the work required by a contract with the commonwealth, or any agency or political subdivision thereof, for the construction, reconstruction, alteration, remodeling, repair or improvement of public ways, including bridges and other highway structures, sewers and water mains, airports and other public works, the

contractor shall present in writing to the awarding authority its certification that the work has been substantially completed. Within twenty-one days thereafter, the awarding authority shall present to the contractor either a written declaration that the work has been substantially completed or an itemized list of incomplete or unsatisfactory work items required by the contract sufficient to demonstrate that the work has not been substantially completed. The awarding authority may include with such list a notice setting forth a reasonable time, which shall not in any event be prior to the contract completion date, within which the contractor must achieve substantial completion of the work. In the event that the awarding authority fails to respond, by presentation of a written declaration or itemized list as aforesaid, to the contractor's certification within the twenty-one-day period, the contractor's certification shall take effect as the awarding authority's declaration that the work has been substantially completed.

Within sixty-five days after the effective date of a declaration of substantial completion, the awarding authority shall prepare and forthwith send to the contractor for acceptance a substantial completion estimate for the quantity and price of the work done and all but one percent retainage, if held by the awarding authority, on that work, including the quantity, price and all but one percent retainage, if held by the awarding authority, for the undisputed part of each work item and extra work item in dispute but excluding the disputed part thereof, less the estimated cost of completing all incomplete and unsatisfactory work items and less the total periodic payments made to date for the work. The awarding authority also shall deduct from the substantial completion estimate an amount equal to the sum of all demands for direct payment filed by subcontractors and not yet paid to subcontractors or deposited in joint accounts pursuant to section thirty-nine F, but no contract subject to said section thirty-nine F shall contain any other provision authorizing the awarding authority to deduct any amount by virtue of claims asserted against the contract by subcontractors, material suppliers or others.

If the awarding authority fails to prepare and send to the contractor any substantial completion estimate required by this section on or before the date herein above set forth, the awarding authority shall pay to the contractor interest on the amount which would have been due to the contractor pursuant to such substantial completion estimate at the rate of three percentage points above the rediscount rate then charged by the Federal Reserve Bank of Boston from such date to the date on which the awarding authority sends that substantial completion estimate to the contractor for acceptance or to the date of payment therefor, whichever occurs first. The awarding authority shall include the amount of such interest in the substantial completion estimate.

Within fifteen days after the effective date of the declaration of substantial completion, the awarding authority shall send to the contractor by certified mail, return receipt requested, a complete list of all incomplete or unsatisfactory work items, and, unless delayed by causes beyond his control, the contractor shall complete all such work items within forty-five days after the receipt of such list or before the then contract completion date, whichever is later. If the contractor fails to complete such work within such time, the awarding authority may, subsequent to seven days' written notice to the contractor by certified mail, return receipt requested, terminate the contract and complete the incomplete or unsatisfactory work items and charge the cost of same to the contractor.

Within thirty days after receipt by the awarding authority of a notice from the contractor stating that all of the work required by the contract has been completed, the awarding authority shall prepare and forthwith send to the contractor for acceptance a final estimate for the quantity and price of the work done and all retainage, if held by the awarding authority, on that work less all payments made to date, unless the awarding authority's inspection shows that work items required by the contract remain incomplete or unsatisfactory, or that documentation required by the contract has not been completed. If the awarding authority fails to prepare and send to the contractor the final estimate within thirty days after receipt of notice of completion, the awarding authority shall pay to the contractor interest on the amount which would have been due to the contractor pursuant to such final estimate at the rate hereinabove provided from the thirtieth day after such completion until the date on which the awarding authority sends the final estimate to the contractor for acceptance or the date of payment therefor, whichever occurs first, provided that the awarding authority's inspection shows that no work items required by the contract remain incomplete or unsatisfactory. Interest shall not be paid hereunder on amounts for which interest is required to be paid in connection with the substantial completion estimate as hereinabove provided. The awarding authority shall include the amount of the interest required to be paid hereunder in the final estimate.

The awarding authority shall pay the amount due pursuant to any substantial completion or final estimate within thirty-five days after receipt of written acceptance for such estimate from the contractor and shall pay interest on the amount due pursuant to such estimate at the rate hereinabove provided from that thirty-fifth day to the date of payment.

Within 15 days, 30 days in the case of the commonwealth, after receipt from the contractor, at the place designated by the awarding authority, if such place is so designated, of a periodic estimate requesting payment of the amount due for the preceding periodic estimate period, the awarding authority shall make a periodic payment to the contractor for the work performed during the preceding periodic estimate period 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 the contractor to transfer title to the awarding authority, upon certification by the contractor that he is the lawful owner and that the materials are free from all encumbrances. The awarding authority shall include with each such payment interest on the amount due pursuant to such periodic estimate at the rate herein above provided from the due date. In the case of periodic payments, the contracting authority may deduct from its payment a retention based on its estimate of the fair value of its claims against the contractor, a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of section thirty-nine F, and a retention to secure satisfactory performance of the contractual work not exceeding five per cent of the approved amount of any periodic payment, and the same right to retention shall apply to bonded subcontractors entitled to direct payment under section thirty-nine F of chapter thirty; provided, that a five per cent value of all items that are planted in the ground shall be deducted from the periodic payments until final acceptance.

No periodic, substantial completion or final estimate or acceptance or payment thereof shall bar a contractor from reserving all rights to dispute the quantity and amount of, or the failure of the awarding authority to approve a quantity and amount of, all or part of any work item or extra work item.

Substantial completion, for the purposes of this section, shall mean either that the work required by the contract has been completed except for work having a contract price of less than one percent of the then adjusted total contract price, or substantially all of the work has been completed and opened to public use except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the work required by the contract."

Section 39I. DEVIATIONS FROM PLANS AND SPECIFICATIONS.

"Every contractor having a contract for the construction, alteration, maintenance, repair or demolition of, or addition to, any public building or public works for the commonwealth, or of any political subdivision thereof, shall perform all the work required by such contract in conformity with the plans and specifications contained therein. No wilful and substantial deviation from said plans and specifications shall be made unless authorized in writing by the awarding authority or by the engineer or architect in charge of the work who is duly authorized by the awarding authority to approve such deviations. In order to avoid delays in the prosecution of the work required by such contract such deviation from the plans or specifications may be authorized by a written order of the awarding authority or such engineer or architect so authorized to approve such deviation. Within thirty days thereafter, such written order shall be confirmed by a certificate of the awarding authority stating: (1) if such deviation involves any substitution or elimination of materials, fixtures or equipment, the reasons why such materials, fixtures or equipment were included in the first instance and the reasons for substitution or elimination, and, if the deviation is of any other nature, the reasons for such deviation, giving justification therefor; (2) that the specified deviation does not materially injure the project as a whole; (3) that either the work substituted for the work specified is of the same cost and quality, or that an equitable adjustment has been agreed upon between the contracting agency and the contractor and the amount in dollars of said adjustment; and (4) that the deviation is in the best interest of the contracting authority.

Such certificate shall be signed under the penalties of perjury and shall be a permanent part of the file record of the work contracted for.

Whoever violates any provision of this section wilfully and with intent to defraud shall be punished by a fine of not more than five thousand dollars or by imprisonment for not more than six months, or both."

Section 39J. PUBLIC CONSTRUCTION CONTRACTS; EFFECT OF DECISIONS OF CONTRACTING BODY OR ADMINISTRATIVE BOARD.

"Notwithstanding any contrary provision of any contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building or public works by the commonwealth, or by any county, city, town, district, board, commission or other public body, when the amount of the contract is more than five thousand dollars in the case of the commonwealth and more than two thousand dollars in the case of any county, city, town, district,

board, commission or other public body, a decision, by the contracting body or by any administrative board, official or agency, or by any architect or engineer, on a dispute, whether of fact or of law, arising under said contract shall not be final or conclusive if such decision is made in bad faith, fraudulently, capriciously, or arbitrarily is unsupported by substantial evidence, or is based upon error of law.”

Section 39K. PUBLIC BUILDING CONSTRUCTION CONTRACTS; PAYMENTS.

"Every contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building by the commonwealth, or by any county, city, town, district, board, commission or other public body, when the amount is more than five thousand dollars in the case of the commonwealth and more than two thousand dollars in the case of any county, city, town, district, board, commission or other public body, shall contain the following paragraph: Within fifteen days (30 days in the case of the commonwealth, including local housing authorities) after receipt from the contractor, at the place designated by the awarding authority if such a place is so designated, of a periodic estimate requesting payment of the amount due for the preceding month, the awarding authority 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 the contractor to transfer title to the awarding authority, upon certification by the contractor that he is the lawful owner and that the materials are free from all encumbrances, but less (1) a retention based on its estimate of the fair value of its claims against the contractor and less (2) a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of section thirty-nine F, and less (3) a retention not exceeding five percent of the approved amount of the periodic payment. After the receipt of a periodic estimate requesting final payment and within sixty-five-days after (a) the contractor fully completes the work or substantially completes the work so that the value of the work remaining to be done is, in the estimate of the awarding authority, less than one percent of the original contract price, or (b) the contractor substantially completes the work and the awarding authority takes possession for occupancy, whichever occurs first, the awarding authority shall pay the contractor the entire balance due on the contract less (1) a retention based on its estimate of the fair value of its claims against the contractor and of the cost of completing the incomplete and unsatisfactory items of work and less (2) a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of section thirty-nine F, 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 thirty-nine F. If the awarding authority fails to make payment as herein provided, there shall be added to each such payment daily interest at the rate of three percentage points above the rediscount rate then charged by the Federal Reserve Bank of Boston 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 (twenty-four days in the case of the commonwealth) after receipt of such a periodic estimate from the contractor, at the place designated by the awarding authority 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.

The awarding authority may make changes in any periodic estimate submitted by the contractor and the payment due on said periodic estimate shall be computed in accordance with the changes so made, but such changes or any requirement for a corrected periodic estimate shall not affect the due date for the periodic payment or the date for the commencement of interest charges on the amount of the periodic payment computed in accordance with the changes made, as provided herein; provided, that the awarding authority 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 of such periodic estimate shall be the date of receipt of the corrected 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 thirty-nine G shall not apply to any contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building to which this section applies.

All periodic estimates shall be submitted to the awarding authority, or to its designee as set forth in writing to the contractor, and the date of receipt by the awarding authority or its designee shall be marked on the estimate. All periodic estimates shall contain a separate item for each filed subtrade and each sub-subtrade listed in sub-bid form as required by specifications and a column listing the amount paid to each subcontractor and sub-subcontractor as of the date the periodic estimate is filed. The person making payment for the awarding authority shall add the daily interest

provided for herein to each payment for each day beyond the due date based on the date of receipt marked on the estimate.

A certificate of the architect to the effect that the contractor has fully or substantially completed the work shall, subject to the provisions of section thirty-nine J, be conclusive for the purposes of this section.

Notwithstanding the provisions of this section, at any time after the value of the work remaining to be done is, in the estimation of the awarding authority, less than 1 per cent of the adjusted contract price, or the awarding authority has determined that the contractor has substantially completed the work and the awarding authority has taken possession for occupancy, the awarding authority may send to the general contractor by certified mail, return receipt requested, a complete and final list of all incomplete and unsatisfactory work items, including, for each item on the list, a good faith estimate of the fair and reasonable cost of completing such item. The general contractor shall then complete all such work items within 30 days of receipt of such list or before the contract completion date, whichever is later. If the general contractor fails to complete all incomplete and unsatisfactory work items within 45 days after receipt of such items furnished by the awarding authority or before the contract completion date, whichever is later, subsequent to an additional 14 days' written notice to the general contractor by certified mail, return receipt requested, the awarding authority may terminate the contract and complete the incomplete and unsatisfactory work items and charge the cost of same to the general contractor and such termination shall be without prejudice to any other rights or remedies the awarding authority may have under the contract. The awarding authority shall note any such termination in the evaluation form to be filed by the awarding authority pursuant to the provisions of section 44D of chapter 149."

Section 39L. PUBLIC CONSTRUCTION WORK BY FOREIGN CORPORATIONS; RESTRICTIONS AND REPORTS.

"The commonwealth and every county, city, town, district, board, commission or other public body which, as the awarding authority, requests proposals, bids or sub-bids for any work in the construction, reconstruction, alteration, remodeling, repair or demolition of any public building or other public works (1) shall not enter into a contract for the work with, and shall not approve as a subcontractor furnishing labor and materials for a part of the work, a foreign corporation which has not filed with such awarding authority a certificate of the state secretary stating that the corporation has complied with requirements of section 15.03 of subdivision A of Part 15 of chapter 156D and the date of compliance, and further has filed all annual reports required by section 16.22 of subdivision B of Part 16 of said chapter 156D, and (2) shall report to the state secretary and to the department of corporations and taxation any foreign corporation performing work under such contract or subcontract, and any person, other than a corporation, performing work under such contract or subcontract, and residing or having a principal place of business outside the commonwealth."

Section 39M. CONTRACTS FOR CONSTRUCTION AND MATERIALS; MANNER OF AWARDING.

"(b) Specifications for such contracts, and specifications for contracts awarded pursuant to the provisions of said sections forty-four A to forty-four L of said chapter one hundred and forty-nine, shall be written to provide for full competition for each item of material to be furnished under the contract; except, however, that said specifications may be otherwise written for sound reasons in the public interest stated in writing in the public records of the awarding authority or promptly given in writing by the awarding authority to anyone making a written request therefor, in either instance such writing to be prepared after reasonable investigation. Every such contract shall provide that an item equal to that named or described in the said specifications may be furnished; and an item shall be considered equal to the item so named or described if, in the opinion of the awarding authority: (1) it is at least equal in quality, durability, appearance, strength and design, (2) it will perform at least equally the function imposed by the general design for the public work being contracted for or the material being purchased, and (3) it conforms substantially, even with deviations, to the detailed requirements for the item in the said specifications. For each item of material the specifications shall provide for either a minimum of three named brands of material or a description of material which

can be met by a minimum of three manufacturers or producers, and for the equal of any one of said named or described materials."

For projects estimated to cost more than \$10,000, the following provision, section 39M subsection c, applies:

"(c) The term "lowest responsible and eligible bidder" shall mean the bidder: (1) whose bid is the lowest of those bidders possessing the skill, ability and integrity necessary for the faithful performance of the work; (2) who shall certify, that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work; (3) who shall certify that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; (4) who, where the provisions of section 8B of chapter 29 apply, shall have been determined to be qualified thereunder; and (5) who obtains within 10 days of the notification of contract award the security by bond required under section 29 of chapter 149; provided that for the purposes of this section the term "security by bond" shall mean the bond of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the awarding authority; provided further, that if there is more than 1 surety company, the surety companies shall be jointly and severally liable."

Section 39N. CONSTRUCTION CONTRACTS; EQUITABLE ADJUSTMENT IN CONTRACT PRICE FOR DIFFERING SUBSURFACE OR LATENT PHYSICAL CONDITIONS.

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

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

Section 39O. CONTRACTS FOR CONSTRUCTION AND MATERIALS; SUSPENSION, DELAY OR INTERRUPTION DUE TO ORDER OF AWARDING AUTHORITY; ADJUSTMENT IN CONTRACT PRICE; WRITTEN CLAIM.

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

(a) The awarding authority may order the general contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as it may determine to be appropriate for the convenience of the awarding authority; provided however, that if there is a suspension, delay or interruption for fifteen days or more or due to a failure of the

awarding authority to act within the time specified in this contract, the awarding authority shall make an adjustment in the contract price for any increase in the cost of performance of this contract but shall not include any profit to the general contractor on such increase; and provided further, that the awarding authority shall not make any adjustment in the contract price under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this contract provides for an equitable adjustment of the contract price under any other contract provisions.

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

Section 39P. CONTRACTS FOR CONSTRUCTION AND MATERIALS; AWARDING AUTHORITY’S DECISIONS ON INTERPRETATION OF SPECIFICATIONS, ETC.; TIME LIMIT; NOTICE.

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

Section 39Q. CONTRACTS FOR CAPITAL FACILITY CONSTRUCTION; CONTENTS; ANNUAL CLAIMS REPORT.

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

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

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

(c) Within twenty-one calendar days of the receipt of a written decision or of the failure to issue a decision as stated in the preceding subparagraph, any aggrieved party may file a notice of claim for an adjudicatory hearing with the division of hearing officers or the aggrieved party may file an action directly in a court of competent jurisdiction and shall serve copies thereof upon all other parties in the form and manner prescribed by the rules governing the conduct of adjudicatory proceedings of the division of hearing officers. In the event an aggrieved party exercises his option to file an action directly in court as provided in the previous sentence, the twenty-one day period shall not apply to such

filing and the period of filing such action shall be the same period otherwise applicable for filing a civil action in superior court. The appeal shall be referred to a hearing officer experienced in construction law and shall be prosecuted in accordance with the formal rules of procedure for the conduct of adjudicatory hearings of the division of hearing officers, except as provided below. The hearing officer shall issue a final decision as expeditiously as possible, but in no event more than one hundred and twenty calendar days after conclusion of the adjudicatory hearing, unless the decision is delayed by a request for extension of time for filing post-hearing briefs or other submissions assented to by all parties. Whenever, because an extension of time has been granted, the hearing officer is unable to issue a decision within one hundred and twenty days, he shall notify all parties of the reasons for the delay and the date when the decision will issue. Failure to issue a decision within the one hundred and twenty-day period or within the additional period specified in such written notice shall give the petitioner the right to pursue any legal remedies available to him without further delay.

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

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

Section 39R. KEEPING AND MAINTAINING OF BOOKS, RECORDS AND ACCOUNTS; STATEMENT OF MANAGEMENT ON INTERNAL ACCOUNTING CONTROL; FINANCIAL STATEMENTS; ENFORCEMENT.

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

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

(2) "Contract" means any contract awarded or executed pursuant to sections thirty-eight A 1/2 to thirty-eight O, inclusive, of chapter seven and any contract awarded or executed pursuant to section eleven C of chapter twenty-five A, section thirty-nine M of chapter thirty, or sections forty-four A through forty-four H, inclusive, of chapter one hundred and forty-nine, which is for amount or estimated amount greater than one hundred thousand dollars.

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

(4) "Independent Certified Public Accountant" means a person duly registered in good standing and entitled to practice as a certified public accountant under the laws of the place of his residence or principal office and who is in fact independent. In determining whether an accountant is independent with respect to a particular person, appropriate consideration should be given to all relationships between the accountant and that person or any affiliate thereof.

Determination of an accountant's independence shall not be confined to the relationships existing in connection with the filing of reports with the awarding authority.

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

(6) "Accountant's Report," when used in regard to financial statements, means a document in which an independent certified public accountant indicates the scope of the audit which he has made and sets forth his opinion regarding the financial statements taken as a whole with a listing of noted exceptions and qualifications, or an assertion to the effect that an overall opinion cannot be expressed. When an overall opinion cannot be expressed the reason therefor shall be stated. An accountant's report shall include as a part thereof a signed statement by the responsible corporate officer attesting that management has fully disclosed all material facts to the independent certified public accountant, and that the audited financial statement is a true and complete statement of the financial condition of the contractor.

(7) "Management," when used herein, means the chief executive officers, partners, principals or other person or persons primarily responsible for the financial and operational policies and practices of the contractor.

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

(b) Subsection (a)(2) hereof notwithstanding, every agreement or contract awarded or executed pursuant to sections thirty-eight A 1/2 to thirty-eight O, inclusive, of chapter seven, or eleven C of chapter twenty-five A, and pursuant to section thirty-nine M of chapter thirty or to section forty-four A through H, inclusive, of chapter one hundred and forty-nine, shall provide that:

(1) The contractor shall make, and keep for at least six years after final payment, books, records, and accounts which in reasonable detail accurately and fairly reflect the transactions and dispositions of the contractor, and

(2) until the expiration of six years after final payment, the office of inspector general, and the commissioner of capital asset management and maintenance shall have the right to examine any books, documents, papers or records of the contractor or of his subcontractors that directly pertain to, and involve transactions relating to, the contractor or his subcontractors, and

(3) if the agreement is a contract as defined herein, the contractor shall describe any change in the method of maintaining records or recording transactions which materially affect any statements filed with the awarding authority, including in his description the date of the change and reasons therefor, and shall accompany said description with a letter from the contractor's independent certified public accountant approving or otherwise commenting on the changes, and

(4) if the agreement is a contract as defined herein, the contractor has filed a statement of management on internal accounting controls as set forth in paragraph (c) below prior to the execution of the contract, and

(5) if the agreement is a contract as defined herein, the contractor has filed prior to the execution of the contracts and will continue to file annually, an audited financial statement for the most recent completed fiscal year as set forth in paragraph (d) below.

(c) Every contractor awarded a contract shall file with the awarding authority a statement of management as to whether the system of internal accounting controls of the contractor and subsidiaries reasonably assures that:

(1) transactions are executed in accordance with management's general and specific authorization;

(2) transactions are recorded as necessary:

i. to permit preparation of financial statements in conformity with generally accepted accounting principles, and

ii. to maintain accountability for assets;

(3) access to assets is permitted only in accordance with management's general or specific authorization; and

(4) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action was taken with respect to any difference.

Every contractor awarded a contract shall also file with the awarding authority a statement prepared and signed by an independent certified public accountant, stating that he has examined the statement of management on internal accounting controls, and expressing an opinion as to:

(1) whether the representations of management in response to this paragraph, and paragraph (b) above are consistent with the result of management's evaluation of the system of internal accounting controls; and

(2) whether such representations of management are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant's financial statements.

(d) Every contractor awarded a contract by the commonwealth or by any political subdivision thereof shall annually file with the commissioner of capital asset management and maintenance during the term of the contract a financial statement prepared by an independent certified public accountant on the basis of an audit by such accountant. The final statement filed shall include the date of final payment. All statements shall be accompanied by an accountant's report. Such statements shall be made available to the awarding authority upon request.

(e) The office of inspector general, the commissioner for capital asset management and maintenance and any other awarding authority shall enforce the provisions of this section. The commissioner of capital asset management and maintenance may after providing an opportunity for the inspector general and other interested parties to comment, promulgate pursuant to the provisions of chapter thirty A such rules, regulations and guidelines as are necessary to effectuate the purposes of this section. Such rules, regulations and guidelines may be applicable to all awarding authorities. A contractor's failure to satisfy any of the requirements of this section may be grounds for debarment pursuant to section forty-four C of chapter one hundred and forty-nine.

(f) Records and statements required to be made, kept or filed under the provisions of this section shall not be public records as defined in section seven of chapter four and shall not be open to public inspection; provided, however, that such records and statements shall be made available pursuant to the provisions of clause (2) of paragraph (b)."

Section 39S. CONTRACTS FOR CONSTRUCTION; REQUIREMENTS.

"(a) As used in this section the word "person" shall mean any natural person, joint venture, partnership corporation or other business or legal entity. Any person submitting a bid for, or signing a contract to work on, the construction, reconstruction, alteration, remodeling or repair of any public work by the commonwealth, or political subdivision thereof, or by any county, city, town, district, or housing authority, and estimated by the awarding authority to cost more than \$10,000, and any person submitting a bid for, or signing a contract to work on, the construction, reconstruction, installation, demolition, maintenance or repair of any building by a public agency, estimated to cost more than \$10,000, shall certify on the bid, or contract, under penalties of perjury, as follows:

(1) That he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work; (2) that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and (3) that all employees to be employed in the work subject to this bid have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration.

(b) Any employee found on a worksite subject to this section without documentation of successful completion of a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration shall be subject to immediate removal.

(c) The attorney general, or his designee, shall have the power to enforce this section including the power to institute and prosecute proceedings in the superior court to restrain the award of contracts and the performance of contracts in all cases where, after investigation of the facts, he has made a finding that the award or performance has resulted in violation, directly or indirectly, of subsection (b), and he shall not be required to pay to the clerk of the court an entry fee in connection with the institution of the proceeding.”

Section 40. DISCHARGE OR RELEASE OF BONDS.

"Bonds given to the commonwealth, any county, city, town or political subdivision to secure the performance of contracts for the construction or repair of public buildings or other public works may be discharged or released by the awarding authority, upon such terms as it deems expedient, after the expiration of one year from the time of completion, subject to section thirty-nine K, of the work contracted to be done; provided that no claim filed under said bond is pending, and provided further, that no such bonds shall be discharged or released prior to the expiration of all special guarantees provided for in the contract unless new bonds in substitution therefor specifically relating to the unexpired guarantees shall be taken."

ATTENTION IS DIRECTED TO THE FOLLOWING SECTIONS OF CHAPTER 82 (THE LAYING OUT, ALTERATION, RELOCATION AND DISCONTINUANCE OF PUBLIC WAYS, AND SPECIFIC REPAIRS THEREON) OF THE GENERAL LAWS OF MASSACHUSETTS AS AMENDED TO DATE.

Section 40. DEFINITIONS APPLICABLE TO SECTIONS 40A TO 40E.

"The following words, as used in this section and sections 40A to 40E, inclusive, shall have the following meanings:

"Company", natural gas pipeline company, petroleum or petroleum products pipeline company, public utility company, cable television company, municipal traffic signal department, and municipal utility company or department that supply gas, electricity, telephone, communication or cable television services or private water companies within the city or town where such excavation is to be made.

"Description of excavation location", such description shall include the name of the city or town, street, way, or route number where appropriate, the name of the streets at the nearest intersection to the excavation, the number of the buildings closest to the excavation or any other description, including landmarks, utility pole numbers or other information which will accurately define the location of the excavation.

"Emergency", a condition in which the safety of the public is in imminent danger, such as a threat to life or health or where immediate correction is required to maintain or restore essential public utility service.

"Excavation", an operation for the purpose of movement or removal of earth, rock or the materials in the ground including, but not limited to, digging, blasting, augering, backfilling, test boring, drilling, pile driving, grading, plowing in, hammering, pulling in, jacking in, trenching, tunneling and demolition of structures.

"Excavator", any entity including, but not limited to, a person, partnership, joint venture, trust, corporation, association, public utility, company or state or local government body which performs excavation operations.

"Marking standards", the methods by which a company designates its facilities in accordance with standards established by the Common Ground Alliance and the American Public Works Association.

"Non-mechanical means", excavation using any device or tool manipulated by human power, including air vacuum, air blowing or similar methods of excavation designed to minimize direct contact with utilities.

"Premark", to delineate the general scope of the excavation or boring on the paved surface of the ground using white paint, or stakes or other suitable white markings on nonpaved surfaces. No premarking shall be acceptable if such

marks can reasonably interfere with traffic or pedestrian control or are misleading to the general public. Premarking shall not be required of any continuous excavation that is over 500 feet in length.

"Professional land surveyor", a professional land surveyor as defined in section 81D of chapter 112.

"Safety zone", a zone designated on the surface by the use of standard color-coded markings which contains the width of the facilities plus not more than 18 inches on each side.

"Standard color-coded markings", red - electric power lines, cables, conduit or light cables; yellow - gas, oil, street petroleum, or other gaseous materials; orange - communications cables or conduit, alarm or signal lines; blue - water, irrigation and slurry lines; green - sewer and drain lines; white - premark of proposed excavation.

"System", the underground plant damage prevention system as defined in section 76D of chapter 164."

Section 40A. EXCAVATIONS; NOTICE.

"No excavator installing a new facility or an addition to an existing facility or the relay or repair of an existing facility shall, except in an emergency, make an excavation, in any public or private way, any company right-of-way or easement or any public or privately owned land or way, unless at least 72 hours, exclusive of Saturdays, Sundays and legal holidays but not more than 30 days before the proposed excavation is to be made, such excavator has premarked not more than 500 feet of the proposed excavation and given an initial notice to the system. Such initial notice shall set forth a description of the excavation location in the manner as herein defined. In addition, such initial notice shall indicate whether any such excavation will involve blasting and, if so, the date and the location at which such blasting is to occur.

Any professional land surveyor working on a preliminary design for a new facility or renovation where excavation is necessary shall: (i) Premark the proposed excavation; and (ii) provide initial notice to the system.

The notice requirements shall be waived in an emergency as defined herein; provided, however, that before such excavation begins or during a life-threatening emergency, notification shall be given to the system and the initial point of boring or excavation shall be premarked. The excavator shall ensure that the underground facilities of the utilities in the area of such excavation shall not be damaged or jeopardized.

In no event shall any excavation by blasting take place unless notice thereof, either in the initial notice or a subsequent notice accurately specifying the date and location of such blasting shall have been given and received at least 72 hours in advance, except in the case of an unanticipated obstruction requiring blasting when such notice shall be not less than four hours prior to such blasting. If any such notice cannot be given as aforesaid because of an emergency requiring blasting, it shall be given as soon as may be practicable but before any explosives are discharged."

Section 40B. DESIGNATION OF LOCATION OF UNDERGROUND FACILITIES.

"Within 72 hours, exclusive of Saturdays, Sundays and legal holidays, from the time the initial notice is received by the system or at such time as the company and the excavator or professional land surveyor agree, such company shall respond to the initial notice or subsequent notice by designating the location of the underground facilities within 15 feet in any direction of the premarking so that the existing facilities are to be found within a safety zone. Such safety zone shall be so designated by the use of standard color-coded markings. The providing of such designation by the company shall constitute prima facie evidence of an exercise of reasonable precaution by the company as required by this section; provided, however, that in the event that the excavator or professional land surveyor has given notice as aforesaid at a location at which because of the length of excavation the company cannot reasonably designate the entire location of its facilities within such 72 hour period, then such excavator or professional land surveyor shall identify for the company that portion of the excavation which is to be first made and the company shall designate the location of its facilities in such portion within 72 hours and shall designate the location of its facilities in the remaining portion of the location within a reasonable time thereafter. When an emergency notification has been given to the system, the company shall make every attempt to designate its facilities as promptly as possible. A company shall conduct periodic audits to ensure: (i) the accuracy of the designated location and marking of its facilities; and (ii) its adherence to marking standards."

Section 40C. EXCAVATOR'S RESPONSIBILITY TO MAINTAIN DESIGNATION MARKINGS; DAMAGE CAUSED BY EXCAVATOR.

“After a company has designated the location of its facilities at the location in accordance with section 40B, the excavator shall be responsible for maintaining the designation markings at such locations, unless such excavator requests remarking at the location due to the obliteration, destruction or other removal of such markings. The company shall then remark such location within 24 hours following receipt of such request.

When excavating in close proximity to the underground facilities of any company when such facilities are to be exposed, non-mechanical means shall be employed, as necessary, to avoid damage in locating such facility and any further excavation shall be performed employing reasonable precautions to avoid damage to any underground facilities including, but not limited to, any substantial weakening of structural or lateral support of such facilities, penetration or destruction of any pipe, main, wire or conduit or the protective coating thereof, or damage to any pipe, main, wire or conduit.

If any damage to such pipe, main, wire or conduit or its protective coating occurs, the company shall be notified immediately by the excavator responsible for causing such damage.

The making of an excavation without providing the notice required by section 40A with respect to any proposed excavation which results in any damage to a pipe, main, wire or conduit, or its protective coating, shall be prima facie evidence in any legal or administrative proceeding that such damage was caused by the negligence of such person.”

Section 40D. LOCAL LAWS REQUIRING EXCAVATION PERMITS; PUBLIC WAYS.

“Nothing in this section shall affect or impair local ordinances or by-laws requiring a permit to be obtained before excavation in a public way or on private property; but notwithstanding any general or special law, ordinance or by-law to the contrary, to the extent that any permit issued under the provisions of the state building code or state fire code requires excavation by an excavator on a public way or on private property, the permit shall not be valid unless the excavator notifies the system as required pursuant to sections 40 and 40A, before the commencement of the excavation, and has complied with the permitting requirements of chapter 82A.”

Section 40E. VIOLATIONS OF SECS. 40A TO 40E; PUNISHMENT.

“Any person or company found by the department of public utilities, after a hearing, to have violated any provision of sections 40A to 40E, inclusive, shall be fined \$1000 for the first offense and not less than \$5,000 nor more than \$10,000 for any subsequent offense within 12 consecutive months as set forth by the rules of said department; provided, however, that nothing herein shall be construed to require forfeiture of any penal sum by a state or local government body for violation of section 40A or 40C; and provided, further, that nothing herein shall be construed to require the forfeiture of any penal sum by a residential property owner for the failure to premark for an excavation on such person's residential property. The department of public utilities may require any person or company not in compliance with sections 40A to 40E, inclusive, to complete a “Dig Safe” training program in lieu of a fine for a first offense.”

ATTENTION IS DIRECTED TO THE FOLLOWING SECTIONS OF CHAPTER 30 (AN ACT MOBILIZING ECONOMIC RECOVERY IN THE COMMONWEALTH) OF THE ACTS OF 2009.

Section 33.

“(a) Notwithstanding any general or special law to the contrary, the following requirements shall apply to any public works project funded by the American Recovery and Reinvestment Act of 2009 where the amount of construction costs under any contract awarded is likely to exceed \$1,000,000. For the purposes of this section, “public works” shall mean building or work the construction of which is carried on by authority of the commonwealth, or by a county, town, authority or district, or with funds of a federal agency or the commonwealth or a county, city, town, authority or district to serve the interest of the general public, regardless of whether title thereof is in the commonwealth or in a county, city, town, authority or district; provided, however, that for the purposes of this definition, “construction” shall have the meaning provided in section 27D of chapter 149 of the General Laws.

(b) For any public works project subject to subsection (a), the specifications set forth in any request for responses shall include a requirement that, on a per project basis, not less than 20 per cent of the total hours of employees receiving an hourly wage who are directly employed on the site of the project, employed by the contractor or a subcontractor and subject to the prevailing wage, shall be performed by apprentices in bona fide apprentice training programs as provided in sections 11H and 11I of chapter 23 of the General Laws which are approved by the division of apprentice training in the executive office of labor and workforce development.

(c) During the performance of a public works project subject to subsections (a) and (b), the contractor shall submit periodic reports to the awarding authority with records indicating the total hours worked by all journeymen and apprentices in positions subject to the apprentice requirement. In any instance in which the apprentice hours do not constitute 5 per cent of the total hours of employees subject to the apprentice requirement, the contractor shall submit a plan to the awarding authority describing how the contractor shall comply with the apprentice requirement.

(d) The attorney general shall have all the necessary powers to require compliance with the requirements of subsections (a), (b) and (c) therewith, including the power to institute and prosecute proceedings in the superior court to restrain the award of contracts and the performance of contracts. Prior to award of the contract, an awarding authority may petition the attorney general for approval to adjust the requirements set forth in said subsections (a), (b) and (c). The attorney general may adjust these requirements only if he determines that compliance with these requirements is not feasible or if application of the requirements would be preempted by federal law.

(e) An awarding authority serving a low-income population may require additional specifications that address the needs of its clients including, but not limited to, preferential hiring for residents of public housing authorities for available apprenticeship positions.

(f) Subject to appropriation, the division of apprentice training shall enhance its outreach efforts to underserved populations in order to increase and diversify the number of apprentices in the commonwealth.”

Section 39.

“Any entity located in the commonwealth that receives federal funds through the American Recovery and Reinvestment Act of 2009 shall provide information as directed by the secretary of administration and finance regarding the use of the funds. The required information shall include, but not be limited to, the reporting information required by the federal government and any other information deemed necessary by the secretary to administer the American Recovery and Reinvestment Act of 2009 responsibly, efficiently and transparently. To the extent possible, the secretary shall work to streamline the reporting of this information, minimize duplication of data entry by recipients and ensure data consistency. The secretary may issue regulations to effectuate this reporting requirement.”

Section 40.

“Employers and hiring agents on all projects funded in whole or in part by the American Recovery and Reinvestment Act of 2009 shall post notices of available employment opportunities to the commonwealth’s job bank or the one-stop career centers closest to where the projects shall be located. The postings shall contain such information as directed by the secretary of labor and workforce development. The secretary may issue regulations to effectuate this job posting requirement.”

END OF SECTION

SECTION 00 83 00

ATTACHMENT C

NOT USED

SECTION 00 83 00

ATTACHMENT D

CHANGE ORDERS

ATTACHMENT D

CHANGE ORDERS

Policy:

This section supplements Article 11, Changes to the Contract, in the General Conditions and Supplementary Conditions.

All change order requests submitted to the Engineer for review and processing must include calculation sheets similar to the example provided herein (Appendix A) and all other supporting documentation necessary for evaluation. Failure to comply with these instructions will result in delays in processing the change order.

In order to avoid possible delays with approval of change orders, at the beginning of the project and as circumstances warrant, the Contractor shall submit a list of construction equipment, identifying major pieces of equipment to be utilized on the project. The list shall include the Contractor's designation, if any, the manufacturer, model, year of manufacture, serial number, size and horsepower of equipment. The Contractor shall also provide for approval a proposed bluebook equipment rental rate development that separately lists for each piece of equipment the monthly rental rate, area adjustment factor, depreciation factor, estimated operating cost per hour and total hourly rate. In the event the Contractor fails or is unable to provide appropriate rate information the Engineer may develop equipment rental rates for use on change orders.

Payment of Change Orders:

Payment of all change orders shall be in accordance with the relevant provisions of Massachusetts General Laws, Chapter 30, Section 39G for non-building construction and Section 39K for building construction as amended from time to time.

Payment of change orders shall be made in accordance with one of the following three methods:

- A. Existing unit prices as set forth in the contract; or
- B. Agreed upon lump sum or unit prices; or
- C. Time and materials

A. Payment for work for which there is a unit price in the contract:

Where the contract contains a unit price for work and the Engineer orders a change for work of the same kind as other work contained in the contract and is performed under similar physical conditions, the Contractor shall accept full and final payment at the contract unit price(s) for the acceptable quantities. Under certain circumstances, the unit

prices may be subject to revaluation and adjustment. See Article 13 in the Supplementary Conditions.

B. Payment for work or materials for which no price is contained in the contract:

If the Engineer directs, the Contractor shall submit promptly in writing to the Engineer an offer to do the required work on a lump sum or unit price basis, as specified by the Engineer. The stated price, either lump sum or unit price, shall be divided so as to show that it is the sum of:

1. The estimated cost of Labor, plus
2. Direct Labor Cost, plus
3. Material and Freight Costs, plus
4. Equipment Costs, plus
5. An amount not to exceed 15% of the sum of items 1 through 4 for overhead and profit, plus (if applicable),
6. In the case of work done by a subcontractor an amount not to exceed 5%, for the general contractor of the sum of the cost (not including subcontractor's overhead and profit) of items 1 through 4 for his overhead and profit (less, if applicable),
7. Credits for work deleted from the contract, including actual costs of the deleted work plus the percentage of overhead, profit, bonds and insurance attributable to such credit amount.

C. Payment for work on a time and materials basis:

Unless an agreed lump sum and/or unit price is obtained as noted above and is so stated in the change price, the Contractor shall accept as full payment for which no agreement is contained in contract, an amount equal to:

1. The estimated cost of Labor, plus
2. The Direct Labor Costs, plus
3. Equipment Costs, plus
4. Material and Freight Costs, plus
5. An amount not to exceed 15% of the sum of items 1 through 4 for overhead and profit, plus, if applicable,
6. In the case of work done by a subcontractor an amount not to exceed 5%, for the general contractor of the sum of the cost (not including subcontractor's overhead and profit) of items 1 through 4 for his overhead and profit (less, if applicable),
7. Credit for work deleted from the Contract, including actual costs of the deleted work plus the percentage of overhead, profit, bonds and insurance attributable to such credit amount.

Explanation of items 1 through 7 as outlined in "B" and "C" above:

1. Labor - Only those workers employed on the project who are doing the extra work, including the foreman in charge, are allowable. General foremen, superintendents, or other supervisory personnel are considered to be included in the overhead markup as provided in items 5 and/or 6. Hourly labor rates in excess of those as listed in the contract wage rates require documentation. As a minimum, an explanation and the appropriate copy of the certified payroll are required.
2. Direct Labor Costs - These costs are limited to those which are required in the contract document. Coverage in excess of the contract provisions, secured by the contractor/subcontractor(s) at his option, are ineligible. The following list of typical direct labor charges is provided for your assistance and is in no way intended to be complete or all encompassing:

Workman's Compensation

Federal/State: Social Security Tax and Unemployment Tax;

Health, Welfare and Pension Benefits; (this cost is included in the wage rates appearing in the Attachment A Massachusetts Wage Rates.

Liability insurance:	Bodily injury; excess umbrella; property damage; public liability
Blasters insurance:	If applied to any required direct labor costs
Builders risk insurance:	If applied to any required direct labor costs
Experience modification insurance:	If applied to any required direct labor costs
Surcharges:	If applied to any required direct labor costs

Following award and prior to execution of a construction contract, the Contractor and filed subbidders (where applicable) shall submit for review by the Owner, documentation to establish the markup percentage(s).

The documented direct labor markup for this contract may be adjusted on an annual basis as measured from the date the contract is executed. The contract agreement will provide for the establishment of the Direct Labor Cost percentage.

3. Material and Freight - Only those materials required as a result of the change order and reasonable freight charges for delivery of same are allowable.
4. Equipment - Only the equipment required as a result of the change order is allowable. Equipment rental rates shall be governed by the current EquipmentWatch, division of

Intertec Publishing [Formerly Nielson/Dataquest] Rental Rate Bluebook for Construction Equipment (the "Bluebook"). In determining the rental rate, the following shall apply:

- a. For equipment already on the project - the monthly prorated rental rate by the hourly use shall be applicable;
- b. For equipment not on the project the daily rate, the weekly rate, or monthly rate will prevail, whichever will prove to be most cost effective. Small tools and manual equipment are examples of costs not allowable under this item. These costs are considered to be included in the overhead markup as provided in items 5 and/or 6.

(1 Month (Normal Use) = 176 hours)

- 5.& 6. Overhead and Profit - All other costs not previously mentioned are considered to be included in this item, be it for the general contractor or subcontractor(s).
7. Credits - Work deleted, material and equipment removed from the contract, stored and/or returned shall be credited to the cost of the change order, less documented costs.

This change order will be prepared in such manner as to clearly separate Eligible and Ineligible Costs (as applicable to state-funded projects).

The Contractor shall furnish itemized statements of the cost of the work ordered and shall give the Engineer access to all accounts, bills and vouchers relating thereto; and unless the Contractor shall furnish such itemized statements, and access to all accounts, bills and vouchers, he shall not be entitled to payment for any items of extra work for which such information is sought by the Engineer.

Appendix A
Example Calculation Sheet

1. Labor

Foreman	10 hours @	\$10.00/hour	\$100.00
Engineer	10 hours @	8.80/hour	85.00
Operator	10 hours @	9.50/hour	95.00
Laborers	24 hours @	7.00/hour	<u>168.00</u>
			\$448.00

2. Direct Labor Cost (use the agreed upon Direct Labor Cost)

*(30)% of \$448.

*(used for example purposes only) \$ 134.00

3. Materials & Freight

150 l.f. of 12" pipe @ \$2.00/l.f.	\$ 300.00
15 v.f. precast SMH	1,700.00
Freight (slip# ___ enclosed)	<u>25.00</u>
	\$2,025.00

4. Equipment

EXAMPLE

1 Backhoe	10 hours @	\$ 80.00/hour	\$ 800.00
1 Truck-crane	10 hours @	100.00/hour	<u>1000.00</u>
			\$1800.00

TOTAL (items 1 through 4): \$4,407.00

5. (20%) markup for Overhead, Profit

(20%) of \$4,407 \$ 881.00

6. (7½ %) markup on subcontractor's cost for general contractor (if subcontractor is involved)

(7½ %) of \$4,407 \$ 331.00

7. Credits (deductibles) -\$323.00

TOTAL COST: \$5,296.00

Reminder: Provide support documentation as necessary i.e. vouchers, correspondence, calculation, photographs, reports.

END OF SECTION

SECTION 00 84 00

ARTICLE 16, TITLE 1, OF
TOWN OF ARLINGTON BY-LAWS

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.

DIVISION 01: GENERAL REQUIREMENTS

SECTION 01 11 00 - SUMMARY OF WORK

PART 1 – GENERAL

1.1 LOCATION

- A. “Foot of the Rocks” is located at the intersection of Massachusetts Avenue and Lowell Street, Arlington, MA 02476.

1.2 GENERAL REQUIREMENTS

- A. The General Conditions, Supplementary Conditions and applicable parts of Division 01 General Requirements are all included as part of this Section. The Contractor is required to examine all other sections of the specifications for requirements that may affect the work of this Section. The Contractor is also required to coordinate the Work with that of all trades affecting or affected by the Work of this Section, and to cooperate with such trades to assure the continued progress of the Work.
- B. The intent of the Contract Documents is to require that the Contractor provide all material, labor and equipment needed in order to furnish a complete Project, and that all of the material, labor and equipment be furnished complete in every respect.

1.3 SCOPE OF WORK

- A. Work covered by this contract includes but may not be limited to: site-work; construction; re- construction; alterations; remodeling or repair of the public works Project described in this paragraph 1.3 including the following major work:
 - 1. Installing site retaining walls and metal barrier railings
 - 2. Installing permeable concrete unit pavers
 - 3. Installing below grade soil cells and associated planting soil
 - 4. Installing site stairs and metal handrails
 - 5. Installing site furnishings, including those purchased by the Town
 - 6. Installing bituminous concrete sidewalk pavement
 - 7. Installing plantings and lawn
 - 8. Substantial Completion date is June 30, 2025.
 - 9. Final Completion date is July 18, 2025.

1.4 DOCUMENTATION

- A. Contractor shall cooperate with the Owner and Owner’s Representative to record any and all changes to existing conditions or proposed work that deviate from the Contract Documents. The Contractor shall furnish all recorded changes to the Owner’s Representative to be used for As-Built documents.

1.5 NOISE CONTROL

- A. The Contractor shall adhere to the Town ordinances for Noise Control (Title V, Article 12, Section 3) throughout the construction period. Noise control will be strictly enforced by the Town.
- B. No construction shall occur between 7 PM and 7 AM Monday through Friday.

- C. No heavy machine shall be used between 6 PM to 8 AM Monday through Friday, 5 PM to 9 AM on Saturday, Sunday, or legal holidays.
- D. Any exemption to prohibited construction hours must be authorized by a Town representative.
- E. Contractor shall not permit engine idling on the job site. This shall be enforced through random, unannounced periodic inspections.

PART 2 – MATERIALS NOT USED

PART 3 – EXECUTION NOT USED

END OF SECTION

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

- A. The Conditions of the Contract and other Sections of Division I, General Requirements apply to this Section.

1.02 PROJECT MANAGEMENT

- A. The Contractor must use sufficient personnel and adequate equipment to complete all the necessary work requirements within a minimum period of time.
- B. Unless specifically authorized by the Owner, in writing, the work must be conducted between the hours of 7:00 a.m. and 5:00 p.m. on Monday through Saturday. No work is to be done on holidays or Sundays.
- C. The Contractor is responsible for the security of partially completed work until the project is accepted by the Owner.

1.03 PROJECT MEETINGS

- A. Pre-construction conference: Within 5 days following a Notice to Proceed, the Contractor shall attend a pre-construction conference to be held at the project location as scheduled by the Owner's Representative. This conference will be attended by the project superintendent as a minimum. The contractor shall bring to this conference the following documents more fully described elsewhere in this specification:
 - 1. Project Progress Schedule
 - 2. Schedule of Values
 - 3. Submittal Register
 - 4. Notification of Product Substitution
 - 5. Initial submittals covering first 30 days of construction
 - 6. Site phone number and after hours point of contact and phone number.
- B. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
 - 1. Attendees: 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, shall attend the meeting. Advise Owner's Representative of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. The Contract Documents.
 - b. Related requests for interpretations (RFIs).
 - c. Related Change Orders.
 - d. Deliveries.
 - e. Submittals.
 - f. Review of mockups.
 - g. Possible conflicts.
 - h. Compatibility problems.
 - i. Time schedules.

- j. Weather limitations.
 - k. Manufacturer's written recommendations.
 - l. Warranty requirements.
 - m. Compatibility of materials.
 - n. Acceptability of substrates.
 - o. Temporary facilities and controls.
 - p. Space and access limitations.
 - q. Regulations of authorities having jurisdiction.
 - r. Testing and inspecting requirements.
 - s. Installation procedures.
 - t. Coordination with other work.
 - u. Required performance results.
 - v. Protection of adjacent work.
 - w. Protection of construction and personnel.
- 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 - 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- C. Progress Meetings: Attend progress meetings at regular intervals as scheduled by the Owner's Representative. Coordinate dates of meetings with preparation of payment requests.
- 1. Attendees: In addition to representatives of Owner, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Shall be set by Owner's Representative. Items shall include, but are not limited to the following: review and correct or approve minutes of previous progress meeting; review other items of significance that could affect progress, include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.

- 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) Requests for interpretations (RFIs).
 - 16) Status of proposal requests.
 - 17) Pending changes.
 - 18) Status of Change Orders.
 - 19) Pending claims and disputes.
 - 20) Documentation of information for payment requests.
3. Minutes: Owner's Representative will record and distribute the meeting minutes.
 4. Schedule Updating
 - a. Contractor shall provide a "Two Week Look Ahead" construction schedule one business day prior to each regularly scheduled meeting. The Construction Schedule shall be reviewed at each progress meeting for comment and adjustment by the other parties. Issue revised schedule within one business day of each meeting.

1.04 COORDINATION

- A. Project Schedule. The Contractor shall submit at the pre-construction conference for approval to the Owner a detailed operational schedule showing the sequence of operations prior to commencement of any work at the site. This project schedule will be in the form of a CPM, PERT or Gantt chart which clearly reflects project tasks to be completed in a logical sequence. Any changes to this operational plan must be approved by the Owner. The Contractor shall keep this schedule updated to reflect actual progress, and will revise the schedule if required to do so based on substantial departures from the planned progress of the work.
- B. Project Superintendent. The Contractor must retain a competent full time representative, satisfactory to the Owner. This representative shall not be changed, except with the consent of the Owner. The representative shall be in full charge of the work.

END OF SECTION

SECTION 01 31 46 - PERMITS

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

- A. The conditions and general requirements of the Contract, Division 01 and applicable parts of Division 31, EXCAVATION FILLING AND GRADING, apply to the work under this Section.
- B. The Contractor shall perform the work in accordance with the Contract Documents, and any applicable municipal requirements.

1.2 SCOPE OF WORK

- A. The Contractor shall be responsible for obtaining all permits required to complete the work of this contract, to provide all coordination and furnish all bonds, assurances and required warranties. As applicable, the Contractor shall be responsible for any/all fees associated with the securing of permits necessary for the execution of the work of this contract. Should any street work be required, a contractor specifically approved by the Town shall perform it.

1.03 PERMITS BY CONTRACTOR

- A. The Contractor shall prepare permit applications and obtain applicable permits after the contract is awarded, bearing all expenses. All required permits shall be obtained, INCLUDING BUT NOT LIMITED TO the following:
 - 1. Parking Permits as needed and appropriate

1.4 GENERAL

- A. Guarantee all work per permit requirements.

1.5 DIG SAFE

- A. Contact DIG SAFE seventy-two (72) hours prior to initiating work at #811.

PART 2 – MATERIALS

2.1 GENERAL

- A. All materials and equipment shall conform to permit requirements and the Town's standards for utilities, excavation, backfill, patching, and surveying or other work unless otherwise stated in these specifications. Coordinate as necessary with the appropriate Town official and/or private utility.

PART 3 – EXECUTION

3.1 GENERAL

- A. Execute all work per permit requirements. All plumbing and electric work to be approved by Town Inspectors; sidewalk ramps to be approved by Town Engineer.

END OF SECTION

SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 REFERENCE

- A. The conditions and general requirements of the Contract, Division 0 and applicable parts of Division 1, apply to the work under this Section.

1.2 SECTION INCLUDES

- A. Submittal requirements, standards, and procedures for all products, materials, and goods specified in the Project Manual.

1.3 SUMMARY

- A. Submittal coordination.
- B. Submittal procedures and grading.
- C. Schedule of Submissions.
- D. Shop drawings, product data and samples.
- E. Manufacturer's instructions.
- F. Manufacturer's and Installer's certificates.
- G. Fabricator's certificates.
- H. Emergency addresses.
- I. Erosion and sediment control program.

1.4 SUBMITTAL COORDINATION

- A. General: The Contractor is fully responsible for delay in the delivery of materials, progress of the Work and damages incurred due to Contractor's failure to submit, revise and resubmit submissions in accordance with the requirements herein, and in a coordinated and timely manner.
- B. Make submittals in a proper and timely fashion, allowing for administrative procedures, Owner's Representative's review, corrections to submissions and resubmittal, if necessary, and fabrication of products without delaying the project. Minimum processing times required by the Owner's Representative are as follows:
 - 1. Review for Owner's Representative's Office only: Allow a minimum of 10 working days for review and processing. Some submittals may require additional time.
 - a. Simultaneous submission of a large number of shop drawings and product data may require longer than 10 working days for review. (In particular submittals for Divisions 3, 5, 6, 21, 22, 23, 25 and 26).

- b. Complex Systems (structural, mechanical, electrical) may require longer than 10 working days for review each time shop drawings, layout drawings, and product data are submitted or resubmitted.
- C. Review by Owner's Representative and its consultant(s): Allow 10 working days for review and processing of submittals by Owner's Representative plus an additional 5 working days for review by each consultant as applicable.
- D. Reprocessing of submittals: For submittals requiring resubmittal, re-processing time required shall be the same as first submittal.
- E. No extension of Contract Time will be authorized due to failure to transmit submittals sufficiently in advance of scheduled performance of Work.
- F. Make submittals of similar items, systems, or those specified in a single specification section together.
- G. Make submittals for products which other products are contingent upon, first.
- H. The Contractor is fully responsible for delay in the delivery of materials or progress of work caused by late review of shop drawings due to failure of the Contractor to submit, revise, or resubmit shop drawings in adequate time to allow the Owner's Representative checking and processing of each submission or resubmission.

1.5 REPETITIVE REVIEW

- A. Shop Drawings, Product Data and Samples, Coordination Drawings submitted for each item will be reviewed by the Owner's Representative or Consultants no more than two times at Owner's expense. Submittals failing to comply with Contract requirements will be reviewed at times convenient to the Owner's Representative and its Consultants and at the Contractor's expense, based upon a flat rate of \$200.00 per hour for each subsequent re-submittal. Contractor shall reimburse Owner for such additional submittal reviews monthly, and Owner reserves the right to deduct said reimbursement from Contractor's periodic application for payment and the Contract Sum.

1.6 SCHEDULE OF SUBMISSIONS

- A. Schedule procedure: Immediately after being awarded the Contract, meet with the Owner's Representative to discuss the schedule of submissions and then prepare and submit within 14 calendar days for approval a schedule of submissions for the Work. The schedule of submissions shall be related to the entire Project, and shall contain the following:
 - 1. Shop Drawing Schedule (for shop and setting drawings to be provided by the Contractor).
 - 2. Schedule of Product Data.
 - 3. Schedule of mock-ups to be fabricated in the field.
 - 4. Sample Schedule (for samples to be provided by the Contractor).
 - 5. Schedule of Manufacturer's Instructions.
 - 6. Schedule of Manufacturer's, Installer's, and Fabricator's Certificates
 - 7. With respect to portions of the Work to be performed by subcontractors, such schedule of submissions for the work of each subcontractor shall be submitted for approval within 30 calendar days after execution of a subcontract with such

subcontractor.

- B. List all submissions required of each trade:
1. Include the Specification Section number, name of subcontractor or vendor, submittal type, item, description, type, quantity and size (where applicable) of each submission.
 2. For each submission, provide the following dates, as estimated:
 - a. Scheduled date of submission.
 - b. Required date of approval. (permit time for appropriate review and resubmissions as may be required).
 - c. Estimated date of beginning fabrication or manufacture of product (where applicable).
 - d. Required date of submission of product to testing laboratory.
 - e. Required date of testing laboratory approval.
 - f. Required date for delivery of product to site.
 - g. Required date for beginning of installation of product.
 - h. Required date for completion of installation (and in-place testing).
- C. For each submittal, schedule to allow adequate time for review by the Owner's Representative and its consultants. The Owner's Representative will not be responsible for Work performed in shop or field prior to approval. Long-lead items requiring expedited action must be clearly indicated.
1. The schedule shall be reviewed and resubmitted as necessary to conform to approved modifications to the construction Project Schedule and shall be updated as may be required by the Owner's Representative.
- D. Posting of submittal schedule: Print and distribute the submittal schedule to Owner's Representative, Owner, subcontractors and other parties affected. Post copies in field.
- E. Update schedule throughout progress of the Project, coordinated with scheduling changes in the Work, and redistribute monthly in conjunction with submittal of Application for Payment.
- F. The Contractor shall add or remove required submissions in the Schedule of Submissions requiring review only at the direction of the Owner's Representative.

1.7 SUBMITTAL PROCEDURES AND GRADING

- A. Prepare and submit to the Owner's Representative the following for approval:
1. Construction Schedule.
 2. Schedule of Values.
 3. Schedule of Submissions.
 4. Schedule of Environmental Submissions.
- B. Provide space for Contractor, Owner's Representative and engineering consultant

review stamps, on the front page of each item's submittal copy. Apply Contractor's stamp, signed or initialed certifying that review, verification of products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and the Contract Documents. The Owner's Representative's stamp shall contain the following data (Engineering consultant review stamps may vary in language, but intent of language is similar):

_____APPROVED
_____APPROVED AS NOTED
_____NOT REQUIRED FOR REVIEW
_____RESUBMIT
_____NOT APPROVED

1. The Owner's Representative will insert the date of action taken and an identification of the person taking the action.
 2. Submittal grading:
 - a. APPROVED - No corrections, no marks.
 - b. APPROVED AS NOTED - Minor corrections required are as noted; all items can be fabricated as noted, without further correction and resubmission of original submission; checking is complete and all corrections are deemed obvious without ambiguity.
 - c. NOT REQUIRED FOR REVIEW: Submission received for informational purposes only and no action will be taken by the Owner's Representative.
 - d. RESUBMIT - Resubmission is required; checking may be incomplete; details of items noted by checker are to be clarified further before full review can be given. Correct and resubmit, do not fabricate noted items requiring correction.
 - e. NOT APPROVED- Submittal is rejected as not in accord with the Contract Documents, too many corrections, or other justifiable reasons. When returning submission, Owner's Representative will state reasons for rejection. Correct and resubmit, do not fabricate.
 3. Review/approval neither extends nor alters any contractual obligations of the Owner's Representative, Engineer or Contractor.
- C. Identify all variations from Contract Documents, and product or system limitations which may be detrimental to successful performance of the completed work.
- D. Contractor's review: Review all shop drawings, product data and samples. Include, without limitation, verification of the following:
1. Proper title, original date, drawing number (which shall be changed if resubmitted), revision numbers and dates, designation of subcontractor and/or supplier.
 2. Identification of Shop Drawings, Product Data or Samples by Specification Section and subsection or paragraph where appropriate and identification of Contract Drawings by number and detail.
 3. On each submittal, as a minimum, Contractor shall identify the following:
 - a. Errors, inconsistencies, and omissions discovered in the contract documents and field conditions must be reported at once to the Owner's Representative.

- b. Any variations from code requirements contained in the contract documents must be reported promptly in writing to both the Owner's Representative and Owner.
 - c. Promptly report to the Owner's Representative information that any design, process, or product infringes on a patent.
 - d. Names of subcontractor(s) and supplier(s). Include name(s) of contact person(s), address, telephone and fax number(s).
- E. Revise and resubmit submittals as required, identify all changes made since previous submittal. Distribute copies of reviewed submittals to concerned parties; instruct parties to promptly report any inability to comply with provisions.

1.8 ELECTRONIC DOCUMENT PROCEDURES REQUIREMENTS

A. General:

- 1. All documents including but not limited to shop drawing and product data submittals, Request for Information, Proposal Requests, Proposed Change Orders, reports, etc. shall be transmitted to Owner's Representative and Owners Project Manager in electronic (PDF) format. The Contractor is strongly advised to utilize a web-based service such as Procore Technologies, Submittal Exchange, EBuilder or approved equal designed specifically for transmitting submittals between construction team members.
- 2. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.
- 3. The electronic document process is not intended for physical color samples, color charts, or material samples.

B. Procedures for Documents and Submittals:

- 1. Document Preparation – Contractor may use any or all of the following options:
 - a. Subcontractors and suppliers may provide electronic (PDF) documents to Contractor via a web based service.
 - b. Subcontractors and suppliers may provide paper documents to Contractor (subject to approval of the CM) who electronically scans and converts to PDF format.
 - c. Subcontractors and suppliers may provide paper documents to Scanning Service which electronically scans and converts to PDF format.
- 2. Contractor shall review and apply electronic stamp certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer / product, dimensions and coordination of information with other parts of the work.
- 3. Contractor shall transmit each submittal or document to Owner's Representative using web based service or email.
- 4. Owner's Representative review comments will be made available on the web based service or email for downloading. Contractor will receive email notice of completed review.
- 5. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of the Contractor.

6. Submit paper and electronic copies of reviewed submittals or documents at project closeout for record purposes in accordance with provisions contained in Division 01.

C. Costs:

1. The cost of web based services shall be paid in full by the Contractor.
2. The Contractor shall provide training for web based service for Owner's Representative, OPM and any other entity required to use such service..
3. Internet Service and Equipment Requirements:
 - a. Email address and Internet access at Contractor's main office.
 - b. Adobe Acrobat (www.adobe.com), Bluebeam PDF Revu (www.bluebeam.com), or other similar PDF review software for applying electronic stamps and comments.

1.9 SUBMISSION REQUIREMENTS AND QUANTITIES

- A. Furnish Owner's Representative with electronic files in Adobe Acrobat Portable Document Format (PDF) files for each of the following submittal types:
1. Schedules
 2. Shop drawings.
 3. Product data, manufacturer's instructions and certificates and similar submissions.
 4. Emergency addresses: 1 file to Owner's Representative, and 1 file direct to Owner.
- B. In addition to electronic submittals furnish Owner's Representative with the following quantities of the following physical submittals:
1. All submittals greater than 50 pages shall be provided with an index.
 2. Samples: Sets of 3 identical samples of each submission required.
- C. All submittals and shop drawings shall include a submittal title sheet that lists the following: Product, Specification Section number, article, paragraph and subparagraph reference (i.e. Section 32 30 00, Article 2.2, Paragraph A - Materials, subparagraph 1 – Waste Receptacles, subparagraph a – Recycling Receptacle).
- D. General submission of physical submittals: Deliver to Owner's Representative at the following address:
- Ray Dunetz Landscape Architecture
179 Green Street
Boston, MA 02130
- E. Transmit submittals to Owner's Representative at the above address, with individual transmittal forms, Document 00 62 12 – PRODUCT SUBMITTAL FORM for each submission. Document 00 62 12 is bound into the Project Manual; unbound copies are available from the Owner's Representative.
1. On transmittal form, identify Project, Contractor, subcontractor, installer, or supplier, pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate. Transmittals received by the Owner's Representative from

sources other than the Contractor will be returned without any action taken.

2. Contractor shall number submittals sequentially by Specifications Section prior to submittal. Resubmitted items shall retain number and be noted as resubmitted (example 260000.01 R1).

- F. Contractor shall provide 2 color copies of all approved submittals to the Owner or Owner's Project Manager as directed.

1.10 SHOP DRAWINGS

- A. General: Provide accurately prepared, large scale and detailed shop drawings prepared specifically for this Project. Shop drawings shall include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Standard information prepared without specific reference to Project are not considered shop drawings.
1. Show adjacent conditions and related work. Show accurate field dimensions where appropriate.
 2. Identify materials and products shown. Note all conditions where require coordination with other trades and special installation procedures.
 3. Show gage and thickness of materials.
 4. Indicate welding details and joint types.
 5. Show every component of fabricated items, notes regarding manufacturing process coatings and finishes, identifying numbers conforming to the Contract Documents (i.e. stair numbers, door numbers and similar items), dimensions, and appropriate trade names.
 6. Show anchorage and fastening details, including type, size and spacing.
 7. Review each submittal for conformity with the Contract requirements prior to submittal, certify such review on each shop drawing with Contractor's stamp, signature and date. Reference on shop drawings to other sections, installers, suppliers, or trade(s) shall designate the appropriate specification sections, and the term "by others" shall not be used.
- B. Size of Format: Not less than 8-1/2 by 11 inches, and no larger than 30 by 42 inches, except for templates, patterns and similar full-size drawings.
- C. The Owner's Representative's comments and corrections will be made on the electronic submission (PDF) and returned to the Contractor. If necessary, the Contractor then shall make the necessary corrections on the original drawings and resubmit the corrected drawings in electronic format (PDF) as specified. Prints of any submittals required for the Owner's Representative's own use, and those of engineering consultants, will be made without cost to the Contractor. The Contractor is responsible to distribute and furnish (at no additional cost to Owner) all shop documents needed for use by the Contractor, subcontractors, installers, vendors and suppliers.
- D. Drawing submittals returned " APPROVED " or " APPROVED AS NOTED " Obtain and distribute adequate prints for construction, including one print of each for designated Owner's Project Manager, and On-site Representative, and then return the reproducibles to the subcontractor or supplier from whom he originally received them.

- E. Drawing submittals returned " NOT APPROVED " or " RESUBMIT ". Obtain a record print, and then forward originals to source for correction; resubmit new reproducibles and prints as specified herein above.
- F. Each drawing shall have a title block on the right hand side containing the following data:

Name of project -	FOOT OF THE ROCKS
Owner's Representative -	Ray Dunetz Landscape Architecture
Contractor -	
Subcontractor/supplier -	
Date of submission -	

- G. Each drawing shall have a clear space on the right hand side for review stamps of both the Owner's Representative and Contractor.
 - 1. The Contractor's Review and Action Stamp: Provide suitable space on label or title block for Contractor's review and action stamp. Stamp and sign each submittal to show Contractor's review and approval prior to transmittal Owner's Representative. Submittals not signed and stamped by Contractor will be returned without action.
 - a. Only submittals received from the Contractor will be considered for review by the Owner's Representative. Contractor shall review each submittal for accuracy and conformance with the requirements of the Contract Documents, and particularly for field measurements and proper fit with adjoining work. Modify submittals as required to show interface with adjacent work and attachment to Building.
 - b. The Contractor's Review and Action Stamp shall contain the following language or similar:

APPROVED FOR CONFORMANCE WITH THE CONTRACT DOCUMENTS.

All dimensions and quantities have been reviewed and are accepted by _____

Contractor's Name

All dimensions and field conditions have been or will be verified prior to fabrication of the items described herein.

- c. Submittals received from the Contractor shall be signed and comply with review requirements. Submittals not certified or improperly certified (stamped but not reviewed) will be returned to the Contractor without Owner's Representative's review. Claims due to the return of uncertified, improperly prepared or inadequately reviewed submittals will be rejected.

1.11 PRODUCT DATA

- A. Submit Product data as specified, and as the Owner's Representative may additionally

prescribe. Product data includes, but is not limited to:

1. Catalog cuts.
2. Complete specifications.
3. Standard color charts.
4. Performance data.
 - a. Compliance with recognized trade association standards.
 - b. Compliance with recognized testing agency standards, labels and seals.
5. Environmental data including, but not limited to:
 - a. Chemical composition.
 - b. Recycled (pre and post consumer) content.
 - c. Locations of material extraction/harvest and manufacture, with respective distances to site.
 - d. VOC content.
 - e. FSC wood content.
 - f. Material certifications as applicable to product.
6. Certified laboratory test report data.
7. Health and safety precautions.
8. Illustrated capacities, characteristics, wiring diagrams, controls, and other pertinent information for complete product and product use description.

B. If more than one size or type is shown on any printed sheet, indicate clearly intended item(s).

C. When accepted or not accepted, the Owner's Representative will retain three copies. Submit sufficient copies for all other parties. No copies stamped RESUBMIT or NOT APPROVED shall be sent to the job site.

1.12 SAMPLES

A. Submit samples clearly labeled as to its material, type or make, manufacturer, size or gauge, and other pertinent data, accompanied by an appropriate transmittal form. Samples shall show full range of color and texture variation that can be expected.

1. When accepted or not accepted, the Owner's Representative will retain one set of samples and return the other to the Contractor. Samples will not be permitted for use in the project.
2. No final color selections shall be made by the Owner's Representative until all interior samples have been received and reviewed with the Owner.

1.13 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification Sections, submit manufacturer's printed instructions for delivery, handling, storage, assembly, installation, start-up, adjusting, and finishing.

- B. Identify conflicts between manufacturer's instructions and Contract Documents.

1.14 MANUFACTURER'S AND INSTALLER'S CERTIFICATES

- A. When specified in individual specification Sections, submit manufacturer's certificates and installer certificates to Owner's Representative for review.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product, but must be acceptable to Owner's Representative.

1.15 FABRICATOR'S CERTIFICATES

- A. When specified in individual specification Sections, submit fabricator's certificates and qualifications to Owner's Representative for review.
- B. Certificates shall document that the fabricator meets the standards specified in the respective individual specification Section.

1.16 EMERGENCY ADDRESSES

- A. Within 15 days of Notice to Proceed, submit in writing, the name, addresses and telephone numbers of key members of their organization including Contractor's Superintendent and personnel at the site, to be contacted in the event of emergencies at the project site, which may occur during non-working hours.

1.17 EROSION AND SEDIMENT CONTROL PROGRAM

- A. Unless specified elsewhere as being prepared by the Engineer, submit erosion and sediment control program within 30 days after date of Owner- Contractor Agreement for Owner's Representative's review. Revise and resubmit as required.
- B. Erosion and sediment program shall indicate proposed methods, materials to be employed, and schedule for effecting erosion and siltation control and preventing erosion damage. Provide sufficient information to fully explain the program; the following are the minimum requirements:
 1. Proposed methods for actuating erosion and siltation control including 1 inch equals 40 feet (1"=40') scale plans indicating location of erosion control devices and siltation basins.
 2. List of proposed materials including manufacturer's product data, in accordance with Division 32 - EARTHWORK and Division 33 - EXTERIOR IMPROVEMENTS.
 3. Schedule of and sediment control program indicating specific dates from implementing programs in each major area of Work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION
01 33 00

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SECTION 01 35 00: SPECIAL PROJECT PROCEDURES

PART 1 – GENERAL

1.1 SAFETY REGULATIONS

- A. This Project is subject to compliance with Public Law 91-596 the "Occupational Safety and Health Act of 1970" (OSHA), as amended, with respect to all rules and regulations pertaining to construction, as amended, and as published by the U.S. Department of Labor.
- B. The committing of nuisances on the Site or adjacent property is prohibited.

1.2 SAFETY PRECAUTIONS

- A. The Contractor shall take all precautions to safeguard the health and well-being of all workers and all others rightfully on the Project site who may be affected by work done under this Contract. The Contractor is solely responsible for safety on the Site of the Project, both during construction hours and non-construction hours.
- B. All safety laws and regulations of the U.S. Department of Labor, the Commonwealth of Massachusetts, and the Town of Arlington applicable to work performed under this Contract shall be adhered to by the Contractor.

1.3 LEGAL RELATIONS/RESPONSIBILITY TO PUBLIC

- A. Laws to be Observed:
 - 1. The Contractor shall keep himself fully informed of all existing and future State and National Laws and Municipal ordinances and regulations in any manner affecting those engaged or employed in the Work, or the materials used or employed in the Work, or in any way affecting the conduct of the Work, and all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the same and of all provisions required by Law to be made a part of this Contract, all of which provisions are hereby incorporated by reference and made a part hereof. The Contractor shall cause all Subcontractors, Suppliers, agents, and employees to observe and comply with, all such existing and future Laws, ordinances, regulations, and orders.
 - 2. If the Contractor uses or stores toxic or hazardous substances s/he is subject to certain additional laws and regulations including but not limited to M.G.L. Chapter 111F, Section 2, (the "Right to Know" law) and regulations promulgated by the State Department of Public Health, the Department of Public Safety and those of Town of Arlington agencies.

1.4 FIRE PROTECTION & PREVENTION

- A. The Contractor shall keep the Project Site free of rubbish and debris at all times.
 - 1. The Contractor shall provide metal barrels located at appropriate areas into which all refuse and garbage shall be deposited. All barrels shall have tight fitting covers.
 - 2. At the end of each work week, the Contractor shall thoroughly clean the Project Site of all rubbish and debris of any nature and remove such from the premises.
 - 3. In addition, to the requirements in this Section, the Contractor shall, until Final Completion of the Work, provide and maintain fire extinguishers ready for use distributed around the Project Site and in and about temporary structures, if any.
 - 4. Gasoline and other flammable liquids shall be stored in and dispensed from UL listed safety containers in conformance with the National Board of Fire Underwriters recommendations and the Commonwealth of Massachusetts Department of Public Safety requirements, and in no event within the confines of the permanent structures.
 - 5. All tarpaulins used shall have UL approval and comply with Federal Specifications CCC-C746. Polyethylene shall not be used.

1.5 RUBBISH REMOVAL

- A. The Contractor shall remove all rubbish, waste, tools, equipment, and appurtenances caused by and used in the execution of the Work; but this shall in no way be construed to relieve the Contractor of his/her primary responsibility for maintaining the Project Site clean and free of debris, leaving all work in a clean condition satisfactory to the Official.
- B. Immediately after unpacking, the Contractor shall collect and remove from the Project Site all packing materials, case lumber, excelsior, wrapping, and other rubbish.

1.6 SITE DRAINAGE & PUMPING

- A. The Contractor shall be responsible at all times for proper and sufficient site drainage and shall maintain such drainage during the life of the Contract in a manner acceptable to the Designer and so as not to adversely affect the adjacent areas.
- B. The Contractor shall provide and maintain all pumps, suction and discharge lines, and power in sufficient number and capacity to keep all excavations, pits, trenches, foundations, and the entire property area free from accumulation of water from any source whatsoever at all times and under all circumstances and contingencies that may arise.
- C. For additional requirements of excavation and dewatering, refer to the Division 02 Section, SITE CLEARING AND PREP and Division 31 Section EXCAVATION FILLING AND GRADING.

1.7 SNOW & ICE REMOVAL

- A. The Contractor shall promptly remove all snow and ice which may impede the Work, damage the finishes or materials, be detrimental to any crafts or trades, or impede trucking, delivery or moving of materials at the Site, or prevent adequate drainage of the Site or adjoining areas.

1.8 WINTER CONSTRUCTION

- A. The Contractor shall provide protection against damage to materials and work installed in freezing weather, including special heat and coverings to prevent damage by the elements. The ground surface, under footings, under pipelines, under masonry, under concrete, and other work subject or damage shall be protected against freezing or ice formations.

1.9 TURF AREAS & SITE MAINTENANCE

- A. From Notice of Proceed through Final Completion, the Contractor shall be responsible for the following tasks:
 - 1. Removal of all graffiti within 36 hours
 - 2. Timely care and maintenance of existing turf areas including mowing. Turf areas will not be allowed to grow taller than 4 inches.
 - 3. Fall clean-up including leaf and branch removal
 - 4. Spring clean-up including leaf and branch removal

1.10 BROKEN GLASS

- A. The Contractor shall be held responsible at all times prior to Substantial Completion of the Work, or occupancy by the Town, whichever occurs first, for all broken or scratched glass, or glass which had been damaged as a result of the Work, or otherwise and, when so directed by the Official, the Contractor shall replace at no increase in Contract Price or Contract Time, all such glass broken, missing, or damaged prior to Substantial Completion.

1.11 CLEANING

- A. The Contractor shall at all times keep the site free from accumulation of waste materials or rubbish.
- B. Immediately prior to final inspection, the entire Project Site shall be thoroughly cleaned by the Contractor including, without limitation:
 - 1. All construction facilities, tools, equipment, surplus materials, debris, and rubbish shall be removed from the Project site and the entire Work shall be left broom clean.

2. All finished surfaces shall be left in perfect condition, free of stains, spots, marks, dirt, and other defects. The Contractor shall be responsible for the cleaning and polishing of the Work of all trades, whether or not cleaning by such trades is included in their respective Sections of the Specifications.
 3. All metals, hardware, fixtures, and equipment shall be left in undamaged, bright, polished condition. In cleaning items that have a manufacturer's finish, or items previously finished by a Subcontractor, care shall be taken so as not to damage such finish.
- C. In cleaning finish surfaces, care shall be taken not to use cleaning agents that may stain any finish materials. Any damage to finishes caused by operations shall be corrected and repaired by the Contractor at no increase in Contract Price.

1.11 OPERATIONS IN OCCUPIED STRUCTURES

- A. The Contractor shall segregate all the Work from the public and/or the user group workforce. The Contractor shall submit the method of segregation to the Town for approval before the start of any work.
- B. The Contractor shall ensure that its agents and employees, including agents and employees of all Subcontractors, do not have any direct and unmonitored contact with children at any time on the Site.
- C. In the event that the Contractor believes a portion of the Work cannot be completed without the possibility of direct and unmonitored contact with a child, the Contractor shall notify the Town and obtain prior written consent before proceeding with that portion of the Work. Workers who may have direct and unmonitored contact with children will be subject to verification of their Criminal Offender Record Information (CORI).

PART 2 – MATERIALS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

SECTION 01 55 00 - ACCESS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 SECTION INCLUDES

- A. Provide all labor, materials, equipment, and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, furnishing and installing the following:
 - 1. Providing and maintaining vehicular access to the site and within the site:
 - a. To temporary construction facilities, storage, and work areas.
 - b. For use by persons and equipment involved in construction of Project.
 - c. For use by emergency vehicles.
 - 2. Removal of temporary access facilities when no longer needed and restoration of areas.

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 02 41 13 – Site Preparation.

1.4 REFERENCES

- A. Codes and Standards: Comply with the standards of the following associations except as otherwise required:
 - 1. Commonwealth of Massachusetts Highway Department (MHD):
Standard Specifications for Highways and Bridges

1.5 EXISTING PAVEMENTS

- A. Areas approved by the Owner's Representative may be used for construction traffic.
 - 1. Provide temporary additional roads as needed for required construction access.
 - 2. Maintain existing construction, and restore to original, or specified, condition at completion of Work.

- B. The Contractor must coordinate with the Town of Arlington for any work which may affect the traffic on Town streets.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 CARE AND PROTECTION OF PROPERTY

- A. The Contractor shall be responsive for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the Work on the part of the Contractor or his/her subcontractors, such property shall be promptly restored by the Contractor, at his expense, to a condition similar or equal to that existing before the damage was done, to the satisfaction of the Owner's Representative.
- B. Refer to Site Preparation Plan for Temporary Laydown Space at Foot of the Rocks to avoid heavy machinery and large deliveries from affecting neighbors and traffic on surrounding streets.

3.2 REMOVAL

- A. Completely remove temporary materials and construction when construction needs can be met by use of permanent installation.
 - 1. Remove and dispose of compacted materials to depths required by conditions to be met in completed Work.
- B. Restore areas to original or to specified conditions at completion of Work, including Temporary Laydown Space as approved by Owner's Representative.

END OF SECTION

SECTION 01 56 00 - TEMPORARY BARRIERS & ENCLOSURES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The General Documents, as listed on the Table of Contents, and applicable parts of Division 01, GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Contract Documents and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.2 GENERAL REQUIREMENTS

- A. All references to products by manufacturer, trade name or performance Specifications bearing the connotation "or approved equal" shall be as determined by the Owner's Representative and the Town, per MGL c. 30 s. 39M, Part b, Criteria 1.

1.3 WORK INCLUDED

- A. Provide all labor, equipment, implements, and materials required to furnish, install, construct, and perform all site improvements complete as shown on the Contract Drawings and specified herein; to include, but not be limited to the following:
 - 1. Temporary Construction Perimeter Fencing
 - 2. Tree or Plant Protection Fencing as indicated on the Contract Drawings
 - 3. All other temporary barriers and controls needed for protection of the public during construction.

1.4 REFERENCES

- A. Examine all other Sections of the Specifications and all Drawings for the relationship of the work under this Section and the work of other trades. Cooperate with all trades and all departments of the City and coordinate all work under this Section therewith.
- B. The following related items are included under the Sections listed below:
 - 1. Division 01 Section: TEMPORARY CONTROLS
 - 2. Division 31 Section: SITE CLEARING AND PREP
 - 3. Division 31 Section: EXCAVATION FILLING AND GRADING
 - 4. Division 32 Section: PLANTING
 - 5. Division 32 Section: LOAM AND PLANTING PREPARATION
 - 6. Division 32 Section: TURF & GRASSES

1.5 SUBMITTALS

- A. Shop Drawings and Samples
 - 1. Provide complete Shop Drawings and/or samples and catalog cuts for all items called for on the Drawings and as specified and in accordance with applicable requirements under Division 01.

1.6 PRODUCT DELIVERY, STORAGE & HANDLING

- A. Deliver materials in manufacturer's original unopened and undamaged packages with labels legible and intact.

- B. Store materials in unopened packages in a manner to prevent damage from the environment and construction operations.
- C. Handle in accordance with manufacturer's instructions.
- D. The Contractor shall be solely responsible for all materials stored on the site once delivered. Any materials left unsecured at the job site shall be solely at the contractor's own risk.

1.7 DEFINITIONS

- A. The following items are included herein and shall mean:
 - 1. NCLMA – National Chain Link Manufacturers' Association
 - 2. OSHA – Occupational Safety and Health Act.

PART 2 - MATERIALS

2.1 BARRIERS & BARRICADES

- A. Provide barriers to prevent unauthorized entry to construction areas.
 - 1. Comply with standards and code requirements for erection of structurally adequate barriers.
 - 2. Install barriers of a neat and uniform appearance.
 - 3. Provide graphics and signs warning of the hazard being protected against.
 - 4. Where appropriate and needed provide lighting, including flashing red or amber lights.
 - 5. Provide barriers at public rights-of-way and for public access to along public ways when adjacent to construction operations.
- B. Provide barricades with blinking beacon light at all open trenches and other excavations.
- C. Provide protection as specified in Division 32 Section, PLANTING for plant life designated to remain.
- D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

2.2 TEMPORARY CONSTRUCTION FENCING

- A. Prior to any excavation work the Contractor shall provide temporary construction fencing as shown on the Drawings and/or as required to completely protect the work area and injury to persons or property.
- B. The Contractor shall furnish and install temporary fencing of the following type in all areas where existing fencing lengths are inadequate to enclose the construction.
 - 1. Chain link fencing, six feet high min., fabricated from No. 9 gauge galvanized wire woven in a 2- inch diamond mesh with top salvage and having galvanized steel H or pipe intermediate and terminal posts. Post spacing shall not exceed eight feet (8') on center. Cross bracing, reinforcing gates and other parts of fencing shall conform to standard Specifications of the National Chain Link Manufacturers Association. All posts shall be set into temporary concrete footings or on temporary chain link fencing stands as approved by the Owner's Representative.
- C. The contractor shall furnish and install matching gates equipped with suitable locks, other hardware, and, where necessary, provide access for construction apparatus or fire-fighting equipment. The Owner shall be provided with a copy of the key used for all locks.

2.3 TEMPORARY WORK IN PUBLICWAYS

- A. Prior to commencing any work in public ways and other areas which are legally used by vehicles or pedestrians, the Contractor shall submit in writing the proposed methods of protection to the Owner. Work shall not be commenced in these areas until written approval is received from the Owner.
- B. In general, all excavations in public ways shall be protected by substantial barriers which will offer complete protection against accidents for pedestrian and vehicular traffic without interrupting the normal flow of traffic. All barriers must be properly lighted with electric or battery powered safety lights and must be maintained in good working order by the Contractor for the duration of the time such barriers are required.
- C. Trenches across sidewalks shall be completely covered with a temporary walkway, comprised of properly supported nominal 2-inch-thick lumber laid with butt joints and covered with exterior grade plywood, one-half of an inch minimum thickness. Provide continuous 2-inch by 4-inch (nominal) rails and posts secured to the temporary walkway conforming to the requirements of the Occupational Safety and Health Act (OSHA).
- D. Wherever temporary chutes are to be extended over sidewalks or other pedestrian or vehicular traffic areas, the bottom and sides of the chutes shall be provided with continuous dustproof and weatherproof lining, applied to the exterior surfaces.
- E. The Contractor will be required to furnish, install, and maintain in good condition, at no increase in Contract Price or Contract Time, all other safety measures which in the judgment of the Official are required to protect the public from accidents due to work performed under this Contract. This requirement is supplementary to the Contractor's rights and obligations to provide and employ safety measures as s/he may deem necessary or as may be required by law or standard safety practices.

2.4 TREE PROTECTION FENCING

- A. See Division 31 Section, SITE CLEARING AND PREP for tree protection fencing requirements.
 - 1. Stake or spray layout of all proposed work under the driplines of existing trees for approval before beginning construction. Install fencing over the greatest extent feasible within the driplines of the trees, allowing for the work.
 - 2. Maintain fencing in sound condition until project completion. Do not relocate installed fencing without the express approval of the Owner's Representative or Owner.

PART 3 – EXECUTION

3.1 BARRIERS, BARRICADES & ENCLOSURES

- A. Install temporary items as specified herein and in the Drawings or, where not specified, to level of quality suitable for the intended purpose as judged by the Owner's Representative.

3.2 REMOVAL OF TEMPORARY BARRIERS, ENCLOSURES & PROTECTIONS

- A. Remove temporary barriers, barricades, fencing, enclosures, and protections as warranted by the progress of the Work and prior to Substantial Completion.
- B. Remove in-ground elements of all temporary barrier installations (if any) completely. Grade site as noted.

- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing facilities used during construction to original condition at start of work or as specified elsewhere in the Contract Documents.

END OF SECTION

SECTION 01 57 00 - TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The work covered by this section of the specifications consists of furnishing all labor, materials, tools and equipment and performing all work required for the prevention of environmental pollution during and as a result of construction operations under this contract.
- B. The requirements set forth in this section of the specifications apply to cross-country areas, river and stream crossings, and construction in and adjacent to wetlands, unless otherwise specifically stated.
- C. Prior to commencement of work, the Contractor shall meet with the Owner and Owner's Representative to develop mutual understandings relative to compliance of the environmental protection program.

1.2 REQUIREMENTS INCLUDED

- A. Provide and maintain methods, equipment, and temporary construction, as necessary to provide controls over environmental conditions at the construction site and related areas under Contractor's control; remove physical evidence of temporary facilities at completion of work.

1.3 RELATED REQUIREMENTS

- A. Section 01 57 00 - ACCESS
- B. Section 01 74 00 - CLEANING UP

1.4 NOISE CONTROL

- A. Noise levels shall not exceed those stipulated by Occupational Safety and Health Administration.

1.5 DUST CONTROL

- A. Provide positive methods and apply dust control materials to minimize raising dust from construction operations, and provide positive means to prevent air-borne dust from dispersing into the atmosphere.

1.6 SURFACE WATER AND GROUNDWATER CONTROL

- A. Provide methods to control surface water to prevent damage to project, site, and adjoining properties.
- B. Dispose of drainage water in a manner to prevent flooding, erosion, sedimentation, or other damage to any portion of the site or to adjoining areas and properties.

1.7 DEBRIS CONTROL

- A. Maintain all areas under Contractor's control free of extraneous debris.

- B. Initiate and maintain a specific program to prevent accumulation of debris at construction site.
 - 1. Provide containers for deposit and removal of debris.

1.8 POLLUTION CONTROL

- A. Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by the discharge of noxious substances from construction operations.
- B. Take special measures to prevent harmful substances from entering public waters.
 - 1. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.
- C. Provide systems for control of atmospheric pollutants.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

3.1 NOTIFICATION AND STOPPAGE OF WORK:

- A. The Owner's Representative will notify the Contractor in writing of any observed non-compliance with the Contract Documents. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails to act promptly, the Owner may order stoppage of all or part of the work through the Owner's Representative until satisfactory corrective action has been taken. No claim for an extension of time or for excess costs or damage incurred by the Contractor as a result of time lost due to any stop work orders shall be made unless it was later determined that the Contractor was in compliance.
- B. The notification process described under paragraph A above does not relieve the Contractor of the contractual obligation for continuous compliance with the Contract Documents.

3.2 AREA OF CONSTRUCTION ACTIVITY:

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

3.3 PROTECTION OF WATER RESOURCES:

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

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

3.4 PROTECTING AND MINIMIZING EXPOSED AREAS:

- A. The Contractor shall limit the area of land which is exposed and free from vegetation during construction. In areas where the period of exposure will be greater than two (2) months, temporary vegetation, mulching or other protective measures shall be provided.
- B. The Contractor shall take account of the conditions of the soil where temporary cover crop will be used to ensure that materials used for temporary vegetation are adaptive to the sediment control. Materials to be used for temporary vegetation shall be approved by the Owner's Representative.

3.5 LOCATION OF STORAGE AREAS:

- A. The location of the Contractor's storage areas for equipment and/or materials shall be located on cleared portions of the job site or areas to be cleared as a part of this project, and shall require written approval of the Owner's Representative. Plans showing storage facilities for equipment and materials shall be submitted for approval of the Owner's Representative.
- B. No excavated materials or materials used in backfill operations shall be deposited within a minimum distance of one hundred (100) feet of any watercourse or any drainage facility. Adequate measures for erosion and sediment control shall be employed to protect any downstream areas from siltation.
- C. Storage areas shall be restored to pre-construction conditions with the planting of native species of trees and shrubs.

3.6 PROTECTION OF LANDSCAPE:

- A. The Contractor shall not deface, injure, or destroy trees or shrubs nor remove or cut them without written authority from the Owner. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorages unless specifically authorized by the Owner's Representative. Excavating machinery and cranes shall be of suitable type and be operated with care to prevent injury to trees which are not to be removed, particularly overhanging branches and limbs. The Contractor shall, in any event, be responsible for any damage resulting from such use.
- B. Branches, limbs, and roots shall not be cut except by permission of the Owner's Representative. All cutting shall be smoothly and neatly done without splitting or crushing. When there is unavoidable injury to branches, limbs and trunks of trees, the injured portions shall be neatly trimmed and covered with an application of grafting wax or tree healing paint as directed.
- C. Where, in the opinion of the Owner's Representative, trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment or by his blasting or other operations, the Owner's Representative may require the Contractor to adequately protect such trees by placing boards, planks, poles or fencing around them. Any trees or landscape

feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the expense of the Contractor. The Owner's Representative will decide what method of restoration shall be used, and whether damaged trees shall be treated and healed or removed and disposed of.

3.7 CLEARING AND GRUBBING:

- A. The Contractor shall clear and grub only on the Owner's land or the Owner's easements, and only the area required for construction operations, as approved by the Owner's Representative.

3.8 DISCHARGE OF DEWATERING OPERATIONS:

- A. Any water that is pumped and discharged from the excavation as part of the Contractor's water handling shall be filtered by an approved method prior to its discharge into a receiving water or drainage system.
- B. The pumped water shall be filtered through filter fabric and baled straw, a vegetative filter strip or a vegetated channel to trap sediment occurring as a result of the construction operations. The vegetated channel shall be constructed such that the discharge flow rate shall not exceed a velocity of more than 1 foot per second. Accumulated sediment shall be cleared from the channel periodically.

3.8 DUST CONTROL:

- A. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of streets as necessary, to minimize creation and dispersion of dust.
- B. Calcium Chloride shall not be used for dust control within wetland resource areas, buffer zones, drainage basins, or in the vicinity of any source of potable water.

3.9 SEPARATION AND REPLACEMENT OF TOPSOIL:

- A. Topsoil shall be carefully removed from areas where excavations are to be made, and separately stored to be used again as directed. The topsoil shall be stored in an area acceptable to the Owner's Representative and adequate measures shall be employed to prevent erosion and drying out of excavated topsoil material.

END OF SECTION

SECTION 01 58 00: PROJECT SIGNS

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

- A. The General Documents, as listed on the Table of Contents, and applicable parts of Division 01, GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Contract Documents and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.2 SCOPE OF WORK

- A. The Contractor shall furnish and install exterior signs in accordance with the design shown on the Drawings and/or included in the Specifications including:
 - 1. Six (6) small (two feet by four feet) "Pardon our Appearance" temporary construction signs to be posted.
 - 2. Two signs shall be posted at each project location, on construction fencing where access is restricted.
- B. The signs shall be maintained in good condition by the Contractor for the duration of the Project and removed only with written approval of the Official.
- C. No signs, notices, or advertisements shall be displayed without written approval of the Official.

1.3 SUBMITTALS

- A. Submit samples of color and a Shop Drawings indicating lettering layouts to Landscape Architect for approval.
 - 1. Electronic file with sign layout to be provided to the Contractor.
 - 2. One graphic shall be produced for all signs. Smaller signs to be reduced in scale.

PART 2 – MATERIALS

2.1 "PARDON OUR APPEARANCE" SIGNS

- A. "Pardon Our Appearance" signs shall be 2 feet by 4 feet and shall be mounted on marine grade plywood panel or approved equal, securely mounted to wood posts, as directed by the Landscape Architect. Sign shall be professionally printed.
- B. Sign shall be securely mounted with galvanized metal attachments and shall be framed so as to be durable. All attachments and mountings shall be child-safe and vandal resistant.

PART 3 – EXECUTION

3.1 PLACEMENT

- A. Signs shall be installed facing the street or access point to the construction area so as to be visible and inform the general public. Where possible, the sign should be located so as not to conflict with the construction activity nor to require moving during the construction process.
- B. The construction sign shall be maintained in satisfactory condition during construction and then removed and disposed of legally by the Contractor just prior to the final acceptance of work.

END OF SECTION

SECTION 01 62 00 - SUBSTITUTIONS

PART 1 – GENERAL

1.1 GENERAL

- A. Substitutions: Changes in products, materials, equipment, and methods of construction required by the Contract Documents proposed after award of the Contract are considered requests for substitutions. The following are not requests for substitutions:
1. Substitutions requested during the bidding period and accepted by Addendum prior to award of the Contract.
 2. Revisions to the Contract Documents requested by the Owner.
 3. Specified options included in the Contract Documents.
 4. Contractor's compliance with regulations issued by governing authorities.
- B. Substitution Request Submittal: The Owner's Representative will consider request for substitution received within 10 days after execution of the Contract, provided that the proposed substitution does not compromise the Contractor's ability to achieve the Substantial and Final Completion dates required in the Contract Documents. The Contractor shall include a minimum of 30 days for the substitution approval process into the project schedule, as well as the potential for the substitution to be rejected with the requirement to provide specified products.
1. Submit three copies of each request for substitution. Submit requests according to procedures required for change-order proposals.
 2. Identify the product or method to be replaced in each request. Include related Specification Section and Drawing numbers.
 3. Provide documentation showing compliance with the requirements for substitutions and the following information.
 - a. Coordination information, including a list of changes needed to other Work that will be necessary to accommodate the substitution.
 - b. A comparison of the substitution with the Work specified, including performance, weight, size, durability, and visual effect.
 - c. Product data, including Drawings and descriptions of products and installation procedures.
 - d. Samples, where applicable or requested.
 - e. A statement indicating the effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the substitution on Contract Time.
 - f. Cost information, including a proposal of the net change, if any in the Contract Sum.

- g. Certification that the substitution conforms to the Contract Documents and is appropriate for the applications indicated.
 - h. The Contractor's waiver of rights to additional payment or time that may become necessary because of the failure of the substitution to perform adequately.
4. Owner's Representative's Action: If necessary, the Owner's Representative will request additional information within one week of receipt of a request for substitution. The Owner's Representative will notify the Contractor of acceptance or rejection within two weeks of receipt of the request. Acceptance will be in the form of a change order.
- a. Use the product specified if the Owner's Representative cannot make a decision within the time allocated.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Conditions: The Owner's Representative will receive and consider a request for substitution when one or more of the following conditions are satisfied. Otherwise, the Owner's Representative will return the requests without action except to record noncompliance with these requirements.
- 1. Extensive revisions to the Contract Documents are not required.
 - 2. Changes are in keeping with the intent of the Contract Documents.
 - 3. The specified product cannot be provided within the Contract Time. The Owner's Representative will not consider the request if the specified product cannot be provided as a result of failure to pursue the Work promptly.
 - 4. The request is related to an "or-equal" clause.
 - 5. The substitution offers the Owner a substantial advantage, in cost, time, or other considerations, after deduction compensation to the Owner's Representative for redesign and increased cost of other construction.
 - 6. The specified product cannot receive approval by a governing authority, and the substitution can be approved.
- B. The Contractor's submittal and the Owner's Representative's acceptance of Shop Drawings, Product Data, or Samples for construction not complying with the Contract Documents do not constitute an acceptable request for substitution, nor do they constitute approval.

PART 3 – EXECUTION

(Not Applicable)

END OF SECTION

SECTION 01 71 23 - CONSTRUCTION LAYOUT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The General Documents, as listed on the Table of Contents, and applicable parts of Division 01, GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Contract Documents and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.2 SCOPE OF WORK

- A. The work under this section shall consist of field staking the horizontal and vertical alignment of all essential features and proposed work, including walls, curbs, walkways, fencing, electrical and utility structures, plantings, furnishings, play equipment, and other related features as shown on the plans, by a Massachusetts-registered Professional Engineer or Land Surveyor. The Contractor shall familiarize himself with the existing conditions and shall be responsible for locating or re-establishing survey field ties, property lines, and benchmarks indicated on the plans.

PART 2 – MATERIALS

21 LAYOUT & STAKING

- A. The Contractor shall be responsible for furnishing all stakes, pins, and grade markings as required to implement the work of layout and staking and shall make all field adjustments ordered by the Owner's Representative at no extra cost to the Owner.
- B. Upon request by the Owner's Representative, the Contractor shall make available to the Owner survey instruments and operator necessary to check the proposed vertical and horizontal alignments at no extra cost.

PART 3 – EXECUTION

31 SURVEY LAYOUT

- A. The Contractor shall use the alignments shown on the plans to establish the layout of all proposed features and shall perform field adjustments as ordered by the Owner's Representative.
- B. All layout shall be by the dimensions noted on the Contract Drawings. Do not scale directly from the plans. If clarification regarding a dimension or intended layout procedure is required, contact the Owner's Representative.
- C. All dimensions marked on the Drawings with "+/-" or "(Confirm)" or "Verify in Field" are intended for confirmation of conformance to the expected conditions and (where applicable) that acceptable slopes and clearances are provided. Once layout has been established using other dimensions, the Contractor shall verify these dimensions (to within a tolerance of 1/2-inch) and report any discrepancy to the Owner's Representative for acceptance or instruction regarding adjustment. These confirmation dimensions should not be used to layout elements.

- D. The Surveyor shall lay out the essential or necessary grades and locations of site furnishings, footings, pavements, utilities, structures, and other proposed elements. The surveyor shall verify the location of any existing spikes, stakes, pipes, drill holes, etc. and shall be responsible for their accuracy. Proposed features shall be located in relation to dimensions shown on the drawings and as adjusted by the Owner's Representative.
- E. The Contractor shall inform the Owner's Representative when the general layout is completed and shall not begin excavation until the Owner's Representative approves the various alignments. Any discrepancies encountered in field conditions shall be reported to the Owner's Representative immediately and shall be adjusted as directed.
- F. The Contractor shall be responsible for maintaining the correct vertical and horizontal alignment of all elements, which responsibility shall not be waived by the Owner's Representative's approval of basic layout and stakeout.

END OF SECTION

SECTION 01 74 00 - CLEANING UP

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Consult the individual Sections of the specifications for cleaning of Work installed under those Sections.

1.2 CLEANING DURING CONSTRUCTION

- A. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
 - 1. Do not burn or bury rubbish and waste materials on the site.
 - 2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
 - 3. Do not dispose of wastes into streams or waterways.
- B. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
- C. Maintain the Site free from accumulations of waste, debris, and rubbish.
- D. Provide on-site containers for collection of waste materials and rubbish.
- E. At the end of each day, remove and legally dispose waste materials and rubbish from site.
- F. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.
- G. Disposal of materials shall be in compliance with all applicable laws, ordinances, codes, and by-laws.

1.3 FINAL CLEANING

- A. Prior to submitting a request to the Landscape Architect to certify Substantial Completion of the Work, the Contractor shall inspect all interior and exterior spaces and verify that all waste materials, rubbish, tools, equipment, machinery, and surplus materials have been removed, and that all sight-exposed surfaces are clean. Leave the Project clean and ready for occupancy.
- B. Unless otherwise specified under other sections of the Specifications, the Contractor shall perform final cleaning operations as herein specified prior to final inspection.
- C. Cleaning shall include all surfaces, interior and exterior, which the Contractor has had access to, whether new or existing.

- D. Employ experienced workmen or professional cleaners for final cleaning.
- E. Use only cleaning materials recommended by the manufacturer of the surface to be cleaned.
- F. Use cleaning materials which will not create a hazard to health or property and which will not damage surfaces.
- G. All broken or defective materials caused by the Contractor's Work shall be replaced at the expense of the Contractor.
- H. Remove grease, mastic, adhesive, dust, dirt, stains, labels, fingerprints, and other foreign materials from finished surfaces. This includes cleaning of the Work of all finishing trades where needed, whether or not cleaning by such trades is included in their respective specifications.
- I. Repair, patch, and touch up marred surfaces to the specified finish, to match adjacent surfaces.
- J. Leave all architectural metals, hardware, and fixtures in undamaged, polished conditions.
- K. Broom clean exposed concrete surfaces and paved surfaces. Rake clean other surfaces of grounds.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION

SECTION 01 77 00 - CLOSEOUT DOCUMENTATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The General Documents, as listed on the Table of Contents, and applicable parts of Division 01, GENERAL REQUIREMENTS, shall be included in and made a part of this Section.
- B. Examine all Contract Documents and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.2 SCOPE OF WORK

- A. The work to be performed under this Section shall include the compilation and submittal of all required maintenance manuals, maintenance and repair products, warranty information, detailed procedures, product information, submittal records, as-built drawings, and certifications of all materials and equipment for the Owner's Representative's approval. Additional submissions may also be required as stipulated in the technical specification sections.
- B. Upon Final Completion of all park construction, the contractor shall submit: three complete copies of a park maintenance manual, and three copies of an as-built drawing set, with three digital (DVD) copies of the as-built drawings.
- C. The Town will not issue the final check for park retainage until the submittal and approval of the maintenance manual and as-built drawings.

PART 2 – SUBMITTALS

21 MAINTENANCE MANUAL

- A. The Maintenance shall be in the form of a three-ring binder, organized, and tabbed into appropriate sections.

22 PARK MAINTENANCE KIT

- A. At the completion of construction, the Contractor shall provide to the Town's Department of Public Works, Parks Maintenance Division, a Maintenance Kit containing all touch-up paint, maintenance instructions, spare parts, and other maintenance materials provided by the manufacturers of all improvements.
- B. The Maintenance Kit shall be delivered in a single container clearly labeled with the Park Name, and each item shall be identified as to the source.

23 AS-BUILT DRAWINGS

- A. As-Built drawing shall be a complete and accurate record that incorporate any and all changes to the construction plan set issued at the time of contract initiation. As-built drawings shall be clearly marked and annotated and shall include but not be limited to: all field changes, change orders, and supplemental drawings provided by the Owner's Representative.
- B. As-Built Drawings shall include complete records of all water, drainage, and electric utilities installed, including sizing, location, and inverts of all drainage pipes and structures, and sizing and location of all water service lines and electrical conduits.
- C. The DVD shall include an electronic copy of all as-built drawings in AutoCAD version 2018 or earlier. Files shall be in both DWG and PDF formats.

PART 3 – EXECUTION

3.1 SUBMISSIONS

- A. Submit all documents and data in a collated, manual format, with three (3) manuals to be submitted. Include a Table of Contents of the material for reference. The submittal is to be entire and complete, addressing all requirements listed above.

END OF SECTION

DIVISION 02 through 32

SECTION 02 41 13 – SITE PREPARATION

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. The GENERAL DOCUMENTS, as listed on the Table of Contents, and applicable parts of Division 1, GENERAL DOCUMENTS, shall be included in and made a part of this Section.
- B. Coordinate work with that of all trades affecting or affected by the work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 SECTION INCLUDES

- A. Provide all labor, materials, equipment and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, furnishing and installing the following:
 - 1. Protection of existing paving, fencing, vegetation and utilities to remain within and adjacent to the property.
 - 2. Removal of existing bituminous concrete, concrete and granite paving, granite curbing and steps, light poles and fixtures and other miscellaneous items.
 - 3. Installation of a 6' height chain link construction fence with gate location determined by Owner's Representative.
 - 4. Disposal of all debris legally off site.
 - 5. Erosion control and catch basin filters.
 - 6. Salvage existing monuments including the Arlington Bicentennial Planning Committee Memorial, Foot of the Rock Boulder and the Wellington Memorial Boulder.
 - 7. Dust control.
 - 8. Removal of existing trees.
 - 9. Selective clearing and grubbing.
 - 10. Strip existing lawn.
 - 11. Saw cutting pavement.
 - 12. Pedestrian safety plan.

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 03 30 00 – Cast In Place Concrete
 - 2. Section 31 00 00 – Earthwork.

1.4 SUBMITTALS

- A. The Contractor shall, prior to any removal of rubbish or debris from the site, submit written evidence satisfactory to the Owner's Representative that he has an approved dumping location for debris and/or spoil from his demolition and excavation activities.
- B. Prior to beginning the work of this Contract, the Contractor shall submit a plan indicating stockpile areas and equipment and materials storage areas to the Owner's Representative for review and approval. The Contractor shall provide any security measures necessary to protect his work and equipment at no additional costs to the Owner.

- C. The Contractor shall provide the manufacturer's literature, material specification, and installation instructions for sedimentation and erosion control materials and devices for approval.
- D. The contractor shall provide a pedestrian safety plan for pedestrian travel along Massachusetts Avenue during the course of construction. Submit the plan for approval by the Owner's Representative. Include in the plan all safety measures, devices, and materials required to ensure unencumbered, universally-accessible safe route of travel at no additional cost to the Owner.

1.5 EXAMINATION OF SITE AND DOCUMENTS

- 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.
- 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 or inaccuracies that may be found therein.

1.6 DESCRIPTION OF EROSION CONTROL WORK

- A. Erosion control measures to prevent all erosion, siltation and sedimentation shall occur in areas of construction within limit of work, adjacent areas and off-site areas outside the limit of work.
 - 1. Control measures shall be accomplished adjacent to or in the following work areas:
 - a. Soil stockpiles and on-site storage and staging areas.
 - b. Cut and fill slopes and other stripped and graded areas.
 - c. At existing drainage structures.
 - 2. The Contractor shall install all measures as needed to control sediment and erosion as required by the Contractor's construction methods and operations, the weather conditions, and as directed by the Owner's Representative.
 - 3. Additional means of protection shall be provided by the Contractor as required for continued or unforeseen erosion problems, at no additional cost to the Owner.
 - 4. Periodic maintenance of all sediment control structures shall be provided to ensure intended purpose is accomplished. Sediment control measures shall be in working condition at the end of each day.
 - 5. After any significant rainfall, sediment control structures shall be inspected for integrity. Any damaged device shall be corrected immediately.

1.7 PERMITS, CODES AND REGULATIONS

- A. Follow all Local, State and Federal laws and ordinances which apply to the work of this Section.
- B. Comply with all applicable regulations of the Commonwealth of Massachusetts Department of Environmental Protection (DEP) and the EPA.

1.8 REFERENCES

- A. Codes and Standards: Comply with the standards of the following associations except as otherwise required:
 - 1. MassDOT: "Standard Specifications for Highways and Bridges", Massachusetts Department of Transportation, Commonwealth of Massachusetts, latest edition.
 - 2. The following standards are applicable to the work of this Section to the extent referenced herein:
 - a. Massachusetts Erosion and Sedimentation Control Guidelines for Urban and Suburban Areas, A Guide for Planners, Designers and Municipal Officials", prepared by the Massachusetts Dept. of Environmental Protection, Bureau of Resource Protection, dated March 1997, reprinted May 2003.
 - 3. Work operations shall meet American National Standards Institute [ANSI] Standard Z-133.1.

1.9 PUBLIC SAFETY

- A. The Contractor shall be solely responsible for pedestrian and vehicular safety and control within and to pedestrian and vehicle routes of travel effected by the work site.
- B. All equipment to be used on this project and all work to be performed shall be in full compliance with all OSHA standards including, but not limited to, those regulations concerning noise levels, protective devices and operator safety. Immediately discontinue any obviously hazardous practice.

1.10 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. It shall be the responsibility of the Contractor to render the site erosion free. Approval by Owner's Representative of any method to accomplish this does not relieve the Contractor of full responsibility for controlling erosion and/or sedimentation throughout the construction process.
- C. Install filter barriers prior to any site clearing, removals or general earthwork and maintain in place in good functioning condition until all work is complete or as otherwise directed by the Owner's Representative. Repair as required.
- D. All land-disturbing activities are to be planned and conducted so as to minimize off-site sedimentation damage.
- E. 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.
- F. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- G. At the conclusion of the site work, remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

1.11 DIG SAFE

- A. Contractor is required to contact Dig Safe (1-888-344-7233) a minimum of 3 business days prior to start of construction.

1.12 SPECIAL PROTECTION FOR MAINTAINING STREETS AND PUBLIC WAYS

- A. Do not close or obstruct streets or sidewalks within the public right of way without a permit. Do not place or store material in streets or sidewalks.
- B. Conduct operations with minimum interference to the abutting streets.

1.13 ACCESS TO JOB SITE

- A. No access to the job site shall be allowed on or through the abutting private properties. Access to the job site shall be along the public rights of way.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. **CONSTRUCTION FENCE:** Erect a 6' high galvanized chain link construction fence along the lines shown on the Drawings with double gate location to be determined in the field and approved by Owner's Representative. Erect the fence immediately after receiving the Notice to Proceed and maintain the fence in a secure and sightly condition until instructed by the Owner's Representative to remove it or portions thereof. Second hand fencing materials meeting the requirements specified herein and in good condition may be used to provide the necessary barrier during construction on this project. Equivalent tubular sections, H-sections or roll formed sections may be substituted for pipe sections if acceptable to the Owner's Representative.
- B. **TREE PROTECTION:** 6' chain link fence and posts as approved by Owner's Representative.

2.2 FILTER BARRIER

A. STRAW WATTLES

1. Straw wattles shall consist of weed free rice straw inside biodegradable netting.
2. Straw wattles shall measure at least nine (9) inches in diameter.
3. Stakes:
 - a. Stakes for wattles shall be one of the following materials:
 - i. Wood stakes of sound hardwood, one inch by one inch (1" x 1") in size by 2' length min.
 - ii. Steel reinforcing bars of at least No. 4 size, by 2' length min.

2.3 PROTECTIVE MEASURES

- A. As temporary coverings on ground areas subject to erosion, provide one of the following protective measures, and as directed by the Owner's Representative:
 1. Hay or straw temporary mulch, 100 pounds per 1,000 square feet.
 2. Wood fiber cellulose temporary mulch, 35 pounds per 1,000 square feet.

3. Tackifier for anchoring mulch or straw shall be a non-petroleum based liquid bonding agent specifically made for anchoring hay or straw.
4. Provide natural (jute, wood excelsior) covering with suitable staples or anchors to secure to ground surface. Note that wire staples and non-biodegradable coverings shall not be used for any area that will be mown turf.
5. Temporary vegetative cover for graded areas shall be undamaged, air dry threshed straw or hay free of undesirable weed seed.

2.4 CATCH BASIN FILTER

- A. Catch basin filters shall be manufactured from a woven polypropylene geotextile and sewn by a double needle machine, using a high strength nylon thread. Seams have a certified average wide width strength per ASTM D-4884 of 165.0 lbs./in.
- B. The filters will be manufactured to fit the opening of the existing catch basin or drop inlet.
- C. Catch basin filter's geotextile fabric shall have the following properties:

Property(ASTM Test Method)	Unit	Typical Values
Grab Strength (D-4632-86)	lbs	300
Puncture (D-4632)	Lbs.	120
Grab Elongation (D-4632-86)	%	20(max)
Trapezoid Tear Strength (D-4533-85)	Lbs	120
Mullen Burst Strength (D-3786-80a)	Psi	800
Coeff. of Permeability (D-4491-85)	Cm/sec	0.55
Water Flow Rate (D-4491-85)	Gal/min/(ft)(ft)	40
Ultraviolet Stability (D-4355-84)	%	80

- D. Use only commercially available sacks that are certified in writing by the manufacturer for the purpose intended.
- E. Siltation Sacks shall be one of the following. Siltation Sacks other than those specified shall be subject to review and acceptance by the Owner's Representative:

<u>Product</u>	<u>Manufacturer</u>
Siltsack	ACF Environmental, Inc VA
Stream Guard	FOSS Environmental
Dandy Bag	Dandy Products, Inc CO

1. The siltation sack shall be manufactured to fit the opening of the catch basin or drop inlet.
2. The sack shall have a colored cord approximately halfway up the sack to keep the sack away from the sides of the catch basin. This colored cord shall serve as a visual indicator by which the sack shall be emptied. Once the cord is covered with sediment, the sack shall be emptied, cleaned and placed back into the catch basin.
3. The sack will have the following features: two dump straps attached at the bottom to facilitate the emptying of the filters; the filters will also have lifting loops as an integral part of the system to be used to lift the filters from the basin.

PART 3 - EXECUTION

3.1 STAKING OUT PROJECT COMPONENTS

- A. All lines and grades not presently established at the site shall be laid out by the Contractor in accordance with the Drawings. Maintain all established bounds and benchmarks and replace as directed any which are destroyed or disturbed.
 - B. Prior to starting any construction work, stake out all limits of proposed paving areas. Promptly upon completion of layout work and before any other construction work is begun on the site, notify the Owner's Representative, who shall conduct a field inspection of the stake-out.
 - 1. Contractor shall indicate on site locations of proposed erosion control measures for approval by Owner's Representative.
- 3.2 CLEARING AND GRUBBING: Shrub and Vine material to be grubbed, together with logs and other organic debris not suitable for re-use shall be removed to a depth of not less than 12 inches below the original surface level of the ground in areas indicated to be grubbed and areas of new work. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform with the original adjacent surface of the ground.
- 3.3 TREE REMOVALS
- A. Where tree removal is designated on the Drawings, remove completely all trees, root systems and stumps below grade and as directed by the Owner's Representative. Stumps shall be removed at a 2' depth minimum below existing finish grade.
 - 1. Chips from the stump material shall be removed and disposed of off-site.
 - 2. Backfill all holes from which stumps are removed with material equal to or better than adjacent areas and compact in accordance with Section 31 00 00 - EARTHWORK, of these Specifications. Do not use brush, chips, stumps or other organic debris as fill for these holes.
- 3.4 STRIP EXISTING TURF
- A. The Contractor shall remove existing lawn turf in proposed areas of regrading and reseeding and as directed by the Owner.
 - B. The work shall consist of stripping by mechanical rake or by hand the existing turf vegetation present on all grassed areas within the job site as directed by the Owner. The stripping shall remove turf vegetation only. The Contractor will be responsible for disposal of all stripped material in an off-site location provided by Contractor.
- 3.5 SAWCUTTING PAVEMENT
- A. Saw cut existing pavements in locations as shown on Drawings. All sawn edges of paving shall be protected from damage until new paving is placed against it. Existing pavement which is damaged, disturbed or settled, shall be cut back by the same method and replaced as directed by the Owner's Representative at no additional cost. This Item shall include the removal of all layers of pavement and of gravel or other base or sub-base materials as required beneath pavements removed. Cut all paving with an approved diamond blade concrete saw on a neat, straight line to the dimensions given, or directed. Remove the portion behind the cut with proper tools, keeping noise and disturbance to a minimum.
- 3.6 REMOVALS AND DISPOSAL OF MATERIALS

- A. Within the actual construction area, remove all existing obstructions such pavements, and the like, which are to be abandoned to at least 1 foot below final finish grades and to greater depths as required by new construction.
 - 1. The use of explosives will not be permitted.
 - 2. At the Owner's discretion, certain obstructions may not be removed to full depth if removal, in the Owner's opinion, will negatively affect materials to remain.
 - 3. Bituminous concrete paving.
 - 4. Miscellaneous soils, topsoil and granular base materials not appropriate for reuse.

3.7 FILTER BARRIERS

- A. Install straw wattles in locations as shown on Contract Drawings and as directed in the field.
 - 1. Wattles shall be placed in a row with ends overlapping a minimum of two (2) feet.
 - 2. Each wattle shall be embedded in the soil a minimum of two (2) and a maximum of six (6) inches.
 - 3. Wattles shall be securely anchored in place by stakes or rebars driven through the wattles with a minimum twelve (12) inches into the soil. Stakes shall be placed four (4) feet on center.
- B. Inspection shall be frequent, and repair or replacement shall be made as needed.
- C. Wattles shall be removed when they have served their usefulness so as not to block or impede stormwater flows or drainage.

3.8 CATCH BASIN FILTERS

- A. Install catch basin filters prior to disturbance of soils uphill from inlet.
- B. Catch basin filters shall be inspected after each rain event and at a minimum every two weeks.
- C. Debris and silt shall be cleaned from filter on a regular basis.

3.9 TEMPORARY PROTECTIVE COVERINGS

- A. Place temporary soil coverings to control erosion and sedimentation on all disturbed or graded areas as required by the construction methods employed and as directed by the Owner's Representative. Erosion control matting shall be installed in all areas seeded or hydroseeded with slopes of one vertical foot to three-foot horizontal, or steeper, immediately after such areas have been seeded and a hay mulch applied as follows:
 - 1. The area to receive matting shall have been recently seeded and shall have a smooth surface free from stones, clods or depressions.
 - 2. Install matting according to manufacturer's instructions.

3.10 TEMPORARY PROTECTIVE COVERINGS (AFTER GROWING SEASON)

- A. Place temporary covering for erosion and sedimentation control on all areas that have been graded and left exposed after October 30. Contractor shall have the choice to use either or both of the methods described herein.
- B. Hay or straw shall be anchored in-place by one of the following methods and as approved by the Owner's Representative: Mechanical 'crimping' with a tractor drawn device specifically

devised to cut mulch into top two inches of soil surface or application of non-petroleum based liquid tackifier, applied at a rate and in accordance with manufacturer's instruction for specific mulch material utilized.

- C. Placement of mesh or blanket matting and anchoring in place shall be in accordance with manufacturer's printed instructions.
- D. Inspect protective coverings periodically and reset or replace materials as required.

3.11 REMOVALS, SALVAGE AND DISPOSAL

- A. Within the actual construction area, remove all existing obstructions such as pavements, ledge, playground mulch surface, granular base courses, debris and the like, which are to be abandoned to at least 1 foot below final finish grades and to greater depths as required by new construction.
 - 1. The use of explosives will not be permitted.
 - 2. At the Owner's discretion, certain obstructions may not be removed to full depth if removal, in the Owner's opinion, will negatively affect materials to remain.
 - 3. Backfill all holes from which obstructions are removed with material equal to or better than adjacent areas and compact in accordance with Section 31 00 00 - EARTHWORK, of these Specifications. Do not use brush, chips, stumps or other organic debris as fill for these holes.
- B. The Contractor shall be responsible for the methods used in this work including properly protecting against damage to all site improvements, utility lines, trees, etc. Check with the municipality and local utility companies for locations of all existing utilities which may be in use or abandoned. Investigate and ascertain that underground utilities are correctly located and that they have been shut off and/or abandoned before disturbing them.
- C. Legally dispose of all demolished material not to be reused and rubbish off the site. Provide Owner with written affidavits confirming legal disposal. On site burning will not be allowed.
- D. Salvage:
 - 1. The Owner retains the first right of refusal of anything found on the site.
 - 2. Memorials that are salvaged shall be removed to safe and secure location.

3.12 DUST CONTROL

- A. Throughout the construction period, Contractor shall carry on an active program for the control of fugitive dust within all site construction zones, or areas disturbed as a result of construction. Control methods shall include the following: Apply calcium chloride at a uniform rate of one and one-half (1 ½) pounds per square yard in areas subject to blowing. For emergency control of dust apply water to affected areas. The source of supply and the method of application for water are the responsibility of the Contractor.
- B. The frequency and methods of application for fugitive dust control shall be as directed by the Owner's Representative.

3.13 REMOVAL AND FINAL CLEANUP

- A. Once the site has been fully stabilized against erosion and with the approval of the Owner, Contractor shall remove sediment control devices and all accumulated silt. Dispose of silt and

waste materials off-site. Regrade all areas disturbed during this process and stabilize against erosion with surfacing materials as indicated. Reseed turf areas as needed.

END OF SECTION

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SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 SECTION INCLUDES

- A. Provide all labor, materials, equipment and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, furnishing and installing the following as indicated on the Drawings:
 - 1. Cast in place concrete stair bases.
 - 2. Below grade concrete slabs, pads, bases, foundations, and footings.

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 03 45 00 – Precast Concrete Wall.
 - 2. Section 31 00 00 - Earthwork.
 - 3. Section 32 30 00 – Site Improvements

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 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
 - 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 Joint Fillers for Concrete Paving and Structural
4. Commonwealth of Massachusetts Highway Department (MHD):
Standard Specifications for Highways and Bridges

1.5 SUBMITTALS

- A. Shop drawings of reinforcing steel shall be submitted. Drawings shall indicate bar sizes, locations, spacings, quantity required, bending and cutting schedules, and supporting and spacing devices.
- B. 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.
- C. Prior to start of concrete work, Contractor shall submit to the Owner's Representative 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.
- D. Samples of the following shall be submitted:

Item	Sample Size
Preformed joint filler	Two pieces, full depth and width, 4 in. length
- E. Manufacturer's product information sheets for all manufactured products referenced herein shall be submitted to the Owner's Representative for approval prior to ordering
- F. Provide sieve test reports to Owner's Representative for approval of all aggregate materials and base materials referenced herein.

1.6 PRECONSTRUCTION MOCK-UPS

- 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 Owner's Representative.
 - 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 Owner's Representative.
 - 5. Demonstrate in the construction of the mock-up formwork the sealer material, form release agent, and curing materials and methods to be used.

6. Mock-up formwork shall be inspected and accepted by the Owner's Representative before placing of concrete.
 7. Use the same concrete mixes and placement procedures, accepted in mock-ups, in the final work, unless otherwise directed by the Owner's Representative.
 8. Protect accepted mock-ups from damage until completion and acceptance of the work represented by the mock-up.
 9. Remove mockups from site at completion of project, as directed by the Owner's Representative.
- B. Mockups: Cast mockups of full-size sections simulating actual design and execution conditions for concrete mix materials, reinforcement, formwork, placing sequence, form removal, curing, finishing, methods and materials of stain removal and correction of defective work, and overall standard of workmanship.
1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Owner's Representative.
 2. Notify Owner's Representative three days in advance of dates and times when mockups will be constructed.
 3. Obtain Owner's Representative's approval of mockups before starting construction.
 4. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed pavement.
 5. Demolish and remove approved mockups from the site when directed by Owner's Representative.
- 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 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 Owner's Representative'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 Owner's Representative has approved the design mixes.

1.8 QUALITY ASSURANCE

- A. Unless otherwise specified, cast-in-place concrete work shall conform to ACI 301. Construction of concrete subbases shall conform to ACI 325.9R.
- B. Dimensions, locations, and details of equipment pads, anchors, supports, channels or receptacles for light fixtures, 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. 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.
- D. Preinstallation Conference: Conduct conference at Project site.

1.9 TESTING

- A. Inspection and testing of the concrete mix will be performed by an independent testing laboratory approved by the Owner's Representative. Testing equipment shall be supplied by the laboratory, and the preparation of samples and all testing shall be performed by the laboratory personnel. Testing costs shall be the responsibility of the Contractor.
- 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 Owner's Representative to final acceptance.
- C. The following testing services may be provided by the Owner, at no cost to the Contractor:
 - 1. Review of Contractor's proposed materials for compliance with the specifications.
 - 2. Review of the Contractor's proposed mix design.
 - 3. Inspection of concrete batching, mixing, and delivery.
- D. The following testing services shall be provided, at the Contractor's expense:
 - 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 testing laboratory, proposed concrete mix design for review, before beginning work. Forward testing laboratory's mix review to Owner's Representative for approval prior to beginning work.
- H. Provide free access to work and full assistance and cooperation, concrete for samples, and such auxiliary personnel and equipment as needed for testing agency to take samples for required tests. Notify testing agency and Owner's Representative of intent to place concrete at least 24 hours before placement.

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.
1. Material shall be dense graded crushed stone conforming to MHD Specifications Section M2.01.7.

2.2 FORMS

- A. Formwork:
1. Forms for Finish Concrete: Unless otherwise indicated, construct forms of plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings. Provide form material with sufficient strength and thickness to withstand pressure of newly placed concrete without bow or deflection and to retain horizontal and vertical alignment until removal.
 2. Forms for Unexposed Finish: Plywood, lumber or metal, with lumber dressed on at least two edges and one side.
 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.
 5. Vertical joints shall be expressed with a reveal, therefore formwork shall include a blockout or liner accessory that will produce a recessed joint as indicated on the Drawings.
- B. Concrete Column Forms: Sonotube Concrete Forms, manufactured by Sonoco, 1 North Second Street, Hartsville, South Carolina 29550. Toll Free (888) 875-8754. Website www.sonotube.com. E-mail terry.mckee@sonoco.com, or approved equal.
1. Description: Multiple layers of 100 percent recycled paperboard, spirally wound, and laminated with adhesive.
 2. Interior Surface: Smooth with spiral seam. Moisture barrier plastic coating.
 3. Exterior Surface:
 - a. Sonotube RainGuard – 100 percent recycled paper,
 - b. Sonotube Commercial - Moisture Barrier outer label.
 4. Forms will impart visible spiral mark on concrete columns.
 5. 1-piece, 1-time-use forms.
 6. Recyclable.
 7. Inside Diameter: As indicated on the Drawings.
- C. Form Ties: Provide prefabricated, adjustable length galvanized steel snap-off ties, with brackets, cones, cornerlocks and other accessories as necessary.
- D. Form Coatings: Commercial formulation compounds that will not bond with, stain or adversely affect concrete.
- E. Forms shall be true to line and free from warp, and shall be of sufficient strength, when staked to resist the pressure of the concrete without springing. Formwork shall be designed so that sections may be fastened together to prevent vertical or horizontal movement of ends.

2.3 CONCRETE MIX

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 AND Section M4 of the MassDOT and the following:

1. Cement shall be Portland cement, conforming to ASTM C 150, Type I or II.
2. Aggregates shall conform to ASTM C 33.
 - a. Normal-Weight Aggregates: ASTM C 33, graded, 3/4-inch (19-mm)] nominal maximum coarse-aggregate size.
 - b. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
3. Minimum Compressive Strength: 4000 psi (20.7 MPa) at 28 days.
4. Maximum Water-Cementitious Materials Ratio: 0.50.
5. Concrete slump at the time of deposit as measured by with ASTM C 143 shall be as follows:

PORTION OF WORK	SLUMP	SLUMP
	RECOMMENDED	MAXIMUM RANGE
Base slabs on ground	2-1/2 inches	2-3 inches
Footings	3 inches	2-4 inches

6. Concrete shall be air-entrained type, conforming to ASTM C 94. Air-Entraining Admixture: ASTM C 260.
7. Air Content: 7 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.

2.4 CONCRETE REINFORCING

A. Steel reinforcing bars shall conform to ASTM A 615.

1. Bars employed as reinforcement shall be deformed type.
2. Bars employed as dowels shall be hot-rolled plain rounds.
3. Unless otherwise indicated on the Drawings, reinforcing bars shall be Grade 60.

B. Galvanized Reinforcing Bars: ASTM A 767/A 767M, Class [I] [II] zinc coated after fabrication and bending.

C. Welded wire fabric reinforcement shall conform to the applicable requirements of ASTM A 185. Fabric reinforcement shall be furnished in flat sheets. Fabric reinforcement in rolls will not be permitted.

D. Galvanized-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from galvanized steel wire into flat sheets.

E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.5 VAPOR RETARDERS

- A. Plastic Vapor Retarder: ASTM E 1745, Class B. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.6 CURING MATERIALS

- A. Moisture-Retaining Blanket for concrete curing complying with ASTM C 171:
 - 1. 'Hydra-Cure S-16' as distributed by A. H. Harris, Dorchester MA, tel: 617-269-4800, or approved equal.
 - 2. Polyethylene sheeting
 - 3. Burlap

2.7 EXPANSION JOINTS

- A. Unless otherwise indicated on the Drawings, expansion joints shall be 3/8 inch maximum wide.
- B. 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.; preformed, nonbituminous type joint filler conforming to ASTM D 1751, similar to Fiber Expansion Joint, 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 inch thick.
- C. 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 shall be made by saw cutting.
- B. Unless otherwise indicated on the Drawings, control joints shall be located 10 ft. o.c. maximum.

2.9 EPOXY GROUT

- A. Non-Shrink, Non-Metallic Grout: The non-shrink grout shall be a factory pre-mixed grout and shall conform to ASTM C1107, "Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)." In addition, the grout manufacturer shall furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95% bearing under a 4' x 4' base plate.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Euco-NS", by Euclid Chemical Co.
 - b. "Five Star Grout", by Five Star Products, Fairfield CT.
 - c. "Masterflow 713" by Master Builders.
 - d. or approved equal.

2.10 BOLTS

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

- B. Expansion bolts for anchoring into existing concrete shall conform to ASTM A 307, and shall have a self-drilling shell similar to Phillips Red Head Self-Drilling Shells, manufactured by Phillips Red Head Anchor Division of ITT, Michigan City, IN., or approved equal.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine all work prepared by others to receive work of this section and report any defects affecting installation to the contractor for correction. Commencement of work will be construed as complete acceptance of preparatory work by others.

3.2 GRADING

- A. Areas to be paved will be compacted and brought approximately to subgrade elevation under Section 31 00 00, EARTHWORK; 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 31 00 00, EARTHWORK.
- C. Subgrade of areas to be paved 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 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 Owner's Representative as specified in Section 31 00 00, EARTHWORK. 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 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.

3.3 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.

3.4 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.5 VAPOR RETARDERS

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

3.6 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

- C. 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 C, 1/2 inch (13 mm) for rough-formed finished surfaces.
- D. 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.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces.
- F. 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.
- G. 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.
- H. 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.
- I. Unless otherwise indicated, chamfer exterior corners and edges of permanently exposed concrete.
- J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- M. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.7 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 Owner's Representative, reinforcing bars shall not be cut in the field.

- D. Unless otherwise indicated on the Drawings, reinforcing shall not extend within 3 in. of formwork and expansion joints. Reinforcement shall continue through construction joints.
- 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. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with 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, Class B.
 - 1. Bars No. 14 and larger shall not be lap spliced.
- G. After forms have been coated with form release agent, but before concrete is placed, reinforcing steel and 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 Owner's Representative.
- H. 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.
- I. Bending: Bend bars cold; do not use heat reinforcing or bend by make-shift methods. Discard bent, kinked or otherwise damaged bars.
- J. Welding of reinforcing bars will be permitted only where permission of the Owner's Representative has been obtained in advance. Such welding shall be performed only under conditions established by the Owner's Representative.
 - 1. Weld reinforcing bars according to AWS D1.4, where indicated.
- K. Longitudinal reinforcing steel in bond beams, walls and footings shall be continuous around corners.

3.8 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 cannot 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.

3.9 FINISHING

- A. General:
 - 1. Smooth-Formed Finish: Exposed vertical surfaces shall be formed to produce a "smooth form finish", as defined in ACI 301. Remove fins and other projections exceeding specified limits on formed-surface irregularities. Repair defects as approved by Owner's Representative.
- B. Walls and Curbs: Exposed surfaces shall be formed to produce an SF-3.0 Surface Finish, as defined in ACI 301 and as follows:
 - 1. To permit satisfactory finishing, forms shall be removed from the vertical faces of the concrete as early as is possible without damaging the surface. Immediately after stripping forms, any fins or projections left by the forms shall be chipped off, and the surfaces rubbed smooth.
 - 2. Form tie holes and other voids and faults shall be patched. Voids, etc., shall be cleaned out, roughened, thoroughly wetted, coated with neat cement paste, and filled with mortar of cement and sand in the same proportions, materials, and color as used in the concrete. The surface of the patch shall be flush with the surrounding surface after finishing operations are complete. Surface shall be kept continuously damp until patches are firm enough to be rubbed without damage.
- 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.
- D. Where final finishing results in honeycombing or other visible surface defects, or color is inconsistent, and these defects can not be repaired to Owner's Representative's satisfaction, Contractor shall remove and replace defected concrete work to Owner's Representative's satisfaction at no additional cost to the Owner.

3.10 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. Refer to paragraph 3.14.

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.

3.11 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:

E. Concrete surfaces shall be cured by completely covering with curing paper or application of a curing compound.

1. Concrete cured using waterproof paper shall be completely covered with paper with seams lapped and sealed with tape. Concrete surface shall not be allowed to become moistened between 24 and 36 hours after placing concrete. During curing period surface shall be checked frequently, and sprayed with water as often as necessary to prevent drying, but not earlier than 24 hours after placing concrete.
2. If concrete is cured with a curing compound, compound shall be applied at a rate of 200 sq. ft. per gallon, in two applications perpendicular to each other.
3. Curing period shall be seven days minimum.

3.12 EXPANSION JOINTS

A. Unless otherwise indicated on the Drawings, expansion joints shall be located at all fixed vertical elements and at a maximum of 30 ft. apart.

B. Expansion joints shall be 3/8 in. wide and shall be as located on the Drawings. Expansion joint shall be formed in the concrete to required width with preformed joint filler in place. Joint filler shall extend the full depth of the slab. Joint filler shall extend the full length of the expansion joint.

1. Joint filler shall not extend above concrete slab.

2. 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.
- C. Expansion joints of slab-on-grade shall be doweled. Dowel shall be centered over the joint prior to concrete placement. The end of the dowel at the side of joint which will be poured second shall be greased immediately before concrete placement.

3.13 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.

3.14 CONTROL JOINTS

- A. Joints shall be sawn as soon as the concrete will withstand the energy of sawing without traveling 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.

3.15 REMOVING FORMS AND SUPPORTS

- A. Forms shall be removed preventing injury to the concrete and ensuring the complete safety of the structure. Formwork for 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. Panels damaged in stripping or otherwise shall not be reused.
- C. 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.

3.16 PATCHING FORMED SURFACES OF EXPOSED CONCRETE

- A. After forms have been removed, inspect concrete surfaces and only at the direction of the Owner's Representative, patch pour joints, voids, stone pockets, other defective areas and before concrete is thoroughly dry. Chip away defective areas to depth of not less than 1 in. with edges perpendicular to surface. Wet areas to be patched and space at least 6 in. wide entirely surrounding it, to prevent absorption of water from patching mortar. Do not patch concrete in freezing weather.
- B. Apply chemical bonding agent to surface in accordance with manufacturer's printed instructions, followed immediately by patching mortar. Make patch of same proportions used for concrete except omit coarse aggregate. Add only enough water consistent with requirements for handling and placing.
- C. Thoroughly compact mortar into place and screed off; leave patch slightly higher than surrounding surface. Leave undisturbed for one to two hours to permit initial shrinkage before final finishing. Finish patch to match texture and color of adjoining surface.

3.17 CONCRETE SURFACE REPAIRS

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

3.18 CHAMFER

- A. Chamfers to be ½" Max at corners of all edges exposed to view unless otherwise noted on the Drawings.

END OF SECTION

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Not Used

SECTION 03 45 00 – PRECAST CONCRETE WALL

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 SECTION INCLUDES

- A. Provide all labor, materials, equipment and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, furnishing and installing the following:
 - 1. Pre-engineered stone panel wall system comprised of a precast concrete wall with complete granite exterior and cap as detailed on Drawings and meeting requirements of these Specifications.
 - 2. Structural design, fabrication, delivery and handling, and installation of wall system.
 - 3. Aggregate base course, geotextile fabric, and drainage for wall system.
 - 4. Metal Inscription Lettering on Wall.

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 03 30 00 – Cast In Place Concrete
 - 2. Section 31 00 00 – Earthwork.

1.4 REFERENCES

- A. Except as noted, work shall conform to the latest edition of the following codes: specifications and standards:
 - 1. American Society for Testing and Materials (ASTM)
 - 2. American Concrete Institute (ACI):
 - a. "Building Code Requirements for Reinforced Concrete", ACI 318.
 - b. "Specifications for Structural Concrete for Buildings", ACI 301.
 - c. "Recommended Practice for Measuring, Mixing, and Placing Concrete", ACI 304.
 - d. "Recommended Practice of Cold (Hot) Weather Concreting", ACI 306 and ACI 307.
 - e. "Recommended Practice for Concrete Formwork", ACI 307.
 - f. "Recommended Practice for Concrete Formwork", ACI 347.

3. Concrete Reinforcing Steel Institute (CRSI):
 - a. Reinforced Concrete - "A Manual of Standard Practice".
 - b. "Recommended Practice for Placing Reinforcing Bars".
 - c. "Recommended Practice for Placing Reinforcing Bars".
4. Standard Specifications: Commonwealth of Massachusetts, Department of Transportation (MassDOT), Standard Specifications for Highways and Bridges, latest edition.
5. American Institute of Steel Construction (AISC):
 - a. "Code of Standard Practice for Steel Buildings and Bridges".
 - b. "Recommended Practice for Placing Reinforcing Bars".
 - c. "Recommended Practice for Placing Reinforcing Bars".
6. Portland Cement Association (PCA):
 - a. "Forms for Architectural Concrete" - Ref. 1.
7. Prestressed Concrete Institute (PCI):
 - a. "Quality Control for Plants and Production of Structural Precast Concrete Products" – MNL-116.
 - b. "Quality Control for Plants and Production of Architectural Precast Concrete Products" – MNL-117.
 - c. "Architectural Precast Concrete" – MNL-122.

1.5 SUBMITTALS

- A. Samples: Provide three (3) samples measuring a minimum of 12" x 12" x full thickness of granite selected to be used as the exposed surfaces of the wall for approval prior to wall fabrication. Submit stone samples to Owner's Representative for review as soon as possible after award of contract, representing sizes and shapes to be used on Project. Include in each set full range of color, finish, and texture to be expected in completed work. Retain samples during construction as standard for completed stone wall system work.
- B. Product Data: Submit specifications and other data for each type of work required, including certification that each type complies with specified requirements. Include instructions for handling, storage, installation and protection of each type.
 1. Product data shall include manufacturer's certifications that mortar and sealant materials are non-staining.
 2. Manufacturer's product data of the metal inscription letters.
- C. Shop Drawings: Submit large scale Shop Drawings for fabrication and erection of all parts of the work. Provide plans, elevations, and details of anchorage, connections, lifting devices, and accessory items. Provide installation templates for work installed by others. Provide information on installation sequence with plans coded to numbered wall system units. Provide shop drawings stamped and sealed by a professional engineer registered in the Commonwealth of Massachusetts. Note - Stone panel wall system fabricator shall be responsible for the design of any and all lifting devices and supports for handling members and to permit wall units to be handled and installed at the project site; full details of lifting devices and supports shall be included as part of the shop drawings submitted for review.

1. Installation Drawings: Provide detailed drawings, properly checked and coordinated with existing conditions showing stone panel wall system design including supports, anchors, connections and attachments. For items installed in work by others, include setting diagrams, templates, and instructions. Installation drawings may be incorporated into Shop Drawings.
 2. Show location of all weep holes and similar items in wall panel system.
 3. Show interface with other adjacent and related work; coursing; special shapes; panel marks illustrating conformance to adjoining panels not being out of color range by more than half; any embedded or penetrating items including bench hardware/brackets supplied by Others; control joints; and details at openings.
 4. Submit shop drawings for mockups.
 5. Coordinate shop drawings with mounting details for the metal inscription letters specified herein and include mounting hardware and installation details as required.
 6. Shop drawing showing the metal inscription lettering indicated in the Drawings with spacing between letters/words/rows and layout on the face of the wall as specified in the Drawings.
 7. Coordinate footing design for the existing drainage pipe that is to remain. Provide sufficient support for the footing to not adversely effect the integrity of the existing drainage pipe.
- D. Calculations: Provide professionally prepared calculations and certification of the performance of the work. Show how design load requirements and other performance criteria including all lifting devices and supports used for handling and installing the stone panel wall units have been met. Provide calculations stamped and sealed by a professional engineer registered in the Commonwealth of Massachusetts.
- E. Base of Wall System and Drainage: Submit for approval manufacturer's product data and representative samples of geotextile, drain pipe, and crushed stone material for review and approval of Owner's Representative.

1.6 QUALITY ASSURANCE

- A. Engineering and Design: Provide the services of a Professional Engineer, registered as a Structural Engineer in the Commonwealth of Massachusetts to design, engineer, and certify that the work of this section meets or exceeds the requirements specified in this section. The engineer shall assume professional responsibility for wall system and connection design and safety, including miscellaneous supporting steel framework and all lifting devices and supports used for handling and installation. Design decisions and modifications that affect visual characteristics shall be subject to approval by Owner's Representative.
1. Show all connections and attachments for stone panel wall system members to receive work of other Sections.
- B. Final acceptance of each member will be subject to approval by the Owner's Representative as based upon full conformance with these Specifications. Members shall be made accessible and fully visible to the Owner's Representative for inspection at the fabricator's plant prior to shipment and/or at the site after shipment. Rejected members shall be immediately removed from the site and plant storage areas.
- C. The work of this Section shall be performed by Subcontractors who are regularly engaged in the engineering, manufacture, fabrication, finishing, and installation of similar stone wall system work and shall be licensed by the system manufacturer. Each subcontractor shall demonstrate to satisfaction of the Owner's Representative that he has successfully performed on comparable projects and can provide references of each.
- D. Basis of System Design: Unless otherwise directed the completed wall system shall be:

1. Stone face shall be free of visible horizontal or vertical joints.
2. Stones used shall be full bed depth (4 in. to 8 in. thick) and comprised of new granite material as approved by the Owner's Representative.
3. At minimum, seventy-five percent (75%) of the wall cap shall be full width stones.
4. Joint between stones shall be raked back to a minimum depth of 1 in. to 1-1/2 in.
5. Backing of system for stone face and top shall be a monolithic concrete backing with minimum 28 day compressive strength of 4,500 psi and 7.5% air entrainment.

1.7 MOCK-UPS

- A. Prior to commencing primary work of this Section, provide a full-size mock-up of the types of stone panel wall system units noted on the Drawings.
1. Contractor shall provide for the erection of the mockup.
 2. Obtain Owner's Representative's acceptance of visual qualities.
 3. Protect and maintain approved mock-up throughout the work of this Section
 4. Construct mock-ups of the following:
 - a. +/- 12 ft. length of two-sided Precast concrete Wall requiring concrete base.
 - b. +/- 12 ft. length of two-sided Precast concrete Wall requiring aggregate base.
- B. Mock-up: If mockup is approved by Owner's Representative, it shall be used as a standard of quality for all stone panel wall system work. Fabrication of the stone panel wall system shall not commence until on-site full-size mockup has been approved by the Owner's Representative. Approved mock-ups may be incorporated into the finished work at the Owner's Representatives discretion.

1.8 JOB CONDITIONS AND PROTECTION OF WORK

- A. Review installation procedures regarding precast concrete wall work and coordinate work with work of other Sections affected by stonework.
- B. No stone wall panel system installation shall be performed when temperatures is 35°F., and dropping, nor shall any work be done on rising temperature until the temperature reaches 32°F., unless properly heated enclosures are provided on both sides and over the top of such stone work.
- C. Do not use frozen materials or materials mixed or coated with ice or frost. Do not use salt to thaw ice in anchor holes or slots. Do not lower freezing point of mortar by use of admixtures or antifreeze agents, and do not use calcium chloride in mortar or grout.
- D. Do not build on frozen work; remove and replace stonework damaged by frost or freezing.
- E. Protect partially completed precast concrete wall work against weather when work is not in progress. Cover stonework with strong waterproof, non-staining membrane extending at least 2 ft. down both sides of stonework. Anchor or fasten securely in place.
- F. Each day, just before stopping work, cover unfinished stonework with waterproof canvas, tarpaulin or reinforced, non-staining, waterproof paper secured in place and weighted down; turn down not less than 18 in. on each side.

1.9 TESTING AND INSPECTION

- A. The Owner reserves the right to have tests made of mortar materials and mortar, at his option, as the job progresses. Tests will be performed by a recognized Testing Laboratory, selected by the Owner's Representative, with all costs paid by the Owner. The Contractor shall agree to abide by the results of the tests; he shall make all adjustments and changes to mortar and materials to meet the specification requirements at no additional cost to the Owner.

1.10 WARRANTIES

- A. Manufacturers shall provide their standard guaranties for work specified in this Section. However, such guaranties shall be in addition to and not in lieu of all other liabilities which manufacturers and Contractor may have by law or by other provisions of the Contract Documents.

PART 2 - PRODUCTS

2.1 PRECAST CONCRETE WALL

- A. Provide the following system fully engineered, designed, and full installation and shop drawings of the stone panel system. Include all calculations and professional engineer stamped and sealed design incorporating the anchorage of the bench mounting brackets to comply with performance standards and code requirements.
- B. Supplier: Natural Stone Wall Solutions, Concord, MA. www.naturalstonewallsolutions.com, or approved equal.
- C. Concrete wall panels shall have a compressive strength of no less than 4,500 PSI and 7.5% air content in conformance with the 2015 International Building Code.
- D. Reinforcement: Reinforcement bars to be sized and spaced per specification in accordance with ASTM A 934.
- E. Mortar shall be in conformance with ASTM C150, color to be selected by Resident Engineer/Owner's Representative to match existing fieldstone walls.
- F. Geogrid: Geogrid reinforcement shall be manufactured for soil reinforcement comprised of high molecular weight, high tenacity, polyester multifilament yarns which are woven in tension and finished with a PVC coating.
1. Geogrid shall be Mirafi Miragrid5XT, or approved equal.
- G. Basis of Design Style:
1. Precast Concrete wall shall have an ashlar granite surface fully embedded in the precast concrete. Granite shall be an "Antique Granite" comprised of rectangular shapes in a running bond pattern. Granite shall be 12" in height and length shall vary from 18" to 36".
 2. Wall cap shall be fabricated from the same granite material as the exposed wall face. At minimum seventy-five percent (75%) of the wall cap shall be full width stones. Cap stones shall be no less than 18" in length.
 3. System installed shall have mortarless appearance with joints raked back.
 4. Final Style to be as selected by the Owner's Representative.
 5. The fabricator shall provide full-size mock-up panels as described in Paragraph 1.7.

2.2 DRAINAGE PIPE AND FITTINGS

- A. Polyvinyl Chloride Pipe and Fittings
1. Polyvinyl chloride (PVC) pipe and fittings shall be Schedule 40.
 2. Provide solid wall pipe, 2 in. diameter, for through wall drain pipe.
 3. Provide perforated pipe, 4 in. diameter for wall drain pipe.

2.3 GEOTEXTILE FABRIC

- A. Geotextile fabric for drainage shall be Mirafi Tencate 140N Filter Fabric manufactured by Tencate; or approved equal.
- 2.4 REINFORCED CONCRETE FOUNDATION
- A. Shall be as specified in Section 03 30 00 CAST IN PLACE CONCRETE.
- 2.5 GRAVEL BASE
- A. Shall be 3/4" Crushed Stone as specified in 31 00 00 EARTHWORK.
- 2.6 METAL INSCRIPTION LETTERS
- A. METAL INSCRIPTION LETTERS shall be manufactured by Woodland Manufacturing, tel: 800-705-4020, or approved equal.
 - B. LETTERS: shall be waterjet cut from aluminum at sizes as shown on approved Shop Drawing Letters shall be 1" thickness. Finish color will be chosen by Owner's Representative.
 - 1. Letters shall have a brushed finish running vertically on each letter.
 - 2. Finish shall be a satin powdercoat, with lifetime warranty provided by manufacturer.
 - 3. Letters shall be mounted with a 'projected jam' mounting utilizing a stainless nut on the threaded fastener.

PART 3 - EXECUTION

- 3.1 ACCEPTABILITY OF SUBGRADE
- A. Contractor shall examine the existing subgrade to determine its adequacy to receive precast concrete wall work. Evidence of inadequate subgrade shall be brought to the immediate attention of the Owner's Representative.
 - B. Start of work of this Section shall constitute acceptance of the subgrade.
- 3.2 GENERAL
- A. Excavation for installation of aggregate base and drains shall be performed so as not to undermine footings. Provide 12 in. minimum width of drainage material.
 - B. As soon as the excavation is completed to the grade of the bottom of the trench, the Contractor shall line the trench with filter fabric. The Contractor shall place a minimum of 6 inches of crushed stone in trench and compact the base firmly. Then the pipe will be laid with perforations down and installed in accordance with the detail and to the lines and grades as shown on the plans. The crushed stone shall be wrapped in filter fabric.
 - C. All areas of fill shall be placed and compacted according to Section 31 20 00, EARTHWORK. Once crushed stone fill has reached the top of trench, the remaining drainage fabric shall be folded toward centerline trench. Drainage fabric shall overlap a minimum of 12 inches completely encasing the stone and pipe.
 - D. All pipe shall be sound and clean before laying. When laying is not in progress, the open ends of the pipe shall be closed by watertight plug or other approved means. Good alignment shall be preserved in laying.
 - E. Test foundation drainage system for proper drainage and flow. Clear or repair any areas of piping

not constructed to accurate lines and grades. Clear any obstructions to drainage flow.

3.3 PRECAST CONCRETE WALL INSTALLATION

- A. Precast concrete wall shall be installed per approved shop drawings and details and manufacturer's printed technical specifications.
- B. Means, methods, equipment, and installation procedures shall be in accordance with the manufacturer's requirements per specified construction drawings and in accordance with approved and stamped shop drawings.
- C. All walls are to be designed, fabricated, and installed by a single manufacturer.

3.4 ACCEPTABILITY OF BACKFILL PLACEMENT

- A. Backfill shall be placed as shown in the construction plans in the maximum compacted lift thickness of 12 inches and shall be placed and spread in such a manner as to eliminate wrinkles or movement of the geosynthetic reinforcement and the wall units.
- B. Backfill placement shall commence at the back of the wall and progress towards the retained material.
- C. At completion of wall construction, backfill shall be placed level with final top of wall elevation. If final grading, paving, landscaping, and/or storm drainage installation adjacent to the wall is not placed immediately after wall completion, temporary surface drainage shall be provided to ensure water runoff is not directed at the wall nor allowed to collect or pool behind the wall until final construction adjacent to the wall is completed.

3.5 PERFORMANCE REQUIREMENTS

- A. Conduct inspections, perform testing, and make repairs or replace unsatisfactory precast concrete wall units as required.
- B. In addition to above, in-place stone panel wall system units may be rejected for any one of the following reasons:
 - 1. Exceeding the specified installation tolerances.
 - 2. Irreparable damage during construction operations.
 - 3. Exposed to view surfaces which develop surface finish deficiencies.
 - 4. Non-compliance with acceptance criteria listed below.

3.6 GENERAL ACCEPTANCE CRITERIA

- A. Precast concrete wall shall meet specifications. No structural deficiencies, cracks, loose inserts or anchors, exposed steel, steel with less than 1 in. minimum cover, or other defects shall be permitted.
- B. Appearance Acceptance Criteria: When viewed in natural daylight, exposed surfaces shall be uniform in color, texture, and finish shall be within the range of approved mock-up samples when compared side by side.
- C. Precast concrete wall units shall be reviewed for compliance with specifications in three stages as follows:
 - 1. Units will be reviewed at fabrication plant.

2. Units will be reviewed after delivery to site.
3. Units will be reviewed after installation and final cleaning.

D. Repair or replace precast concrete wall units as directed by the Owner's Representative.

3.7 CLEANING

A. After stone panel wall work shall be carefully cleaned, removing all dirt, excess mortar, 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 precast concrete wall work, surfaces shall be left in a clean, unsoiled condition, acceptable to the Owner's Representative.

C. Repair or replace precast concrete wall units as directed by the Owner's Representative.

3.8 INSTALLATION OF METAL INSCRIPTION LETTERS

A. Metal inscription letters shall be installed according to manufacturer's recommendations, approved shop drawings and the Drawings with specified hardware.

B. Lettering shall be level, plumb, and true.

C. Letters shall project from the surface of the wall a minimum of 3/4".

D. Each line of letters shall form a consistent level line across the entire length of the inscription with no variation.

3.9 CONSTRUCTION WASTE MANAGEMENT

A. Comply with the requirements of Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL, for removal and disposal of construction debris and waste.

END OF SECTION

SECTION 04 00 00 - MASONRY

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 SECTION INCLUDES

- A. Provide all labor, materials, equipment and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, furnishing and installing the following:
 - 1. New granite benches.
 - 2. New granite steps on concrete base
 - 3. Cleaning of existing boulders
 - 4. Granite curbing.

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 02 41 13 - Site Preparation
 - 2. Section 03 30 00 – Cast In Place Concrete
 - 3. Section 31 00 00 – Earthwork.

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.
- B. American Society for Testing and Materials (ASTM):
 - C 144 Aggregate for Masonry Mortar
 - A 167 Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
 - C 615 Granite Dimension Stone
- C. Commonwealth of Massachusetts Highway Department (MHD):
 - Specifications Standard Specifications for Highways and Bridges, latest edition.
- D. Americans with Disabilities Act, (ADA), Appendix to Part 1191 Accessibility Guidelines for Buildings and Facilities.

- E. Massachusetts Architectural Access Board (MAAB).
- F. International Building Code (IBC), latest edition.
- G. Massachusetts State Building Code, 9th Edition, and all Supplements.

1.5 QUALITY ASSURANCE

- A. Engage an installer who has successfully completed within the last 3 years at least 6 applications similar in type to that of this project and who will assign mechanics from these earlier applications to this project, of which one will serve as lead mechanic.
- B. Construction Tolerances:
 - 1. Variations from plumb: 1/4 inch in 10 feet.
 - 2. Variations from level: 1/4 inch in 20 feet.
 - 3. Variation of linear line: 1/2 inch in 20 feet.
- C. Quality Control
 - 1. All stone shall be strictly in accordance with samples approved by Owner's Representative.
 - 2. All finishes, dimensions and tolerances shall meet both industry standards and those indicated on approved shop drawings and samples.
 - 3. All stone used shall be sound and free from cracks, seams or starts that might impair its structural integrity or function.
 - 4. No patching shall be permitted except with the approval of the Owner's Representative.
- D. Stone Sources: All stone proposed for use on this project site shall be obtained from one source that is shown to be able to meet project requirements. The specified source shall have adequate capacity and facilities to meet the project requirements. Obtain stone units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for all products required for each continuous surface or visually related surfaces.
 - 1. Any source used is subject to approval of the Owner's Representative.
- E. Stone Manufacturing: Fabrication including cutting and finishing shall be carried out at a factory with the demonstrated ability to produce the work required.
- F. Obtain approval before start-up of any masonry work involving samples or mock-ups specified. All approved samples and mock-ups to remain in place to serve as reference for duration of job.
- G. DEFECTIVE WORK: Any piece of stone showing flaws or imperfections upon receipt at the storage yard or building site shall be referred to the Owner's Representative for determination as to responsibility and decision as to whether it shall be rejected, patched or redressed for use.

1.6 SUBMITTALS

- A. Submit manufacturer's catalog data and specification sheets for each type of masonry unit, accessories, mortar, and other manufactured products, including certifications that each type complies with specified requirements. Include instructions for handling, storage, installation and protection.

- B. Submit samples:
 - 1. Submit 1 stone sample with a minimum 12x12x.5 inch size for each of the following:
 - a. New stone benches
 - b. New granite treads.
 - 2. Do not order materials until Owner's Representative's approval has been obtained. Delivered materials shall closely match the approved samples.
- C. SHOP DRAWINGS for new stone benches, new stone treads, and granite curbing shall be submitted for Owner's Representative's approval. Include in the drawings: all dimensions, shapes, finishes and location of all materials, bedding, bonding, anchoring and jointing of all dimension work, relations to adjacent construction, relations to work of other trades, and all other details required for the proper installation of the work with due reference to all related work.
- D. Existing Conditions Photography: Contractor shall photograph existing boulders paying special attention to existing signage and embedded plaques location on the boulders.
- E. Physical samples of masonry mortar showing full range of colors available.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Provide all labor, materials, equipment, services and transportation required to complete masonry work as shown on Drawings.
- B. Packing and Loading of Stone: Carefully pack and load finished stone for shipment using all reasonable and customary precautions against damage in transit. Do not use any material which may cause staining or discoloration for blocking or packing.
- C. Site Storage of Stone: Upon receipt at the project site, stone materials shall be stacked on timber platforms at least 4" above the ground. Take extreme care to prevent staining during storage. If storage is to be for a prolonged period, place polyethylene or other suitable plastic film between any wood and finished surfaces. Do not use salt for the melting of ice formed in Lewis holes or on pieces, or for any purpose involving its contact with the stone.
- D. Store and handle stone units to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion or other causes.

1.8 COLD WEATHER PROTECTION

- A. Remove all stone determined to be frozen or damaged by freezing conditions.
- B. Do not erect or clean any stone when temperature of surrounding area is below 40 degrees F., or below 45 degrees F. and falling, or forecast by public news media to fall to or below 35 degrees F. within 24 hours without temporary heated enclosures or without heating materials or other precautions necessary to prevent freezing. Minimum temperature within heated enclosure shall be 40 degrees F. Do not use masonry materials which are likely to contain frost. Do not use accelerating ingredients with any mortar. Do not use anti-freeze compounds to lower the freezing point of mortar. Mortar shall harden without freezing and with no damage from frost. Protect all masonry against freezing for not less than 48 hours after installation.
- C. Do not lay stone units which are wet or frozen. Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen setting beds. Remove any ice or snow formed on masonry bed by carefully applying heat until top surface is dry to the touch. Remove and replace masonry work damaged by frost or freezing.

- D. Comply with requirements of International Masonry All-Weather Council's "Guide Specification for Cold-Weather Masonry Construction". Heat materials and provide temporary protection of completed portions of masonry work.

1.9 HOT WEATHER PROTECTION

- A. Protect masonry work in hot weather to prevent excessive evaporation of mortar setting beds. Provide artificial shade, wind breaks and use cooled materials as required. Use fresh mortar. Discard mortar which has stiffened due to hydration.

PART 2 - MATERIALS

2.1 GRANITE - GENERAL

- A. GRANITE: Comply with the physical requirements and properties of ASTM C615 and with "Specifications for Building Granite" National Building Quarries Association, Inc., for color and finish qualities. Granite for all uses shall be reasonably consistent as to color. Granite shall be sound, durable stone, free from imperfections such as knot formations, starts, cracks or seams which may impair its structural integrity. Granite shall be free of minerals that may cause objectionable staining under normal environments of use. Sizes shall be as indicated on the Drawings.
 - 1. Granite for new stone benches and steps shall be chosen from one of the following granites:
 - a. Stanstead,
 - b. Caledonia,
 - c. Or approved equal.
 - 2. All granite for uses above shall be selected and quarried from one source only to ensure matching stone color.

2.2 GRANITE FABRICATION

- A. Cut all stone as required accurately to shape and dimensions and full to the square. All exposed faces shall be dressed true. Fabricate stone to pitch in multiple directions as required.
 - 1. Cut stone in lengths, widths and depths as shown.
 - 2. All faces shall be fabricated to ensure right angles (90 degrees) to the planes of each other and the ends of all pieces.
 - 3. All exposed arrises shall be in true alignment and slightly eased to prevent snipping.
- B. Provide all necessary holes, slots, recesses and sinkages for accessories in accordance with industry standard practices. Provide cramp holes or Lewis pin holes for stones that can not be handled manually. No holes for handling devices will be allowed in exposed surfaces. Provide all cutting and drilling of stone to accommodate other trades.
- C. Dimensional Tolerance
 - 1. Face Dimensions: Maximum variation in the dimension of any piece shall be 1/4 of the specified bed joint width, however, in any case not less than +/- 1/16".
- D. Flatness Tolerances: Variation from true plane or flat surface shall be determined by a 4 foot dimension in any direction on the surface. Variations for specified finishes are as follows:

1. Sawn Finish: None
2. Thermal Finish: 3/16"
3. Honed Finish: 1/16"
4. Rock Face: 1/2"

E. Beds and Joints: Pieces shall be bedded and jointed as shown on the approved shop drawings, and bed and joint surfaces shall be cut as follows:

1. 3/8" joints.

F. Backs of Pieces: Backs of pieces shall be sawn or roughly dressed to approximate true planes. Sawn backs shall be cleaned of all rust stains and free from iron particles. Wherever shown on approved shop drawings, pieces shall be backed off to clear structural members or other obstructions.

G. GRANITE FINISHES:

1. Benches: All exposed vertical faces shall be rock faced. Top surface used for sitting area shall have a thermal finish.
2. Stair treads: All exposed faces of treads shall be thermal finished.
3. Curbing – Saw cut top, rock face sides.
4. Backs, bottoms and hidden joints, not visible, shall be sawn or roughly dressed to approximate true planes.

H. Washes shall be constant in profile throughout their length, in strict conformity with details shown on approved shop drawings.

I. Incidental Cutting and Drilling: Where thickness permits, all pieces weighing over 100 pounds may have Lewis holes for lifting if desired. Lewis holes may extend no closer than 2" from the finished face and will not be permitted on exposed surfaces except with written permission of the Owner's Representative.

J. Anchor Tolerances

1. The centers of all back anchors cut into stone shall be within +/- 1/4" of the location specified on the shop drawings. The dimensions of all back anchor sinkages shall be as shown on the shop drawings within a tolerance of +/- 1/16". The thickness of slots or kerfs cut into the edge of stone for anchorage purposes shall be within +/- 1/16" of the dimension shown on the shop drawings. The location across the stone thickness on the centers of slots or kerfs cut into the edge of stone shall be as stated on the shop drawings within a tolerance of +/- 1/16".
2. Depth of kerfs, rebated kerfs or anchor holes shall be as shown on the shop drawings, but shall be allowed to vary in depth to a minimum required for anchorage clearance and a maximum not to impact the structural integrity of the anchoring system. In any case tolerances of -1/8" +3/8" will be allowed.

K. Clean shop granite at time of final fabrication.

2.3 AGGREGATE BASE

A. Provide crushed stone for base course as specified under Earthwork Section 31 00 00, in this Specification.

2.4 CONCRETE BASES AND FOOTINGS

- A. CONCRETE FOR BASES/FOOTINGS shall be in accordance with Section 03 30 00 – CAST IN PLACE CONCRETE.

2.5 STONE ACCESSORIES

- A. Anchors, dowels and other accessories shall be stainless steel, type 302/304 of the sizes and shapes indicated on the Drawings and as specified herein, or if not indicated, as required to securely anchor and fasten stonework in place.
- B. Stone anchors: Type and size indicated or, if not indicated, as required to securely anchor and fasten stonework in place. Fabricate anchors, cramps and dowels from AISI Type 302/304 stainless steel. Relying on adhesives alone for anchoring will not be allowed.
- C. Setting buttons: Lead or plastic buttons of the thickness required for the joint size indicated, and of the size required to maintain uniform joint width.

2.6 MORTAR MATERIALS

- A. Portland cement shall conform to ASTM C150, Type I.
- B. Lime: ASTM C207 type S, special finishing hydrated lime.
- C. Aggregate for Mortar: Non-staining sand, ASTM C144, or ASTM C404, Size No. 2 except for joints 1/4 inch and less (if any) use aggregate graded with 100 percent passing No. 16 sieve.
 - 1. Provide clean washed crushed stone aggregates of each water place and water feature granite of color to match or blend visually with work as required.
 - 2. Colored Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for used in mortar mixes. Use only sunfast, limeproof pigments with record of satisfactory performance in masonry mortars. Architect will not be limited to "standard" colors. Provide custom colors when color selected is not available as one of the following products:
 - a. "Spectrum Custom Colors": S.B. Green & Co., Inc., Watertown, MA.
 - b. "SGS Mortar Colors": Solomon Grind-Chem Services, Inc.
 - c. Iron oxide pigments: Lander-Segal.
 - 3. Calcium chloride and accelerators: NOT PERMITTED.
 - 4. Water: Clean, potable, non-alkaline and free of deleterious materials which would impair strength or bond.

2.6 GEOTEXTILE FILTER FABRIC

- A. GEOTEXTILE FILTER FABRIC: "Mirafi 140" by Celanese Corp.; "BIDIM C22" by Monsanto Co.; or "Filter X" by Carthage Mills, Inc., or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION OF NEW STONE WORK

- A. Before commencing work, Contractor shall fully examine all substrates, bases, and work performed by other craftsmen upon which masonry work is to be installed. Notify the Owner's

Representative immediately of any deficiencies before installation has begun. By commencing with installation of masonry, Contractor indicates that he has fully accepted the base materials and is hereby responsible for any and all inferior base work upon which the masonry work is constructed.

- B. Execute stonework by skilled mechanics and employ skilled stone fitters at the site to do necessary field cutting as needed as stone is set.
- C. Do not use stone units with chips, cracks, voids, stains, or other defects which may be visible in the finished work.
- D. Assemble and install the stone treads, benches, and curbing in single installations in accordance with the Drawings and Shop Drawings. Comply with width, thickness, pattern, radius and length requirements as shown and specified.
- E. Before installation of masonry units, thoroughly clean stone of all dust, dirt and foreign matter before setting by thoroughly scrubbing with fiber brushes followed by a thorough drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh fillers or abrasives. Set stone after top surface of slab is dry.
- F. Place setting buttons under heavy stones in the same thickness as joint and in sufficient quantity to avoid squeezing mortar out. Do not set heavy stones or projecting stones until mortar in courses below has hardened sufficiently to maintain alignment and avoid squeezing. Securely prop or anchor projecting stones until stones above have set. Provide anchors, supports, fasteners and other attachments shown or necessary to secure work in place. Shim and adjust accessories for proper setting of work.
- G. Tamp and beat stone to level and embed them in setting bed to full, solid and even bearing. Exercise care to equalize bed and joint openings. Take every precaution to prevent direct bearing contact between pieces. Set and level each stone in single operation, prior to initial set of setting bed. Do not return to areas already set and disturb stone for leveling purposes. Do not saw through mortar joints to correct bearing or adjust joint. Do not use pinch bar on exposed face of stone.
- H. Stone Joints: Butter vertical joints for full width before setting and set units in full bed of mortar, unless otherwise indicated. Rake out all joints approximately 3/4 inch before mortar is set to allow for sealant and mortar repointing as shown. Where sealant not indicated repoint joints in two equal thickness of mortar.
- I. Install stainless steel dowels as required for setting new stair treads as shown on approved shop drawings. Anchors or dowels shall be spaced not more than 48 inches on center in each length of stone with no less than 2 dowels per stone. Insert anchors, dowels, etc. with non-expanding filler in holes provided in the granite.

3.2 POINTING OF NEW STONE WORK

- A. Pointing: Except where otherwise specified, brush clean all previously raked joints and beds, and point with mortar to a flat cut joint. Wet joints before new mortar is applied. When thumbprint hard, tool the beds and joints with a round jointer having a diameter 1/4" larger than the width of the joint. Provide a neat, uniform appearance.
 - 1. During the tooling of joints, enlarge any voids or holes, except weepholes, and completely fill with mortar.
 - 2. Point all open beds and joints for a depth of at least one inch.

3. At special locations, where so directed, point and finish joints and beds as the setting progresses.
 4. Where so specified, point joints and beds with specified sealant after first installing the specified backup material and applying primer if required, all in strict accordance with the printed instructions of the sealant manufacturer. Test all sealants for compatibility prior to use.
 5. Tool all sealants to ensure maximum adhesion to contact surfaces.
 6. Where so specified, caulk joints with lead and finishes as directed.
- C. Remove excess mortar from the surface before it sets using a bristle brush or by rubbing the surface with burlap or clean sand. If mortar is left on the surface, wash surface clean using dilute solutions of Hydroclean HT-455.
- C. Cut back and redo work judged defective by Owner's Representative at no additional cost.

3.3 INSTALLATION OF EXISTING BOULDERS

- A. After cleaning salvaged boulders as specified within this Section, boulders shall be placed in locations identified on the Drawings and as directed by the Owner's Representative.
- B. Compact the existing subgrade and install the compacted gravel in accordance with Section 31 00 00 – EARTHWORK.
- C. Move the boulders into position using heavy-duty nylon straps rated to securely hoist the size of the boulder being moved. No marring or damage of the boulder shall occur as a result of positioning. Special care shall be taken of existing signage and plaques located on or embedded in the boulders.
- D. After placement and orientation of the boulder as approved by the Owner's Representative, backfill any visible voids with subbase material to ensure a secure placement of the boulder.
- E. Backfill around the boulder with materials according to the Drawings.

3.4 CLEANING AND PROTECTION

- A. After installation is completed, carefully clean all work, removing all dirt, excess mortar, stains and/or other site incidental defacements. Clean soiled masonry surfaces using a nonacidic solution which will not harm masonry or adjacent materials. Consult masonry manufacturer for acceptable cleaners. Do not use wire brushes, acid or other solutions which may cause discoloration. Use nonmetallic tools in cleaning operation. Apply in accordance with cleaner manufacturer recommendations.
- B. Protect work in progress and after completion. Keep the premises neat and clean at all times.

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 SECTION INCLUDES

- A. Provide all labor, materials, equipment and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, furnishing and installing the following:
 - 1. New ornamental steel barrier railing with provision for interpretative sign. (Interpretative sign is not included in contract).
 - 2. New aluminum sign kiosk.
 - 3. Furnish and install all accessory items including hardware, connecting angles, clip angles, bolts, welds, and bracing members necessary for complete installations of the respective elements.

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 02 41 13 - Site Preparation
 - 2. Section 03 30 00 - Cast in Place Concrete
 - 3. Section 03 45 00 – Precast Concrete Wall
 - 4. Section 05 52 13 – Exterior Metal Handrails
 - 5. Section 09 00 00 – Finishes
 - 6. Section 31 10 00 – Earthwork
 - 7. Section 32 30 00 - Site Improvements

1.4 REFERENCES

- A. Codes and Standards: Comply with the standards of the following associations except as otherwise required:
 - 1. AWS (American Welding Society): D1.1 "Structural Welding Code" and "Standard Qualification Procedure".
 - 2. MassDOT: "Standard Specifications for Highways and Bridges", Massachusetts Department of Transportation, Commonwealth of Massachusetts, latest edition.
 - 3. ASTM: American Society for Testing and Materials

- A 570 Specification for Steel, Sheet and Strip, Carbon Structural Quality
 - B 210 Specification for Aluminum and Aluminum Alloy Drawn Seamless Tubes
 - B 211 Specification for Aluminum and Aluminum Alloy Bar, Rod and Wire
 - 4. BANA (Braille Authority of North America): Braille Signage Guidelines, latest edition.
 - 5. ADA: United States Americans with Disabilities Act.
- B. Metalwork Fabricator Qualifications: Firms experienced in successfully producing metal fabrications similar to those indicated for this project, with sufficient production capacity to produce required units without causing delay in the work. Work shall be performed by a firm having not less than 10 years successful experience in comparable projects and employ personnel skilled in the processes and operations indicated and required.
- C. Steel Materials: Provide steel chemically suitable for metal coatings complying with the following requirements: Carbon below 0.25 percent, silicon below 0.24 percent, phosphorous below 0.05 percent, and manganese below 1.35 percent.
- 1. Geometrically suitable for galvanizing as specified in ASTM A384 and A385.
- D. Welding Qualifications: Quality processes and operators in accordance with AWS "Standard Qualification Procedure". Certify that welders have passed AWS qualification test within the past 12 months.
- E. Fabrication: Comply with requirements of ASTM A143, ASTM A384 and ASTM A385.
- 1. Assemblies: Where size of assembly is too large for galvanizing kettle, galvanize components prior to fabrication and assemble after galvanizing.
- F. Preassemble items in shop to greatest extent possible to minimize field splicing, welding and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- G. Construction Tolerances:
- 1. Variations from plumb: 1/4 inch in 10 feet.
 - 2. Variations from level: 1/4 inch in 20 feet.
 - 3. Variation of linear line: 1/4 inch in 20 feet.
 - 4. Variations from slope as indicated: 1/4 inch in 10 feet.
 - 5. Variations from flush in unit to unit offset: 1/32 inch.
- 1.5 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 high grade metal. 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.
- 1.6 WORKMANSHIP
- A. All metal fabrications work 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.

1.7 PERFORMANCE REQUIREMENTS

- A. General: Provide installed metal fabrication assemblies complying with following structural performances, unless otherwise indicated:
 - 1. Live Loads shall not be less than the minimum required by applicable building codes.
 - 2. Design shall incorporate safety factors as required by the applicable building codes.
 - 3. Design and construction shall be as such to assure that under the required design live loads there shall be no failure of any member, deflection of not more than $L/240$ of length of any member, and without permanent deformation of any member or fastener.
- B. Minimum Structural Performances: Provide installed metal fabrication assemblies complying with following minimum structural performances, unless otherwise indicated:
 - 1. Top Rails of Guards:
 - a. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction
 - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
- C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
- D. Thermal Movements: Allow for thermal movement resulting from the following maximum change in ambient temperature in the design, fabrication and installation of fencing and gates to prevent buckling, opening up of joints, overstressing of components, connections and other detrimental effects. Base design calculation on actual surface temperatures of materials due to both solar heat gain and night time sky heat loss.
 - 1. Temperature Change: 120 degrees F. ambient; 180 degrees F material surfaces.

1.8 SUBMITTALS

- A. Manufacturer's catalog data and specification sheets for each type of manufactured product, including certification that each product complies with specified requirements. Include instructions for handling, storage, installation and protection.
- B. Calculations: Provide professionally prepared calculations and certification of the performance of this work. Indicate how design requirements for loading and other performance criteria have been satisfied.
- C. Welders Certification: Provide certifications, signed by Contractor, certifying that welders employed at project comply with requirements specified under AWS D1.1, AWS D1.3 and AWS D1.6.
- D. SHOP DRAWINGS:
 - 1. Submit shop drawings of barrier railings including each post, details of post installation, hardware and accessories. Show sizes and thicknesses of all members, types of materials, methods of connection and assembly, welds, complete dimensions, clearances,

anchorage, relationship to surrounding work, and other pertinent details of fabrication and installation. Take all necessary field dimensions and verify dimensions as required.

- a. Include plans and details of sections and connections to new masonry.
 - b. Provide complete elevations of all new metal barrier railings.
 - c. Where materials or fabrications are intended to comply with certain requirements for design loading, include structural engineer's certification, material properties and other information needed for structural analysis.
 - d. Include on Shop Drawings locations and sizes of drainage holes in HSS members through which galvanizing can enter interior spaces.
2. Submit shop drawings of kiosk, including posts, details of post installation, hardware, accessories and locations, and attachment of interpretive signage. Show sizes and thicknesses of all members, types of materials, methods of connection and assembly, welds, complete dimensions, clearances, anchorage, relationship to surrounding work, and other pertinent details of fabrication and installation. Take all necessary field dimensions and verify dimensions as required.
- a. Include plans and details of sections of concrete foundation and connections of kiosk to new concrete foundations.
 - b. Provide complete elevations of new kiosk.
 - c. Where materials or fabrications are intended to comply with certain requirements for design loading, include structural engineer's certification, material properties and other information needed for structural analysis.
3. Submit shop drawings of all signage for kiosks. Shop drawing shall be full-color showing with all dimensions of each panel. Show methods of securing to the associated site element.

E. Samples for Verification:

1. Submit samples for each profile and pattern of fabricated metal and for each type of metal finish required, prepared on metal of same thickness and alloy indicated for the Work.
2. Provide a 12" x 12" sample of the signage panel showing specified materials and finishes and full range of color of printing.

E. Warranties: Submit written warranties from fabricator as follows:

1. Special Project Warranty by fabricator agreeing to repair or replace fabrications that fail in materials or workmanship due to non-compliance with specified requirements. Repair and replacement costs shall include labor, materials and overhead. Failure is defined as embrittlement, distortion, or warpage. Warranty period begins at date of fabrication and extends until 2 years after the date of Substantial Completion.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect and handle materials after fabrication in the shop, during loading, shipping, unloading at the site, storage and erection as required to prevent damage to finish surfaces, section contours, squareness, straightness and flatness of fabricated members. Use only material that is not subject to staining or discoloration for blocking and packing. Provide suitable packaging to prevent damage to surfaces and distortion of materials. For factory-primed or factory-finished materials use nylon slings or padded cables for handling.

1. Store on wood skids or pallets, covered with non-staining, waterproof membrane. Place and stack to distribute weight evenly and to prevent breakage or cracking. Protect stored

materials from weather with waterproof, non-staining covers or enclosures, but allow air to circulate around materials.

1.9 PROJECT CONDITIONS

- A. Field Measurements: Check by accurate field measurements before removals and fabrication, actual conditions of walls and other construction to which metal fabrications must fit. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.
- B. Where field measurements cannot be made without delaying the work, guarantee dimensions and proceed with fabrication of products without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

PART 2 - PRODUCTS

2.1 METAL MATERIALS - GENERAL

- A. Provide metal forms and types that comply with requirements of referenced standards and that are free from surface blemishes where exposed to view in the finished unit.
 - 1. Exposed to view surfaces exhibiting pitting, seam marks, roller marks, rolled trade names, roughness, stains, discolorations or other imperfections on finished unit, and for sheet steel, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet, are not acceptable.
- B. Provide all materials of the best commercial quality for the purpose intended, free from all defects which would impair the strength or durability of the work.
- C. Surface Appearance: Contractor shall be responsible for surface defects due to manufacture or fabrication of steel components. Contractor shall provide materials with acceptable appearance and smoothness, as judged solely by the Owner. Contractor shall be required to grind or blast raw materials or fabrications prior to galvanizing. Do not apply finish coatings over galvanizing until the Owner's Representative approves the galvanized surface appearance in writing.
- D. Steel and Iron: Provide steel and iron in form indicated to comply with the following requirements:
 - 1. Ferrous Steel Plate, Shapes, and Bars: ASTM A 36/A 36M.
 - 2. Ferrous Steel Sheet: Commercial-quality, cold-rolled, stretcher-leveled, carbon-steel sheet complying with ASTM A 366/A 366M, Class I, matte finish.
 - 3. Gray-Iron Castings: ASTM A 48, Class 30 (ASTM A 48M, Class 200).
 - 4. Malleable-Iron Castings: ASTM A 47 (ASTM A 47M), grade as recommended by fabricator for type of use indicated.
 - 5. Ductile Iron Castings: ASTM A 536, grade as recommended by fabricator for type of use indicated.
- F. Drainage holes shall be provided in HSS members to allow galvanizing to enter interior spaces. Locate holes on bottom of members away from welded joints.

2.2 NEW BARRIER RAILING

- A. BARRIER RAILING shall be fabricated of ferrous steel components as shown on Drawings. Height of railing is shown on Drawings and described below.

1. Pickets shall be fabricated of 1/2" square solid steel.
 2. Corner posts shall be fabricated from galvanized steel tubular members per ASTM A500.
 - a. Members shall have 1/8" minimum wall thickness.
 - b. Ends of top rail shall be fully welded and ground smooth.
 - c. Corner posts shall be 2-1/2" x 2-1/2" tube stock.
 3. Top Rails, Mid-Rails, and Posts shall be fabricated from galvanized steel flat bars per ASTM A500.
 - a. Provide 1/2" diameter bolt holes in posts in interpretive signs. Interpretive sign not in contract.
 - b. Top Rail shall be 1" x 3" tube stock.
 4. Terminal and Corner Fence Posts shall be fabricated of galvanized steel tubular members per ASTM A500. Posts shall have 1/4" wall thickness.
 5. Interpretive Panels shall be fabricated of galvanized sheet steel per ASTM A36A.
- B. FINISH: All new barrier rails shall be hot dip galvanized and painted after fabrication, per Section 09 00 00, FINISHES, in this Specification.
1. Steel members shall have drainage holes to permit galvanizing to enter interior spaces. Locate holes on bottoms of members away from welded joints.

2.3 KIOSK FRAMEWORK

- A. Provide one (1) aluminum kiosk framework.
1. Triangular sign framework shall be fabricated in the dimensions and form indicated in the Drawings.
 - a. Frame shall be upright and create a triangular layout in plan, as shown on Drawings.
 - b. Aluminum frame and exhibit base will be finished in powder coat.
 - c. Signs mounted in the aluminum framework comes with a 5-year warranty.
 - d. Graphics for the signs shall be provided by the Owner in digital format.
 2. CONCRETE FOUNDATION: Provide concrete consisting of Portland cement complying with Section 03 30 00 Cast in Place Concrete, of these specifications, and ASTM C150, aggregates complying with ASTM C33 and clean water. Mix materials to obtain concrete complying with ASTM C94 with a minimum 28 day compressive strength of 3,000 psi, using at least 4 sacks of cement per cubic yard, 3/4" maximum size aggregate, 3" maximum slump, and 2% to 4% entrained air.
 3. KIOSK: shall be finished with a 2-part catalyst-hardened acrylic polymer coating equal to the following:
 - a. Topcoat shall be Enduratone 1029 by Tnemec, or approved equal, with a primer by Tnemec compatible with the topcoat.
 - b. Colors for finish on all aluminum kiosk components shall be confirmed by the Owner's Representative.

2.4 NEW SIGNS FOR KIOSK

- A. SIGNS FOR KIOSK

1. SIGNS shall be a custom high pressure laminate (CHPL) graphic panel that is graffiti proof and guaranteed for 10 years against fading and weather deterioration. The CHPL sign material is composed of layers of FSC Certified phenolic resin impregnated brown or black kraft filler paper to produce specified thicknesses, surfaced by a layer of melamine overlay, graphics imaged on saturation grade paper with UV resistant pigment based process color inks, and with an optically clear UV overlay that will resist no less than 99% of all sunlight and UV rays, as well as provides a graffiti resistant surface that allows for removal with standard cleaners.
 - a. CHPL thickness shall be a minimum 1/2" thick.
 - b. Signs shall have threaded holes for mounting positioned on the back side of the board.
 - c. Signs shall have the standard Matte finish.
 - d. Provide a total of (3) signs. Each sign shall be 2'-4" x 6'-0".
2. Sign shall be composed of layers of material which are assembled and heat / pressure consolidated at approximately 1,200 PSI at temperatures exceeding 275° Fahrenheit at manufacturer's prescribed time frames. All manufacturing processes of printing, pressing, machining, finishing and crating to be accomplished within a single standalone manufacturing facility to ensure consistent quality control and providing standard product delivery times of three weeks.
3. The graphic material and images are to be supplied by the Owner and shall be produced under the supervision of the sign manufacturer. CHPL manufacturer must supply project specific electronic PDF proofs for content approval and minimum 8" x 10" x .060" actual material lab samples for color and finish approval from production ready digital art work and specifications as provided by Owner's Representative.
4. Sign shall be manufactured by iZone Imaging, PO Box 368, Temple, TX 76503. Tel: 888.464.9663; email: info@izoneimaging.com, or approved equal.

2.5 MISCELLANEOUS MATERIALS

- A. WELDING RODS, BARE ELECTRODES AND FILLER METALS: Select in accordance with AWS specifications for the type and metal alloy to be welded as recommended by the producer of the metal to be welded and as required for color match, strength and compatibility with the parent material joined in the fabricated items.
- B. LEAD: 99.9% pure lead.
- C. JOINT SEALANT for metal fabrications: SikaFlex 1A as manufactured by the Sika Corporation, Lyndhurst NJ, or approved equal. Color to be selected by Owner's Representative.
 1. Primer: Provide non-staining type recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated.
 2. Cleaners for Nonporous Surfaces: Provide non-staining, noncorrosive, chemical cleaner of type acceptable to manufacturer of sealant and sealant backing materials which are not harmful to substrates and adjacent nonporous materials.
 3. Masking Tape: Provide non-staining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.
- D. CONCRETE: Provide concrete consisting of Portland cement complying with Section 03 30 00 of these specifications and ASTM C150, aggregates complying with ASTM C33 and clean

water. Mix materials to obtain concrete complying with ASTM C94 with a minimum 28 day compressive strength of 3000 psi, using at least 4 sacks of cement per cubic yard, 3/4" maximum size aggregate, 3" maximum slump, and 2% to 4% entrained air.

- E. GROUT: Exterior Erosion-Resistant Anchoring Cement: Super Por-Rok by CGM Building Products, Bensalem, PA.

PART 3 - EXECUTION

3.1 NEW METAL FABRICATION

- A. Fabricate and install all metalwork as shown on the Drawings and in conformance with approved Shop Drawings.
- B. Steel fabrication shall be accomplished using the highest standards of workmanship. Individual steel pieces shall be saw cut and carefully fit together. All connections shall be full welded and ground flush and smooth. All fabricated steel items shall be fine sanded throughout to produce a high standard of surface smoothness. All surfaces and connections shall be without visible grinding marks, surface differentiation or variation.
- C. All material that is specified to be galvanized shall be hot-dipped galvanized and finish painted after fabrication, as specified. See Section 09 00 00 – FINISHES.
- D. The Contractor shall be responsible for timing the delivery of the fencing so as to minimize on-site storage time prior to installation. All stored materials and items must be protected from weather, careless handling, and vandalism.
- E. Shop Assembly: Preassemble fence in shop to greatest extent possible to minimize field splicing and assembly. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- F. Straighten pickets. Maximum deviation from straight shall be 1/8 inch in 4 feet.
- G. Sheer and punch metals cleanly and accurately. Remove burrs.
- H. Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- I. Weld pickets to rails. Make all welds continuous, 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. 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.
- J. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fence rigidly in place.
- K. Allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up 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.

3.2 INSTALLATION – KIOSK

- A. Take field measurements prior to preparation of shop drawings and fabrication where possible. Do not delay job progress. Allow for trimming and fitting where taking field measurements before fabrication might delay work.
- B. Install kiosk and sign bases in accordance with approved shop drawings. Do not begin installation and erection before final grading is established.
- C. Setting Anchors in Concrete:
 1. Core drill concrete in a neat fashion such that the hole is 1 inch greater in diameter than the anchor to be placed in it is plumb and in alignment. Hole depth shall be 9 inches minimum.
 2. Clear post holes of loose material. Provide cardboard sleeves around all steel work to be set in concrete. Fill the space between the masonry and post solidly with exterior erosion-resistant anchoring cement, finished to divert water running down the post away from the post base. Ensure that hole is very dry prior to filling.
- D. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment, elevation, level, true and free of rack, measured from established lines and levels.
 1. Provide all temporary bracing, guy wires, turnbuckles, horizontal struts, etc., as may be required to plumb and hold the metal fabrications in place and aligned at all times during assembly and to take care of all lateral and vertical loads to which the work may be subjected. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry or similar construction.
 2. Do not field modify any shop assembly unless approved by Owner's Representative.
- E. Fit exposed connections accurately together to form tight hairline joints that cannot be shop welded because of shipping size limitations. Grind exposed joints smooth. Do not weld, cut or abrade the surfaces of exterior units which have been hot dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- F. Field Welding: Comply with AWS Code for procedures of manual shielded metal arc welding, appearance and quality of welds made, methods used in correcting welding work and 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 that no roughness shows after finishing and contour of welded surface matches those adjacent.
- E. Install sealants in strict accordance with manufacturer's written instructions.
- F. Install signage panels as indicated in the approved shop drawings.

3.2 INSTALLATION – BARRIER RAIL

- A. Take field measurements prior to preparation of shop drawings and fabrication where possible. Do not delay job progress. Allow for trimming and fitting where taking field measurements before fabrication might delay work.
- B. Install barrier rail in accordance with approved shop drawings. Do not begin installation and erection before receiving material.
- C. Core-drilling: Drill holes for posts to diameters and spacings indicated. Diameter for hole cored in receiving material shall be 1" greater than the material being inserted. Depth shall be a minimum of 12".
- D. Setting Posts in Stone or Concrete:
 - 1. Core drill concrete and stone in a neat fashion such that the hole is 1 inch greater in diameter than the fence component or anchor to be placed in it is plumb and in alignment. Hole depth shall be 12 inches minimum.
 - 2. Clear post holes of loose material. Provide cardboard sleeves around all steel work to be set in concrete. Fill the space between the masonry and post solidly with exterior erosion-resistant anchoring cement, finished to divert water running down the post away from the post base. Ensure that hole is very dry prior to filling.
- F. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment, elevation, level, true and free of rack, measured from established lines and levels.
 - 1. Provide all temporary bracing, guy wires, turnbuckles, horizontal struts, etc., as may be required to plumb and hold the metal fabrications in place and aligned at all times during assembly and to take care of all lateral and vertical loads to which the work may be subjected. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry or similar construction.
 - 2. Do not field modify any shop assembly unless approved by Owner's Representative.
- G. Fit exposed connections accurately together to form tight hairline joints that cannot be shop welded because of shipping size limitations. Grind exposed joints smooth. Do not weld, cut or abrade the surfaces of exterior units which have been hot dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- H. Field Welding: Comply with AWS Code for procedures of manual shielded metal arc welding, appearance and quality of welds made, methods used in correcting welding work and 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 that no roughness shows after finishing and contour of welded surface matches those adjacent.
- G. Install sealants in strict accordance with manufacturer's written instructions.
- H. For the interpretive railing, install signage panels as indicated in the approved shop drawings.

3.3 TOUCH-UP AND REPAIR

- A. For damaged and field-welded metal coated surfaces and clean welds abraded areas and surfaces to which paint was omitted for field welding.
 - 1. At galvanized surfaces, apply organic zinc repair paint. Touch up with aerosol sprays is not acceptable.

3.4 PROTECTION

- A. Protect materials, fabrications, and assemblies with metal coatings from damage during construction using methods approved by fabricator, galvanizer and coating manufacturer.

END OF SECTION

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SECTION 05 52 13 - METAL HANDRAILS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 SECTION INCLUDES

- A. Provide all labor, materials, equipment and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, furnishing and installing the following:
 - 1. New metal handrails at granite steps
 - 2. Furnish and install all accessory items including hardware, connecting angles, clip angles, bolts, welds, and bracing members necessary for complete installations of the respective elements.

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 02 41 13 - Site Preparation
 - 2. Section 03 30 00 - Cast in Place Concrete
 - 3. Section 04 40 00 - Masonry
 - 4. Section 09 00 00 – Finishes

1.4 REFERENCES

- A. Codes and Standards: Comply with the standards of the following associations except as otherwise required:
 - 1. American Society for Testing and Materials (ASTM):
 - A 36 Structural Steel
 - A 53 Pipe, Stainless Steel Welded and Seamless
 - A 123 Stainless Steel 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 385 High-Quality Zinc Coatings (Hot-Dip)
 - 2. Massachusetts State Building Code, Latest Edition
 - 3. Massachusetts Architectural Access Board, Standards.
 - 4. Americans with Disabilities Act, Latest Edition.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements.
- B. Shop Drawings: Provide large scale shop drawings for fabrication, installation and erection of all parts of the work. Provide plans, elevations, and details of anchorages, connections and accessory items. Provide installation templates for work installed by others. Show all interfaces and relationships to work of other trades.
- C. Field Measurements: Take all necessary field measurements before preparation of shop drawings and fabrication. Do not delay progress of the job. If field measurements are not possible prior to fabrication, allow for field cutting and fitting.
- D. Initial Selection Samples: Submit samples showing complete range of colors, textures, and finishes available for each material used.
- E. Verification Samples: Submit representative samples of each material that is to be exposed in the completed work. Show full color ranges and finish variations expected. Provide samples having minimum size of 144 sq. in.
- F. Calculations: Provide professionally prepared calculations and certification of the performance of this work. Indicate how design requirements for loading and other performance criteria have been satisfied.

1.6 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 high grade stainless steel. 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.

1.7 WORKMANSHIP

- A. Handrail work 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.

1.8 PERFORMANCE REQUIREMENTS

- A. General: Provide installed handrail assemblies complying with following structural performances, unless otherwise indicated:

- 1. Live Loads shall not be less than the minimum required by applicable building codes.

2. Design shall incorporate safety factors as required by the applicable building codes.
3. Design and construction shall be as such to assure that under the required design live loads there shall be no failure of any member, deflection of not more than $L/240$ of length of any member, and without permanent deformation of any member or fastener.

B. Minimum Structural Performances: Provide installed handrail and guardrail assemblies complying with following minimum structural performances, unless otherwise indicated:

1. Handrails:
 - a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
 - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.

1.9 QUALITY ASSURANCE:

- A. Source: For each material type required for the work of this section, provide primary materials which are the product of one manufacturer. Provide secondary or accessory materials which are acceptable to the manufacturers of the primary materials.
- B. Engineering: Provide services of Professional Engineer, registered in the Commonwealth of Massachusetts, to design and certify that work of this Section meets or exceeds performance requirements specified.

1.10 ANCHORAGE

- A. Anchorage shall be provided where necessary for fastening handrails 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.

1.11 DISSIMILAR MATERIALS

- A. Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, masonry, wet or pressure-treated wood, or absorptive materials subject to wetting, the surfaces shall be protected with a coat of bituminous paint or asphalt varnish.

PART 2 - PRODUCTS

2.1 EXTERIOR STEEL HANDRAILS

- A. Materials shall be new stock, free from defects impairing strength, durability or appearance, and of best commercial quality for each intended purpose.
 1. Steel pipe shall be seamless 316 grade stainless steel pipe conforming to ASTM A 53, Schedule 40. Stainless steel pipe shall be used at exterior uses.
 2. Stainless steel tubing shall be 316 grade structural stainless steel square tubing conforming to ASTM A 501.
 3. All other steel shall be stainless 316 grade and conform to ASTM A 36.
 4. Construction specialties such as slotted inserts, wedge inserts, etc., shall be as manufactured by Hohmann and Barnard; Gateway Erectors Inc.; Richmond Screw Anchor Co.; or equal approved by the Owner's Representative.

2.2 FASTENERS AND ANCHORS

- A. Provide all anchors, bolts, sockets, sleeves, and other parts required for securing each item of work of this Section to the construction. Furnish required inserts and sleeves for installation

in concrete under Section 033000, Cast In Place Concrete.

- B. Exposed fastenings shall be of the same material and finish as the metal to which applied, unless otherwise noted.
- C. Welding rods shall conform to AWS Standards and the recommendation of the welding rod manufacturer. Welding of steel shall conform to AWS D1.1.

2.3 GROUT

- A. Epoxy Grout: Provide non-shrink, non-metallic, non-corrosive epoxy grout conforming to the following requirements:
 - 1. Grout shall be manufactured specifically for use in supporting heavy loads.
 - 2. Shrinkage at 28 days: None (0.00 shrinkage when tested in accordance with ASTM C827 modified procedure) with a minimum effective bearing area (EBA) of 95 percent coverage of the tested base plate.
 - 3. Compressive strength, minimum: 10,000 psi at seven days, when tested in accordance with ASTM C579.
 - 4. Initial setting time: Approximately one hour at 70 degrees F.
 - 5. Provide flowable consistency as necessary for the particular application.
 - 6. Epoxy grouts which are volatile and which give off noxious fumes are not acceptable.

2.4 ELECTROLYTIC SEPARATION

- 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 Themec 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 FABRICATION AND WORKMANSHIP

- A. Metal surfaces shall be clean and free from mill scale, flake, rust and rust pitting; well formed and finished to shape and size, true to details with straight, sharp lines and angles and smooth surfaces. Curved work shall be to true radii. Exposed sheared edges shall be eased.
- B. Weld all permanent connections. Weld shall be continuous on all exposed surfaces and where required for strength on concealed surfaces. Exposed welds shall be ground flush and smooth, with voids filled with metallic filling compound (metallic filling compound not permitted on surfaces to receive hot-dip galvanizing). Tack-welding will not be permitted unless specifically called for. Do not use screws or bolts where they can be avoided. Where used, fastener heads shall be countersunk, screwed up tight, and threads nicked to prevent loosening.
- C. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall give ample strength and stiffness. Joints exposed to weather shall be formed to exclude water.
- D. Do all cutting, punching, drilling, and tapping required for attachment of hardware and of work by other trades where so indicated or where directions for same are given prior to, or with approval of, shop drawings.

- E. Live loads: Refer to Paragraph 1.8. Factor of safety shall not be less than 2-1/2 to 1.

3.3 INSTALLATION - GENERAL

- A. Materials shall be carefully handled and stored under cover in manner to prevent deformation and damage to the materials and to shop finishes, and to prevent rusting and the accumulation of foreign matter on the metal work. All such work shall be repaired and cleaned prior to erection.
- B. Work shall be erected square, plumb, and true, accurately fitted, and with tight joints and intersections. All anchors, inserts and other members to be set into concrete or masonry shall be furnished loose by this trade to be built-into concrete and masonry by those trades as the work progresses. Later cutting or drilling shall be avoided wherever possible.
- C. Metal work shall be rigidly braced and secured to surrounding construction, and shall be tight and free of rattle, vibration, or noticeable deflection after installation.
- D. 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, used strictly in accordance with manufacturer's directions. Holes to receive members shall be formed with galvanized sheet metal sleeves, expanded polystyrene foam, 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.
- E. Electrolytic Isolation: Where dissimilar metals are to come into contact with one another, isolate by 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.

3.4 EXTERIOR STEEL HANDRAILS

- A. Fabricate and install exterior steel handrails at stairs as called for on the Drawings.
- B. Handrails shall be of Landscape Architectural Quality. Exceptional care shall be taken in welding and grinding, filling and surface sanding to provide truly smooth, clean, neat and flush construction throughout, free of all surface defects and defacements.
 - 1. Steel handrails shall be fabricated of seamless oval steel pipe, in accordance with designs and configurations as called for on the Drawings. Sizes and shapes of all members shall be as indicated. Joints shall be full-welded and ground flush and smooth.
- C. Include as part of this work all posts, pickets, pipe handrails, intermediate rails, proprietary wall brackets, proprietary weld-on fittings (escutcheons, flanges, and returns, 90 degree corners, bends, crossovers, tees, etc.) anchors, and other items required for complete installations.
- D. Installation of Steel Handrails: Unless otherwise indicated on the Drawings, installation shall be in pipe sleeves embedded in concrete and filled with grout or molten lead.

END OF SECTION

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SECTION 09 00 00 - FINISHES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 SECTION INCLUDES

- A. Provide all labor, materials, equipment and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, furnishing and installing the following:
 - 1. Surface preparation, hot-dip galvanizing and painting all new metal components on shop-fabricated metalwork.

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 05 50 00 – Metal Fabrications.

1.4 REFERENCES

- A. Codes and Standards: Comply with the standards of the following associations except as otherwise required:
 - 1. AHDGA (American Hot-Dip Galvanizers Association Inc.): "Inspection Manual for Hot-Dip Galvanized Products".
 - 2. ASTM (American Society for Testing and Materials):
 - a. ASTM A123: Zinc (Hot Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates and Hardware.
 - b. ASTM A143: Safeguarding Against Embrittlement.
 - c. ASTM A153: Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - d. ASTM A384: Safeguarding Against Warpage.
 - e. ASTM A385: Providing High Quality Zinc Coatings.
 - f. ASTM A780: Repair of Hot-Dip Galvanizing.
 - 3. Standards of SSPC [Steel Structures Painting Council] except as otherwise required:
 - a. SSPC-PA2: Paint Thickness Measurement.
 - b. SSPC-PAL: Paint Application Specification No. 1.

- c. SSPC-SP1: Solvent Cleaning.
- d. SSPC-SP2: Hand Tool Cleaning.
- e. SSPC-SP3: Power Tool Cleaning.
- f. SSPC-SP6: Commercial Blast Cleaning.
- g. SSPC-SP7: Brush Off Blast Cleaning.
- h. SSPC-SP10: Near White Metal Blast Cleaning
- i. SSPC-SP16: Brush Blasting
- j. SSPC-Vis-1: Pictorial Surface Preparation Standards.

4. SAE INTERNATIONAL

- a. SAE- J1993: High Carbon Cast Steel Grit
- B. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, within recommended limits and in accordance with manufacturer's directions.
- C. Include on label of containers: manufacturer's name, type of paint, manufacturer's stock number, color, batch number, instructions for reducing where applicable, label analysis. Paint material containers not displaying manufacturer's product identification will not be acceptable.
- D. Coordination of Work: Review other Sections of these specifications in which primers are provided to ensure compatibility of the total systems for various substrates. Upon request, furnish information on characteristics of finish materials to ensure use of compatible primers.
- E. Material Quality: Provide the manufacturer's best quality trade sale paint material of the various coating types specified.
- F. Provide products which comply with all state and local regulations including VOC/VOS rules at the time of application.
- G. All colors and paint finishes shall be as selected by Owner's Representative. Perform no finish painting until such color samples have been approved. Obtain approval prior to purchase and delivery.
- H. Applicator: Company specializing in commercial painting and finishing for 5 years, completing work of similar scope.

1.5 SUBMITTALS

- A. For all materials requiring finishing:
- 1. Submit samples of manufacturer's latest color chips for selection by Owner's Representative. Perform no steel coatings until such color samples have been approved.
 - 2. Provide manufacturer's name, product name and product line number for each material.
 - 3. Provide manufacturer's technical data sheet for each coating giving descriptive data, curing time, mixing, thinning and application instructions, and shelf life.

1.6 WARRANTIES

- A. Warranties: Submit written warranties from galvanizer and coating manufacturer as follows:
- 1. Special Project Warranty by galvanizer agreeing to repair a galvanized finish which exhibits excessive corrosion during a period of 20 years after the date of Substantial Completion.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original containers with seals unbroken and labels legible and intact including instructions for mixing and/or reducing.
- B. Storage of Materials: Store only acceptable project materials on project site, in a suitable protected and ventilated location within temperature range recommended by manufacturer. Comply with health and fire regulations.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. All metal components shall be shop-coated in a controlled environment in a suitable designed spray booth capable of controlling environmental conditions.
 - 1. Coating work shall not be allowed when the relative humidity exceeds 80% or when the temperature is less than 5 degrees above the dew point. Test with a moisture meter.
 - 2. The temperature of the material to be coated must be within 5 degrees of the ambient temperature with minimum material temperature to be above 50 degrees. Temperature and relative humidity to be logged on a daily basis of each application.
 - 3. Paint shall not be applied when the air, steel or paint materials are below 50 degrees F., or the humidity is above 80%. The paint shall be fully cured prior to installation.
- B. Apply coatings only when work areas are reasonably free of airborne dust at time of application.

1.9 PROJECT CONDITIONS

- A. All applicators shall wear protective clothing suitable for use with mineral spirit-based materials. Avoid prolonged breathing of vapors.

1.10 MAINTENANCE MATERIALS

- A. Provide Owner with not less than three (3) one gallon containers of each finish paint used in clean, unopened, tightly sealed and clearly labeled containers.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. GALVANIZING:
 - 1. Hot-Dip Galvanizing shall be by Duncan Galvanizing, V&S Galvanizing or approved equal. Provide dry film thickness specified in referenced standards.
- B. GALVANIZING REPAIR PAINT: Organic high zinc dust content paint for re-galvanizing welds in galvanized steel, complying with SSPC-Paint-20 and with a minimum of 95 percent zinc by weight and compatible with galvanizing and metal coatings shall be chosen from one of the following:
 - 1. Tnemec-Zinc series 90-xx by Tnemec Company, Inc.
 - 2. Zinc Shield, Organic Zinc Rich Coating 5700 by Wilbur & Williams, a Division of California Products Corporation.
 - 3. ZiRP by Duncan Galvanizing Corporation.
 - 4. ZRC Cold Galvanizing Compound by Sealube Co.
 - 5. Brite Zinc by Brite Products.
 - 6. Or approved equal.

- C. FINISH PAINT for all galvanized steel surfaces shall be manufactured by Carboline Global Headquarters, 2150 Schuetz Rd., St. Louis, MO 63146., or approved equal:
1. Primer Coat: 1 coat of Carboline Galoseal WB high build, high solids primers.
 2. Finish Coat: 1 coat of Carboline Carbothane 134 HG Aliphatic Acrylic low VOC thin film Polyurethane. Finish coat shall have a gloss finish.
 3. Coating Thicknesses:
 - a. Primer shall be applied to achieve a dry film thickness in the range of 4.0 to 6.0 mils.
 - b. The Polyurethane topcoat shall be applied to achieve a dry film thickness in the range of 2.0 to 3.0 mils.
 4. Finish color to be chosen by Owner's Representative.
- D. KIOSK: shall be finished with a 2-part catalyst-hardened acrylic polymer coating equal to the following:
1. Topcoat shall be Enduratone 1029 by Tnemec, or approved equal, with a primer by Tnemec compatible with the topcoat.
 2. Colors for finish on all aluminum kiosk components shall be confirmed by the Owner's Representative.

2.2 APPLICATION OF GALVANIZING AND METAL COATING

- A. Galvanizing: All ferrous metal and cast iron components shall be hot dip galvanized unless otherwise noted herein or on the Drawings. Provide a zinc coating for those items indicated or specified to be galvanized as follows:
1. ASTM A153 for galvanizing iron and steel hardware.
 2. ASTM A123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed and forged steel shapes, plates, bars and strip 0.0299 inch thick and heavier.
 3. ASTM A386 for galvanizing assembled steel products. Wherever possible, perform galvanizing after assembly of items. Only where items are too large for galvanizing tanks will galvanizing prior to assembly be acceptable. After galvanizing, straighten processed items as required to remove all warpage and distortion caused by the process.
 4. Safeguard against embrittlement in conformance with ASTM A143.
 5. Safeguard against warpage in conformance with ASTM A384.
 6. Include a paintable white rust preventative in the galvanizing process.
- B. Galvanizing Application: Galvanize materials in accordance with specified requirements. Galvanizing shall provide a visually acceptable substrate for applied coatings, and be free of lumps, globules, or heavy deposits which will interfere with intended use or esthetic appearance of materials.
- E. Metal Coating Application: Apply primer coating over hot-dip galvanizing within 12 hours after galvanizing in the galvanizer's facility in accordance with specified requirements and recommendations of galvanizer and coating manufacturer. Primer surface must be cured before application of the finish coat. Metal coatings shall be free of lumps, runs, or sags which will interfere with intended use or aesthetic appearance of materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions under which painting will be performed for compliance with requirements for application of paint. Do not begin paint application until unsatisfactory conditions have been corrected.

- 1. Start of galvanizing will be construed as the Applicator's acceptance of metal surfaces and conditions.

3.2 PROTECTION

- A. Exercise great care not to deface adjacent work. Cover or otherwise protect surfaces not being painted concurrently or not to be painted and the finished work of other trades. Remove removable device plates, escutcheons and similar items before painting and replace these items after paint has dried. Remove protective covering, masking tape, etc., when painting of surfaces or items is completed.

3.3 PREPARATION

- A. General Procedures: Clean surfaces before applying paint or surface treatments. Remove oil and grease prior to cleaning. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- B. Surface Preparation: Clean and prepare surfaces to be painted in accordance with the paint manufacturer's instructions for each particular substrate condition and as specified. Clean surfaces free of all dust, dirt, oil, wax, efflorescence and any other surface contaminants which may adversely affect adhesion, penetration or appearance.
 - 1. All scale present of metal surfaces shall be removed by blasting in accordance with SSPC-SP10. Blasting shall be done with an air compressor having a minimum capacity of 200 psi, the blast media to be a cast steel grit: G25, G40 or G50 in accordance with SAE J1993.
 - 2. New Galvanized Surfaces: Clean by solvent cleaning in accordance with SSPC-SP16 so that the surface is free of oil, grease, dirt and dust contaminants. Detergent wash if necessary to remove dirt, dust and foreign matter. Remove white rust by hand or power brushing. Exercise care not to damage or remove galvanizing. Apply galvanizing repair paint to ungalvanized areas prior to priming. Fresh water rinse surface prior to painting.
 - a. Apply primer to test area. Allow primer to dry at least 7 days before testing. If adhesion is poor, brush off blast clean in accordance with the requirements of SSPC-SP7.
- C. Materials Preparation: Carefully mix and prepare paint materials in accordance with manufacturer's directions.
 - 1. Do not use any material older than manufacturer's recommended shelf life.
 - 2. Do not use mixed material beyond manufacturer's recommended pot life.
 - 3. Deliver paints and enamels ready mixed to project site. Accomplish job mixing and job tinting only when acceptable to Owner's Representative. Use tinting colors recommended by manufacturer for the specific type of finish.
 - 4. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue. Use suitably sized non-ferrous or oxide resistant metal containers.
 - 5. Mix material according to manufacturer's latest printed instructions. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
 - 6. Thin material according to manufacturer's latest printed instructions. Use only thinners approved by paint manufacturer, and within recommended limits.

3.4 APPLICATION

- A. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being used.
- B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces or conditions detrimental to formation of a durable paint film.
- C. Prime Coats: After surface preparation has been completed, apply a prime coat of material as recommended by the manufacturer to materials that are required to be painted or finished and has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in the first coat appears, to assure a finish coat with no burn through or other defects due to insufficient sealing
- D. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practical after preparation and before subsequent surface deterioration.
 - 1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm and does not deform or feel sticky under moderate thumb pressure and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
 - 2. Comply with the recommendation of the material manufacturer for drying time between succeeding coats.
 - 3. Successive coats of paint shall differ sufficiently in shade so as to be readily distinguishable.
- E. Provide finish coats that are compatible with primers used.
- F. Galvanized surfaces damaged by welding or other causes shall be wire brushed to remove all loosened or cracked zinc coating and re-galvanized with a 95 percent zinc cold galvanizing coating prior to finishing with approved touch-up paint provided by the color galvanizer as specified, herein.
- G. Minimum Coating Thickness: Apply materials at not less than the manufacturer's recommended spreading rate. Provide a total dry film thickness of the entire system as recommended by the manufacturer.
 - 1. Measure dry film thickness using magnetic film thickness gauge in accordance with SSPC-PA2.
- H. The required finished product shall be free of runs, sags, pinholes and holidays.
 - 1. Apply additional coats when undercoats, stains or other conditions show through final coat of paint until paint film is of uniform finish, color and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 - 2. Sand between applications where sanding is required to produce an even, smooth surface in accordance with the manufacturer's directions.
 - 3. Make edges of paint adjoining other materials or colors clean and sharp with no overlapping.
- I. Completed Work: Remove, refinish or repaint work not in compliance with specified requirements.

3.5 FIELD QUALITY CONTROL

- A. The Owner's Representative reserves the right to invoke the following test procedure at any time and as often as the he/she deems necessary during the period when the paint is being applied.
1. The Owner's Representative may engage the services of an independent testing laboratory to sample the paint material being used. Samples of material delivered to the project will be taken, identified, sealed and certified in the presence of the Contractor.
 2. The testing laboratory will perform appropriate tests for the following characteristics as required by the Owner:
 - a. Quantitative materials analysis.
 - b. Abrasion resistance.
 - c. Apparent reflectivity.
 - d. Flexibility.
 - e. Washability.
 - f. Absorption.
 - g. Accelerated weathering.
 - h. Dry opacity.
 - i. Accelerated yellowness.
 - j. Recoating.
 - k. Skinning.
 - l. Color retention.
 - m. Alkali and mildew resistance.
 3. If test results show material being used does not comply with specified requirements, the Contractor may be directed to stop painting, remove noncomplying paint, pay for testing, repaint surfaces coated with rejected paint, and remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are noncompatible.

3.6 CLEANING AND PROTECTION

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish and other discarded paint materials from the site.
- B. Remove all equipment, materials and debris caused by work of this Section and leave the site of the work in a clean condition insofar as this work is concerned.
- C. Provide "Wet Paint" signs and other devices as necessary to protect newly painted finishes.
- D. Rectify any damage to adjacent work caused by painting operations. Touch up and restore finishes where damaged. Remove spilled, splashed or spattered paint from all surfaces. Repaint entire item where portion of finish has been damaged or is unacceptable.
- E. Protect all painted surfaces against damage until the date of substantial completion. All finished work under this Section shall have perfect surfaces when completed work is ready for inspection for substantial completion. Repair or retouch all areas which do not comply with requirements of this Section for any reason whatsoever to the satisfaction of Owner's Representative at no additional cost to Owner.

END OF SECTION

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SECTION 31 00 00 - EARTHWORK

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 SECTION INCLUDES

- A. Provide all labor, materials, equipment and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, furnishing and installing the following:
 - 1. Stripping and removal of existing loam.
 - 2. Excavating, filling, backfilling and grading as required for the construction of paving, walls, site improvements and other site work.
 - 3. Providing, furnishing and placing of all fill and backfill materials as specified herein, as shown on the Drawings or as required.
 - 4. Compaction and decompaction procedures.
 - 5. Protecting all existing structures, utilities, pavements, planting and other site improvements from damage due to construction.
 - 6. Performing all dewatering necessary to maintain excavated areas free from water from any source.
 - 7. Removing and disposing of all unsuitable and surplus excavated materials from the site.
 - 8. Work under this Section shall include an Allowance, for bidding purposes, for the removal of rock, concrete and other subsurface materials up to and including four [4] cubic yards in volume encountered during excavation that can be removed by normal power excavation equipment. Excavation of this material shall be at the Contractor's expense.
 - a. Such removals shall be measured by the Contractor by notifying the Owner's Representative prior to the removal. If not performed, credit to the extent of ledge, boulder, or foundation removal less than four (4) cubic yards in the measurements shall be applied to the contract price at a value of \$80.00 per cubic yard. The contract price shall be reduced by the extent of work not undertaken as called for in this Section. The contract price shall be increased, if additional work is authorized by the Designer and verified by the Owner, at a value of \$100.00 per cubic yard.
 - b. Rock excavation shall be measured in place by a Civil Engineer employed by the Contractor with quantities verified by the Designer. No rock removals shall be credited to the Contractor without prior measurements and verifications.

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 02 41 13 - Site Preparation
2. Section 03 30 00 - Cast in Place Concrete
3. Section 32 30 00 – Site Improvements
4. Section 32 90 00 – Lawns and Planting

1.4 REFERENCES

- A. Codes and Standards: Comply with the standards of the following associations except as otherwise required:
1. AASHTO: American Association of State Highway and Transportation Officials.
 2. ANSI A10 Series standards: American National Standards Institute, "Safety Requirements for Construction and Demolition".
 3. ASTM: American Society of Testing Materials.
 4. MassDOT: "Standard Specifications for Highways and Bridges", Massachusetts Department of Transportation, Commonwealth of Massachusetts, latest edition.

1.5 QUALITY ASSURANCE

- A. Comply with all codes, laws, ordinances and regulations of governmental authorities having jurisdiction over this part of the work.
- B. Provide protection for all persons and property in accordance with ANSI/NFPA 241, Building Construction and Demolition Operations. Execute all work in such a manner as to protect existing buildings, streets, curbs, paving, utility lines, structures, fences and adjoining property from damage by equipment, settlement, undermining, washout, frost and other hazards created by earthwork operations.

1.6 TESTING SERVICES

- A. The testing laboratory will be responsible for conducting and interpreting tests, state in each report whether or not the test specimens conform to all requirements of the Contract Documents and specifically note any deviation there from. Specific test and inspection requirements shall be as specified herein.

1.7 SUBMITTALS

- A. Test Reports:
1. Gradation tests for all soil materials.
 2. Optimum moisture - maximum density of soils.
 3. Field density tests.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protect and handle manufactured materials during loading, shipping, unloading at the site, storage and erection as required to prevent damage.

1.9 BENCH MARKS AND ENGINEERING

- A. Line and grade work in accordance with the Drawings and Specifications shall be laid out by a registered Civil Engineer or Land Surveyor employed by the Contractor. Establish permanent bench marks, as required, to which access can be easily had during the progress of the work. Maintain all established bounds and bench marks and replace as directed any which are

disturbed or destroyed. Establish lines and grades in conformity with the Drawings. Provide sufficient grade stakes to witness correct lines and grades.

- B. Verify dimensions and elevations on the ground and report any discrepancies immediately to the Owner's Representative. Any discrepancies not reported prior to construction shall not be the basis for claims for extra compensation.
- C. The Drawings indicate, in general, alignment and finish grade elevations. The Owner's Representative, however, may make such adjustments in grades and alignments as are found necessary in order to avoid interference with any special conditions encountered.

1.10 DEFINITIONS

- A. Fill and backfill shall be, for the purpose of this Specification, considered interchangeable terms and shall mean material to be used to bring existing or construction grades up to finish subgrade levels.
- B. The words "finish grade" as used herein mean the required final grade elevations indicated on the Drawings. Where not otherwise directed, areas outside buildings shall be given uniform slopes between points for which finish grades are shown, or between such point and existing grade, except that vertical curves or roundings shall be provided at abrupt changes in slope.
- C. The word "subgrade" as used herein, means the required surface of subsoil, borrow fill or compacted fill. This surface is immediately beneath the site improvements, specially dimensioned fill, paving, loam or other surfacing materials.
- D. Excavation is defined as the removal of materials from the construction area to the lines and grades shown on the plans.
 - 1. Unclassified Excavation is defined as the removal of all material encountered regardless of its nature. All material excavated will be considered as Unclassified Excavation unless the Special Provisions specify Classified Materials.
- E. "Unsuitable Materials" shall include the following:
 - 1. Pavements, utility structures, building foundations and other manmade structures.
 - 2. Peat, muck, organic silt and other organic materials subject to decomposition, consolidation or decay.
 - 3. Miscellaneous fill including cinders, ash, glass, wood, masonry and metal.
 - 4. Ledge and boulders except as specified herein for fills.
- F. "Trench" shall be defined as an excavation of any length where the width is less than twice the depth. All other excavations shall be unclassified.

1.11 EXISTING CONDITIONS

- A. Subsurface Information: The Owner's Representative assumes no responsibility for the Contractor's failure to make his own site investigation and makes no representation regarding the character of the soil or subsurface conditions which may be encountered during the performance of the work. Bidders are expected to examine the site and then decide for themselves the character of materials to be encountered.
- B. Existing Utilities

1. Before starting earthwork, locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.
 2. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility Owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of Owner.
 3. Do not interrupt existing utilities serving facilities occupied or used by Owner and others, during occupied hours, except when permitted in writing by Owner and then only after acceptable temporary utility services have been provided. Provide minimum of 48 hour notice to Owner, and receive written notice to proceed before interrupting any utility.
- C. Retaining Structures: Provide bracing, shoring, sheeting, temporary tie backs, rock anchors and rock bolts, sheet piling, underpinning or other retaining structures necessary to prevent any movement or settlement of existing or new construction, utilities, paving, piping or conduit.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. ORDINARY FILL shall conform to the requirements of Section M1.01.0 of MassDOT. In addition it shall be clean, mostly granular, natural inorganic soil. It shall be free of organic or other weak or compressive materials, frozen materials, cinders, trash, rubble and stone larger than six (6) inches maximum dimension.
1. Material from excavation on the site meeting the above requirements may be used as ordinary fill provided it has not been contaminated with unsuitable material.
- B. GRANULAR FILL shall conform to the requirements of Section M1.03.0, Type c of MassDOT.
- C. GRAVEL, as noted in the Drawings, shall be DENSE GRADED CRUSHED STONE conforming to the requirements of Section M2.01.7 of MassDOT.
- D. DOUBLE WASHED CRUSHED STONE shall be 3/4" minus irregular stone with fines conforming to the requirements of Section M2.01.4 of MassDOT.
- E. FILTER FABRIC: one of the following:
1. Amoco 4545 as manufactured by Amoco
 2. AEF 480HS as manufactured by American Engineering Fabrics, Inc., New Bedford, MA.
 3. 80NW as manufactured by US Fabrics, Cincinnati, OH.
 4. Typar 3201 as manufactured by E. I. DuPont de memoirs & Co., Inc., Wilmington, DE.

2.2 USE OF FILL MATERIALS

- A. Ordinary Fill may be utilized as fill in landscaped areas up to subgrade.
- B. Granular Fill shall be utilized as fill in the following locations:
1. To replace unsuitable material.
 2. All walk embankments to subgrade.
 3. Elsewhere as shown on the Drawings or specified. Wherever fill materials such as Ordinary Fill or Gravel have not been specified herein or shown on the Drawings.

- C. Gravel shall be utilized as sub-base material for all paved surfaces, where so indicated on the Drawings or specified herein.

PART 3 - EXECUTION

3.1 STRIPPING TOPSOIL

- A. Stripping: Prior to starting general excavation, all topsoil shall be stripped to their entire depth from areas to be occupied by new walk areas, or any areas where the existing grade is to be changed.
- B. The Contractor shall segregate excavated material into stockpiles depending on the type and reuse potential of the material. At a minimum, the following materials shall be segregated separately:
 - 1. Topsoil
 - 2. Fill soils deemed suitable for reuse on site.

3.2 STOCKPILING

- A. Stockpiled material shall be stored so as not to interfere with the established sequence of the construction. Determine whether there is sufficient space for stockpiling and work with the Owner to establish stockpile zones outside of the limit of work.
- B. Should conditions make it impracticable or unsafe to stack material adjacent to excavations, the material that is not contaminated shall be hauled and stored at an approved location. When required, it shall be re-handled and used in backfilling at no additional cost to the Owner.
- C. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water away from existing drainage structures.
- D. All stockpiled loam shall be protected from wind and water erosion as specified in Section 02 41 13, SITE PREPARATION.
- E. Hand Excavation: In general, stripping by machine will be permitted with the exception of work in the vicinity of trees to remain and existing utilities which might be disturbed or damaged during stripping operations.

3.3 EXCAVATION

- A. Excavation is "Unclassified", and includes excavation to subgrade elevations indicated, or required to accommodate new construction, regardless of character of materials and obstructions encountered and shall be understood to include rock, shale, boulders, earth, hardpan, fill, foundations, pavements, curbs, piping and debris. It shall include the removal of all rubble, debris, foundations, pavement, utilities and appurtenances to two (2) feet minimum below finish grade.
- B. Excavate to the following basic subgrades:
 - 1. Footings and other site improvements: To exact elevations required.
 - 2. Paving: To elevations indicated on the Drawings.

- C. Unauthorized Excavation: When suitable bearing material is encountered at subgrade elevations shown and excavation is made to greater depth, bring grade back to elevation required by providing granular fill at no additional cost to the Town.
- D. Rock Excavation
1. The material to be excavated shall be assumed for bidding purposes to be earth and other materials that can be removed by normal power excavation equipment. This includes rock, concrete and other subsurface materials up to and including two [2] cubic yards in volume encountered during excavation. Excavation of this material shall be at the Contractor's expense.
 2. Rock or ledge shall be defined as follows:
 - a. Open Ledge - Class A: Rock, stone or boulders over two [2] cubic yards in volume to be removed and disposed of from an open area normally by bulldozer, power shovel or similar type equipment.
 - b. Trench Ledge - Class A: Rock, stone or boulders over one [1] cubic yard in volume to be removed and disposed of from a confined area normally by backhoe or similar type equipment.
 - c. Open Ledge - Class B: Rock, stone or boulders over two [2] cubic yards in volume that can be removed only by blasting or pneumatic equipment.
 - d. Trench Ledge - Class B: Rock, stone or boulders over one [1] cubic yard in volume that can be removed only by blasting or pneumatic equipment.
 - e. Anything other is "earth" insofar as removal of the material to be excavated is concerned.
 3. When, during the process of excavation, rock is encountered, uncover such materials and free them of loose material. Notify the Owner's Representative before proceeding further. The area in question shall be cross sectioned as stipulated herein. Do not proceed with excavation of material claimed as rock until the material has been classified by the Owner's Representative. Failure on the part of the Contractor to uncover such materials or notify the Owner's Representative or take cross sections will forfeit the Contractor's right of claim to any credits. The quantity of rock to be removed shall be based upon the pay line limits as established herein. The quantity of rock to be removed shall be approved by the Owner's Representative prior to blasting.
 4. The Contractor shall employ and pay for a Land Surveyor or Civil Engineer registered in Massachusetts to take cross sections of rock before removal of same and to provide computations of cross sections within the pay line limits. Complete current records of actual quantities of rock excavated, methods of excavation used and extent of labor and equipment involved shall be maintained jointly by the Contractor and Owner's Representative, and shall be dated and signed by both with duplicate copies retained by the Owner's Representative for record. Such records shall include plot plans showing at a suitable scale all elevations, locations and measurements or computed volumes of rock or boulders encountered. All labor and equipment necessary to make these plot plans and take these measurements shall be furnished by the Contractor. No payment will be considered for rock which has been removed without obtaining the above required data.
 5. Excavate rock encountered in grading the site areas to depths as follows:
 - a. Under utility structure footings and subsurface piping: to six [6] inches below the required subgrade for such footing or piping.
 - b. Outside of utility structures: to one [1] foot outside [measured horizontally] of such structure.
 - c. Outside of subsurface piping: to six [6] inches outside [measured horizontally] of such piping.

6. Blasting: The use of explosives will not be permitted.
 7. If rock is encountered the Contract Price will be adjusted in accordance with the median price for rock removal per Mass DOT's price list for the District in which the project site is located.
 8. The additional price for rock removal shall include filling the void created by removal of the rock beyond the indicated limits of excavation with suitable materials in accordance with paragraphs on Fill, Backfill and Compaction at no added cost to the Owner. No allowance shall be made by the Contractor on account of rock or ledge, if encountered, reducing the amount of ordinary fill material available for filling operations, the Contractor being responsible to provide all such required material whether obtained from on or off the site.
 9. The Owner's Representative reserves the right to adjust the proposed elevations to conform to any rock conditions.
- E. Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
- F. Dewatering: Prevent water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.
1. Do not allow water to accumulate in the excavations. Remove water to prevent softening of foundation bottoms, undercutting footings and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
 2. Establish and maintain temporary drainage ditches and their diversions outside excavation limits to convey rain water and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches. The disposal of water from excavations shall not cause damage to adjacent property and shall be in compliance with all applicable laws and regulations, in particular, those related to protection of water resources and other environmental features.
 3. Keep the water level in areas being compacted at least two (2) feet below the level at which compaction is being done at all times. Under no circumstances lay pipe or install appurtenances in water. Keep all trenches free from water until they have been backfilled.
- G. Material Storage: Stockpile satisfactory excavated materials where directed until required for backfill or fill. Place, grade and shape stockpiles for proper drainage. Do not store within drip line of trees to remain.
- H. Excavation for Structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet, and extending a sufficient distance from footings and foundations to permit placing and removal of formwork, installation of services, other construction and for inspection.
- I. Frost Protection:
1. Make no excavations to full depth indicated when freezing temperature may be expected unless intended improvements can be accomplished immediately after the excavations have been completed. Protect bottom so excavated from frost if progress is delayed. Protect the subgrade of in place footings from frost. Should protection fail remove frozen materials and replace with concrete or granular fill as directed at no cost to Department.

2. Keep the site clear and free of accumulations of snow within the limit of the Contract lines as necessary to carry out the work of the Contract.
3. Fill materials containing frost shall not be utilized, nor shall filling be done over frozen material.
4. Protect the underside of all in place construction from frost penetration during the construction period of this Contract. Such protection shall include all in place footings and slabs, during all periods of freezing temperatures until such time as the entire project is complete. Minimum frost protection shall consist of a 4 foot thickness of earth, or equivalent in insulating properties.

3.4 BACKFILL AND FILL

- A. Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.
 1. Under lawns: Use satisfactory excavated or borrow material.
 2. Under paving and surfacing: Use subbase material, or satisfactory excavated or borrow material, or combination of both.
- B. Backfill excavations as promptly as work permits, but not until completion of the following:
 1. Acceptance of construction below finish grade.
 2. Backfilling of voids with satisfactory materials.
- C. Placement and Compaction: Place backfill and fill materials in uniform lifts of not more than 12 inches in loose depth for ordinary fill and 8 inches in loose depth for other materials compacted by heavy compaction equipment, and not more than 6 inches in loose depth for material compacted by hand operated mechanical compactors.
 1. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification.
 2. Place backfill and fill materials adjacent to structures, piping or conduit evenly to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping or conduit to approximately the same elevation in each lift.
 3. Do not place any fill material until structural components involved have sufficient strength to withstand the pressure to be imposed. Remove from spaces to be filled all unstable material, including all rubbish, trash, refuse and other debris.
 4. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
 5. Coordinate backfilling with the installation of the work of all trades.
 6. Compact backfill to match adjacent areas as specified above. Correct settlement of fill by filling to subgrade levels in all areas where settlement occurs.
 7. No wheel loads are allowed within 3 feet of the slope face. Compact backfill within 3 feet of the slope face by hand operated mechanical compactors.

3.5 DECOMPACTION OF SOILS

- A. General:
 1. All existing in-place soil within the limit of new lawn turf and new tree plantings that has been subject to compaction, vehicular traffic, equipment storage or material stockpiling

prior to and during the performance of this Contract shall be deep ripped to a depth of 12 inches in accordance with the requirements of this Specification.

B. Decompaction Operations:

1. Vertically fracture all exposed subsoil material in specified areas as noted above within the Limits of Work through deep turnover and ripping, decompaction, restoring soil porosity and permeability and aiding infiltration and reducing runoff. Fracture the subsoil to a depth of 12 inches.
2. Effective fracturing of compressed subsoil material is achieved only when the soil material is moderately dry to moderately moist. Perform subsoiling only when soil has suitable moisture content as described in this Specification.
3. Contractor shall take care to stage operations of loam placement so that newly placed soils are not compacted after placement. Contractor shall demonstrate that his/her protocols for re-spreading topsoil will not cause extensive compaction.

3.6 SUBGRADE PREPARATION AND GRAVEL PLACEMENT FOR PAVEMENTS

- A. Clean the rough subgrade of all loose, soft, foreign or other unsuitable material and reshape as required. Add suitable fill material to meet required grade.
- B. Compact to required grades and sections for paving. Tamp traces of trenches. Remove spongy or otherwise unsuitable material and replace with approved material. Loosen exceptionally hard spots and recompact. Take every precaution to obtain a foundation of uniform bearing power. In absence of specific requirement, compact foundation by such means as will provide firm base and insurance against settlement of superimposed work.
- C. Roll with wheeled roller having a weight per inch of width not less than 400 pounds. Begin rolling longitudinally at sides, overlapping each pass by one-half of rear wheel. Fill all depressions or settlements which occur. Continue until all stones are firmly interlocked and surface is true and unyielding. Compaction shall be in accordance with these Specifications. After final rolling, surface is to be free of depressions or irregularities greater than 3/8 inch in 10 feet.
- D. Construct base course as detailed on the Drawings for all areas of new paved surfaces in this Section. Placement of gravel base course shall conform to the requirements of MHD except as herein modified.
- E. Spread gravel from self-spreading vehicles, approved type of power grader or by hand upon prepared subgrade. Spread evenly in layers so as to avoid separation of aggregates. Layers shall not exceed 6 inches in depth after compaction. Remove stones larger than 3 inches. When spread and rolled on the prepared surface, it shall form a stable surface. Compaction shall have a density of not less than 95% of maximum density determined in accordance with AASHTO-T-180 Method D. All rolling shall be done with a roller weighing 8 to 10 tons. Compact any portion which is not accessible to a roller by mechanical or hand tamper.
- F. Final rolled surface shall be true to the lines and grades indicated on the Drawings or as directed by the Owner's Representative. Fill any depression that may appear during and after rolling the gravel and re-roll until the surface is true and even. Tolerance shall be 3/8 inch maximum above or below the cross-section grades and 3/8 inch maximum under a 10 foot line longitudinally.
- G. Maintain the surface of any layer in its finished condition until succeeding layer is placed. Properly drain the subbase at all times.

3.7 COMPACTION

- A. Control soil compaction during construction providing minimum percentage density specified for each area classification.
- B. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density of soils which exhibit a well defined moisture density relationship determined in accordance with ASTM D1557, Method C.
 - 1. Pavements and Site Improvements: Compact top 12 inches of subgrade and each layer of backfill or fill material at 95 percent maximum density.
- C. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material, to prevent free water from appearing on surface during or subsequent to compaction operations.
 - 1. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
 - 2. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry.

3.8 GRADING

- A. Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.
- B. Grade areas to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes, and as follows:
 - 1. Plant beds, lawns or unpaved areas: Finish areas to receive topsoil to within not more than 0.10 foot above or below required subgrade elevations.
 - 2. Paved areas: Shape surface of areas under paved surfaces to line, grade and cross section, with finish surface not more than 0.10 foot above or below required subgrade elevations.
- C. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.
- D. Do all cutting, filling, reshaping, re-grading and re-compacting as necessary to meet the requirements of the Drawings and this Section of the Specifications. Maintain subgrades at the levels specified until turned over to subsequent construction. Bring to required subgrade levels any areas where settlement, erosion or other grade changes occur.

3.9 PROTECTION AND REPAIR

- 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 specified tolerances.

- C. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape and compact to required density prior to further construction.

3.10 DISPOSAL OF UNSUITABLE AND SURPLUS EXCAVATED MATERIALS

- A. Remove excess excavated materials, including unacceptable excavated material, trash and debris, and legally dispose of it off the project site.

3.11 FIELD QUALITY CONTROL

- A. Quality Control Testing During Construction: Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed.
- B. If in the opinion of the Owner, based on testing service reports and inspection, subgrade of fills which have been placed are below specified density, provide additional compaction and testing at no additional expense.

3.12 TESTS

- A. Testing laboratory will perform the following general services:
 1. Determine maximum dry density and optimum moisture content of soils in accordance with standards herein before specified.
 2. Provide optimum moisture - maximum density curves for undisturbed soil used for bearing and material used for compacted fill.
 3. Test and approve all subgrades and compacted fill layers before construction thereon.
- B. Testing laboratory will perform the following field tests:
 1. Determine frequency of field tests to assure densities required. Unless otherwise determined, minimum field testing shall be a density test for each 5,000 square feet of undisturbed subgrade and for each 5,000 square feet of overlying compacted fill.
- C. Costs of all required testing shall be the responsibility of the Contractor. In the event of additional tests to reverify a substandard compaction, as measured by the requirements set herein, there shall be no additional cost to the Owner.

END OF SECTION

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SECTION 32 12 16 - BITUMINOUS CONCRETE PAVING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 SECTION INCLUDES

- A. Provide all labor, materials, equipment and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, furnishing and installing the following:
 - 1. New bituminous concrete paving for roadways and walks, including aggregate base course.
 - 2. New pavement and repairs to existing pavement following curb installation.

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 04 00 00 – Masonry.
 - 2. Section 31 00 00 – Earthwork.

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 20
Penetration Graded Asphalt Cement
 - M 81 Cut-Back Asphalt (Rapid Curing Type) M
 - 140 Emulsified Asphalt

2. American Society for Testing and Materials (ASTM):
 - D 979 Sampling Bituminous Paving Mixtures
 - D 1557 Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10-lb. (4.54-kg) Rammer and 18-in. (475-mm) Drop
 - D 3549 Thickness or Height of Compacted Bituminous Paving Mixture Specimens
 - D 1188 Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
 - D 2041 Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
 - D 2726 Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens
 - D 2950 Density of Bituminous Concrete in Place by Nuclear Methods
3. Federal Specifications (Fed. Spec.):
 - SS-S-1401 Sealing Compound, Hot Applied, for Concrete and Asphalt Pavements
 - TT-P-115E Paint, Traffic, Highway, White, and Yellow
4. Commonwealth of Massachusetts Highway Department (MHD): Specifications
Standard Specifications for Highways and Bridges

1.5 QUALITY ASSURANCE

- A. Unless otherwise specified, work and materials for construction of the asphaltic concrete paving shall conform to the applicable portions of the following:
 1. MHD Specifications Section 460 for bituminous pavement for roadways and parking areas, Section 701 for bituminous sidewalks, and Section 405 for aggregate base course.
 - a. MHD Specifications Section 472 for repairs to existing pavements after installation of new curb.
- B. Paving work, base course etc., shall be done only after excavation and construction work which might damage them has been completed. Damage caused during construction shall be repaired before acceptance.
- C. Repair and/or replace existing paved areas damaged during this Project. Workmanship and materials for such repair and replacement shall match those employed in existing work, except as otherwise noted.

- D. Pavement subbase shall not be placed on a muddy or frozen subgrade.
- E. Existing pavement under state or local jurisdiction shall, if damaged or removed during the course of this project, be repaired or replaced under this section of the specification in conformance with applicable codes, standards, and practices.
- F. Qualifications:
 - 1. Manufacturer shall be a paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of the state in which Project is located.
 - 2. Contractor shall have a minimum 5 years experience installing bituminous concrete pavements and shall have successfully completed at least three projects of comparable scale within the past 3 years.
- G. Contractor shall provide and pay for testing procedures specified herein. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.
- H. The Owner reserves the right to retain an independent testing laboratory to perform inspection and testing of paving and associated work.
- I. Asphalt-Paving Publication: Comply with AI MS-22, "Construction of Hot Mix Asphalt Pavements," unless more stringent requirements are indicated.
- J. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1.

1.6 SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
- B. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
- C. Shop Drawings: Indicate pavement markings, cross walks, lane separations, and defined parking spaces. Indicate, with international graphics symbol, spaces dedicated to people with disabilities.
- D. Qualification Data: For manufacturer.
- E. Material Certificates: For each paving material, signed by manufacturers.
- F. Certificate stating that the proposed pavement marking paint meets the VOC regulations of the local Air Pollution Control District having jurisdiction over the geographical area in which the project is located.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:
 - 1. Prime and Tack Coats: Minimum surface temperature of 60 deg F (15.5 deg C).
 - 2. Slurry Coat: Comply with weather limitations of ASTM D 3910.
 - 3. Asphalt Base Course: Minimum surface temperature of 40 deg F (4 deg C) and rising

- at time of placement.
4. Asphalt Surface Course: Minimum surface temperature of 40 deg F (4 deg C) and rising at time of placement.

PART 2 - PRODUCTS

2.1 DENSE GRADED CRUSHED STONE 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.

1. Material shall be dense graded crushed stone conforming to MHD Specifications Section M2.01.7.

2.2 ASPHALTIC CONCRETE

- A. Asphaltic shall be a standard plant-mixed, hot-laid paving material for road work, consisting of clean, crushed rock aggregate, mineral filler, and asphalt equal to Class I, Type1-1, in accordance with MHD Specifications Section M3.11.03, except as modified herein. The master range composition tolerances for bituminous concrete materials shall be as follows:

Table A (As modified)
Percent by Weight Passing Square Opening Sieves

<u>Standard Sieve Size</u>	<u>Base Course</u>	<u>Binder Course</u>	<u>Top Course (Dense Mix)</u>
2 in.	100		
1 in.	55-80	100	
3/4 in.		80-100	
5/8 in.			
1/2 in.	40-65	55-80	100
3/8 in.			80-100*
No. 4	20-45	28-50	55-80
No. 8	15-33	20-38	48-63
No. 16			36-49
No. 30	8-17	8-22	24-38
No. 50	4-12	5-15	14-27
No. 100			6-18
No. 200	0-4	0-5	4-8
Bitumen	4.0-5.0	4.5-5.5	7-8

1. Base or bottom course paving for roadways and parking lots shall have maximum aggregate size passing 2 in. sieve, and bitumen content of 4.5% + 1/2% by weight.
2. Binder course paving for roadways and parking lots shall have maximum aggregate size passing 1 in. sieve, and bitumen content of 5% + 1/2% by weight.
3. 4. Top or wearing course paving for sidewalks shall conform to composition for "Dense Mix".

- B. Complete job mix formula, listing quantities and pertinent ingredient properties, shall be submitted to and approved by Owner's Representative at least two weeks before work is scheduled to begin.

2.3 BITUMINOUS MATERIALS

- A. Bituminous material for prime coat shall be one of the following:
 - 1. Cut-back asphalt (rapid-curing type) conforming to AASHTO M 81, Grade RC-70 or RC-250.
 - 2. Emulsified asphalt rapid-setting type conforming to AASHTO M 140, Grade RS-1.
- B. Tack Coat (between concrete base and bituminous binder): ASTM D 977 or AASHTO M 14] emulsified asphalt, or ASTM D 2397 or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- C. Bitumen shall be a rapid-setting type emulsified asphalt conforming to AASHTO M 140, Grade RS-1.
- D. Bituminous crack sealer shall be a hot-applied bituminous sealer conforming to Fed. Spec. SS-S-1401.

PART 3 - EXECUTION

3.1 GRADING

- A. Areas to be paved will be compacted and brought approximately to subgrade elevation with Granular Fill under Section 31 00 00, EARTHWORK 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 Granular Fill material conforming to Section 31 00 00 - EARTHWORK.
- 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 Owner's Representative as specified in Section 31 00 00 - EARTHWORK. 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 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. 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.

3.4 SURFACE PREPARATION

- A. Prime Coat (Vehicular Areas): Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.15 to 0.50 gal./sq. yd. (0.7 to 2.3 L/sq. m). Apply enough material to penetrate and seal but not flood surface. Allow prime coat to cure for 72 hours minimum.
 - 1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
 - 2. Protect primed substrate from damage until ready to receive paving.

- B. Tack Coat:
 - 1. Apply uniformly to surfaces of Portland cement concrete base at a rate of 0.05 to 0.06 gal./sq. yd.
 - 2. Apply uniformly to surfaces of new hot mix asphalt pavement at a rate of 0.03 to 0.04 gal./sq. yd.
 - 3. Apply uniformly to abutting vertical surfaces at a rate of 0.06 to 0.07 gal./sq. yd.
 - a. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - b. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.5 ASPHALTIC PAVING

- A. Asphaltic paving mixture, equipment, methods of mixing and placing, and precautions to be observed as to weather, condition of base, etc., shall conform to MHD Specifications Section 460 Class I Bituminous Concrete Pavement for roadway and parking areas and Section 701 Sidewalks, Wheelchair Ramps, and Driveways for sidewalks.
- B. Complete job mix formula, listing quantities and pertinent ingredient properties, shall be submitted to and approved by Owner's Representative at least two weeks before work is scheduled to begin.
- C. Asphaltic base, binder, and wearing courses shall each be applied individually, in single lifts of full thickness indicated on the Drawings.
- D. Work shall not be performed during rainy weather or when temperature is less than 40^o F. or 60^o F. as indicated in Paragraph 1.06.
- E. Adjacent concrete work, etc., shall be protected from stain and damage during entire operation. Damaged and stained areas shall be replaced or repaired to equal their original condition.
- F. Existing paved surfaces to be resurfaced shall be cleaned of foreign and objectionable matter with blowers, power brooms, or hand brooms immediately before applying bituminous pavement. Cracks shall be cleaned and bituminous crack sealer applied to fully seal pavement.
- G. The surface of the pavement to be resurfaced shall receive a tack coat before laying asphaltic binder course. Tack coat shall be applied at rate specified above. Base surface shall be dry and clean when prime coat is applied. Asphaltic paving material shall not be

- placed until emulsion has completely broken. Adjoining new paving shall be placed before tack coat has dried or dusted over.
- H. Deliveries shall be timed to permit spreading and rolling all material during daylight hours, unless artificial light, satisfactory to Owner's Representative, is provided. Loads which have been wet by rain or otherwise will not be accepted. Hauling over freshly laid or rolled material will not be permitted.
- I. Placing and rolling of mixture shall be as nearly continuous as possible. Rolling shall begin as soon after placing as mixture will bear the operation without undue displacement. Delays in rolling freshly spread mixture will not be permitted. Rolling shall proceed longitudinally, starting at edge of newly placed material and proceeding toward previously rolled areas. Rolling overlap on successive strips shall be greater than or equal to 1/2 width of roller rear wheel. Alternate trips of roller shall be of slightly different lengths. Corrections required in surface shall be made by removing or adding materials before rolling is completed. Skin patching of areas where rolling has been completed will not be permitted. Course shall be subjected to diagonal rolling, crossing lines of the first rolling while mixture is hot and in compactable condition. Displacement of mixture or other fault shall be corrected at once by use of rakes and application of fresh mixture or removal of mixture, as required. Rolling of each course shall be continued until roller marks are eliminated. Roller shall pass over unprotected edge of course only when paving is to be discontinued for sufficient time to permit mixture to become cold.
- J. In places not accessible to roller, mixture shall be compacted with hand tampers. Hand tampers shall weigh at least 50 lb. and shall have a tamping face less than or equal to 100 sq. in. Mechanical tampers capable of equal compaction will be acceptable in areas in which they can be employed effectively.
- K. Portions of pavement courses which become mixed with foreign material or are in any way defective shall be removed, replaced with fresh mixture, and compacted to density of surrounding areas. Asphaltic material spilled outside lines of finished pavement shall be immediately and completely removed. Such material shall not be employed in the work.
- L. Joints shall present same texture, density, and smoothness as other sections of the course. Continuous bond shall be obtained between portions of existing and new pavements and between successive placements of new pavement. New material at joints shall be thick enough to allow for compaction when rolling. Compaction of pavement, base, and subgrade at joints shall be such that there is no yielding of new pavement relative to existing pavement when subjected to traffic.
- M. Contact surfaces of previously constructed pavement (if greater than or equal to seven days since binder placed), manholes, and similar structures shall be thoroughly cleaned and have tack coat applied before fresh mixture is placed. Tack coat shall be applied at rate specified herein. Base surface shall be dry and clean when tack coat is applied. Asphaltic paving material shall not be placed until emulsion has broken. Adjoining new paving shall be placed before tack coat has dried or dusted over.
- N. Earth or other approved material shall be placed along pavement edges in such quantity as will compact to thickness of course being constructed, allowing at least 1 ft. of shoulder width to be rolled and compacted simultaneously with rolling and compacting surface. Pavement edge shall be trimmed neatly to line before placing earth or other approved material along edge.

1. After final rolling, vehicular traffic shall not be permitted on pavement until it has cooled and hardened, and in no case less than six hours.
- O. Variations in smoothness of finished surface shall be less than or equal to the following tolerances when tested with a 10 ft. straightedge, applied both parallel to and at right angles to centerline of paved area.
1. For roadway and parking pavement surface course - 1/4 in. in 10 ft.
 2. For sidewalk pavement surface course - 1/4 in. in 10 ft.
 3. At joint with existing pavement, and at other locations where an essentially flush transition is required, pavement elevation tolerance shall not exceed 0.01 ft.
 4. At other areas pavement elevation tolerance shall not exceed + 0.05 ft.
 5. Irregularities exceeding these amounts or which retain water on surface shall be corrected by removing defective work and replacing with new material conforming to this Section.

3.6 PATCHING

- A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically.
Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m).
1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings.
Remove spillages and clean affected surfaces.
- C. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.7 REPAIRS TO EXISTING PAVEMENT

- A. Subgrade shall be done in strict accordance with Paragraph 3.01, above.
- B. Aggregate base course shall be replaced in strict conformance with Paragraph 3.02, above.
- C. Asphaltic concrete paving mixture, equipment, and methods of mixing and placing shall conform to MHD Specifications Section 472 for Bituminous Concrete for Patching, and Paragraph 3.3, above.

3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.

- B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979 or AASHTO T 168.
 - 1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
 - 2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
 - a. One core sample will be taken for every 1000 sq. yd. (836 sq. m) or less of installed pavement, with no fewer than 3 cores taken.
 - b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.9 DISPOSAL

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Do not allow excavated materials to accumulate on-site.

END OF SECTION

SECTION 32 13 13 – CONCRETE PAVING

PART 1 – GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. The scope of work consists of all materials, equipment, labor and services required for all Concrete Paving work, including all items incidental thereto, as specified herein and as shown on the Drawings.
- B. The following list of items is to be used as a guide and shall not be considered as limiting the scope of the work.
 - 1. Concrete Paving with Saw-cut Joints
- C. Cement concrete pads and footings shall be placed according to Section 03 30 00 – CAST IN PLACE CONCRETE and the relevant provisions of the MassDOT Standard Specifications.

1.3 RELATED WORK UNDER OTHER SECTIONS

- A. Section 03 30 00 – CAST IN PLACE CONCRETE
- B. Section 04 00 00 – MASONRY for installation of granite curbing.
- C. Section 31 00 00 – EARTHWORK
- D. Section 31 10 00 – SITE PREPARATION

1.4 REFERENCES

- A. Contractor shall comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. ASTM – ASTM International;
 - 2. AASHTO - American Association of State Highway and Transportation Officials;
 - 3. Standard Specifications – MassDOT “Standard Specifications for Highway and Bridges”, Latest Edition and all Supplements
 - 4. American Concrete Institute, (ACI), ACI 224.3R-95 – Joints in Concrete Construction.
 - 5. Americans with Disabilities Act, (ADA), Appendix to Part 1191 Accessibility Guidelines for Buildings and Facilities.
 - 6. Massachusetts Architectural Access Board (MAAB).
 - 7. Massachusetts State Building Code, 9th Edition.
 - 8. International Building Code (IBC), latest edition.

1.5 QUALITY ASSURANCE

- A. Contractor shall comply with all regulations, laws, and ordinances required by all authorities having jurisdiction. All labor, materials, equipment, and services necessary to make the work comply with such requirements and the work specified in Drawings and herein shall be provided without additional cost to the Owner
- B. Walks for use by persons shall conform to the applicable portions of the Americans with Disability Act Accessibility Guidelines (ADA), Massachusetts State Building Code, and the International Building Code.

1.6 SUBMITTALS

- A. At least 30 days prior to intended use, Contractor shall provide the following samples and submittals for approval. Do not order materials until Owner's Representative's approval of samples, certifications and/or test results has been obtained. Delivered materials shall closely match the approved samples. Samples and approvals that are not obtained prior to the ordering of materials or the completion of work shall result in possible disapproval of obtained materials or completed work.
- B. Concrete Testing: Contractor shall submit name and qualifications of the concrete testing agency he has engaged for testing of concrete for concrete pavement construction. The concrete testing agency shall have been performing the tests specified in this Specification for a minimum of five (5) years prior to submitting a bid for this project.
- C. SHOP DRAWINGS - Submit detailed Shop Drawings for each item required to be fabricated or installed under these items. Include plans, sections and details as required to show all materials, layout, dimensions, jointing, method of connection and assembly, fabrication and tolerances for types of materials, types and details of connections and openings, cuts, holes, bolts and painting for all items required. Take all necessary field dimensions and verify dimensions as required. Shop drawings required are as follows:
 - 1. Concrete Paving showing typical sections, reinforcing, dimensions, finish, jointing and scoring pattern.
- D. MANUFACTURERS' LITERATURE OR TEST RESULTS - Submit manufacturer's material descriptions and/or installation instructions for the following:
 - 1. Concrete aggregate mix analysis.
 - 2. Manufacturer's product literature for all cement concrete materials noting the compliance to the applicable standards and codes referenced herein.
 - 3. Manufacturer's material safety data sheet.
- E. MOCK-UPS
 - 1. Schedule mock-up construction so that mock-up can be accepted a minimum of 30 days prior to the application of paving surfaces represented by the mock-up.
 - 2. Locate mock-up panels in areas as directed by Owner's Representative.
 - 3. Continue to construct mock-ups until acceptable mock-ups are produced (at no cost to Owner). Acceptable mock-ups shall become the standard for texture, color and

workmanship of all subsequent work. Owner's Representative shall have the sole responsibility of determining acceptability of the mock-ups.

4. Use same setting bed and joint mixes used in accepted mock-ups in final work unless otherwise directed by Owner's Representative.
5. Protect accepted mock-ups from damage until completion and acceptance of the work represented by the mock-ups.
6. Mock-up may become part of finished work. If located otherwise, remove mock-up panels from the site at completion of the project, unless otherwise instructed by Owner's Representative.
7. Construct mock-up panels or areas for each different type of paving system as specified herein to demonstrate ability to archive types of setting bed, joints, pattern, color and texture required herein.
 - a. Construct a minimal 12' x 16' mock-up of concrete paving.
8. Prior to the saw-cutting of joints, the contractor shall layout the approved saw-cut pattern with chalk or other non-permanent indicators for approval by the Owner's Representative.

1.7 TESTING

- A. Inspection and testing of the concrete mix will be performed by an independent testing laboratory approved by the Owner's Representative. Testing equipment shall be supplied by the laboratory, and the preparation of samples and all testing shall be performed by the laboratory personnel. Testing costs shall be the responsibility of the Contractor.
- 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 Owner's Representative to final acceptance.
- C. The following testing services may be provided by the Owner, at no cost to the Contractor:
 1. Review of Contractor's proposed materials for compliance with the specifications.
 2. Review of the Contractor's proposed mix design.
 3. Inspection of concrete batching, mixing, and delivery.
- D. The following testing services shall be provided, at the Contractor's expense:
 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 testing laboratory, proposed concrete mix design for review, before beginning work. Forward testing laboratory's mix review to Owner's Representative for approval prior to beginning work.
- H. Provide free access to work and full assistance and cooperation, concrete for samples, and such auxiliary personnel and equipment as needed for testing agency to take samples for required tests.

Notify testing agency and Owner's Representative of intent to place concrete at least 24 hours before placement.

PART 2 – MATERIALS

2.1 GENERAL

- A. Delivery: Materials shall be delivered in original packages with Manufacturers' labels. Owner's Representative will have the right to reject materials delivered in damaged packages without labels.
- B. Storage: Materials shall be stored in a dry condition above ground on raised platforms, covered by opaque, waterproof tarpaulins or roofs, and shall be protected from damage and theft. Products delivered and stored for use shall match products submitted and approved by Owner's Representative or shall be rejected.
- C. Contractor shall fully inspect project conditions before commencing with any paving operations. Any deficiencies in subgrade conditions or surrounding conditions that may adversely affect his/her work shall be brought to the attention in writing to the Owner's Representative. By starting work on cement concrete paving, Contractor accepts responsibility for any and all conditions affecting his/her contracted work.

2.2 CONCRETE PAVING

- A. Concrete shall be 4000 PSI Portland Cement Concrete conforming to MDOT M4.02.00.
- B. The minimum cement contents for various minimum 28 days compressive strengths (6" x 12" cylinder) is based on air entrained and water reduced mixtures. The use of an approved additive other than air entraining and water reducing additives shall not affect the minimum cement content.
- C. The Contractor shall submit to the Owner's Representative, for approval, his/her proposed concrete supplier, source and type of materials, with current ASTM C-33 aggregate data, and concrete mix designs by an approved laboratory complete with trial mix data. Trial mixtures will be designed and tested at the maximum allowable slump and air content for each designated class of concrete.
 - 1. All concrete for sidewalks shall have a minimum compressive strength of 4000psi and contain $6\% \pm 1 \frac{1}{2}\%$ entrained air.
 - 2. All concrete exposed to sea water shall have a minimum compressive strength of 4500psi and contain $6\% \pm 1 \frac{1}{2}\%$ entrained air.
 - 3. Plant mixed cement concrete shall be the only concrete allowed to be used with all items requiring concrete in this contract. Hand mixing or other types of mixing will not be permitted.
- D. MATERIALS:
 - 1. Portland Cement: Shall conform to ASTM C150, latest edition.
 - 2. Portland Cement used for concrete shall be the type designated on the plans and/or in the specifications for the particular work. If no type is specified, Type II will be furnished.

3. When high early strength is required, it shall be attained by using Type III cement or by adding a non-chloride set accelerator.
- E. FINE AGGREGATE:
1. Fine aggregate shall consist of natural sand, manufactured sand, or a combination thereof, conforming to the requirements of ASTM C33, Specifications for "Concrete Aggregates" latest edition. The Fineness Modulus of the fine aggregate shall be $2.80 \pm .20$ and the percent passing the #200 sieve shall not exceed 2 percent by dry sieving and 3 percent by wet sieving.
- F. COARSE AGGREGATE:
1. Coarse aggregate of washed gravel, crushed gravel, crushed stone or a combination thereof conforming to ASTM C33 Specifications for "Concrete Aggregates" latest edition. Aggregate for Lightweight Concrete shall conform to ASTM C330 Specification for "Lightweight Aggregates for Structural Concrete".
- G. WATER:
1. Water for concrete shall be clear and apparently clean and shall not exhibit any deleterious effects upon the required concrete properties.
- H. ADMIXTURES:
1. Air entraining and water reducing admixtures will be used in all concrete as specified. They shall be used in strict accordance with the manufacturer's recommendations and added at the batch plant. Admixtures shall be a ready-to-use liquid material, and contain no calcium chloride. Super-plasticizers may be added at the plant or job site.
- I. AIR ENTRAINING ADMIXTURE:
1. Shall conform to ASTM C260 Specification for "Air Entraining Admixtures for Concrete."
- J. WATER REDUCING ADMIXTURE:
1. Shall conform to ASTM C494 Specification for "Chemical Admixtures for Concrete."
 2. All concrete for sidewalks shall have a minimum cement concrete of 564 lbs/cubic yard, contains a water reducing admixture and contains $6\% \pm 1\%$ entrained air.
- K. Reinforcing: Paving shall be reinforced with wire mesh conforming to AASHTO M55, with fusion-bonded epoxy coating conforming to ASTM A775.
- L. Expansion Joints: Provide expansion joints 20 feet on center minimum or as shown on the Drawings.
- M. Joint Filler: Transverse joints in concrete pavement shall have pre-formed joint filler composed of cellular fibers bonded together and uniformly saturated with asphalt conforming to AASHTO M213. Provide removable plastic joint cap with integral permanent plastic bond breaker. Cover depth shall match width of joint filler

- N. Joint Dowel Bars: Galvanized smooth steel dowels, ASTM A615, Grade 60. Cut dowel true to length with ends square and free of burrs. Provide polypropylene plastic slip dowel sleeve system. System shall be similar to "speed dowel" by SIKA USA or approved equal.
- O. Filler and backer rod for joints abutting dissimilar materials shall consist of isomeric polymer foam meeting the physical requirements of AASHTO M153. Provide closed cell polyethylene backer rod of circular rod stock. Backer rod shall be one-third larger than joint width.
- P. Sealant and Joint Primer: Use Primer recommended for sealant. Sealant shall be self-leveling, polyurethane-based elastomeric sealant, matching color of finished surfaces.

PART 3 - EXECUTION

3.1 GENERAL

- A. All items located on the Drawings shall be fabricated and installed by Contractor as detailed on the Drawings, as per manufacturers' written installation procedures and as directed by the Owner's Representative. All fabrication and installation work shall be accomplished using the highest standards of workmanship and shall include all excavation, compaction and fine grading of subbase and gravel base materials, labor, transportation and incidentals to make the work complete.
- B. Contractor shall schedule delivery of items and all necessary equipment and hardware so as to arrive at the site in a timely manner to comply with construction schedule and minimize on-site storage time. Contractor shall be ready to discuss the purchasing of site improvements with long lead times at the beginning of the Contract so suitable arrangements can be made to meet the date of completion. Items delivered to the site prior to scheduled installation time shall be stored in a secured staging area with all small components retained separately by Contractor. Protect all items from weather, careless handling, construction in the vicinity, and vandals or pilferers.
- C. Stake locations of all items in the field for approval by Owner's Representative before commencing any excavation.
- D. Contractor shall install all formwork for items level and with plumb vertical alignment, or as indicated otherwise on the Drawings.
- E. Contractor shall review with the Owner's Representative all intended procedures including protection of completed surfaces from vandalism and graffiti until surfaces have sufficiently set.
- F. Any incidence of damage to any item during installation shall be reported immediately to the Owner's Representative, remedial action shall be decided, and repairs made to the satisfaction of the Owner's Representative.

3.2 EXCAVATION

- A. After approval of all Shop Drawings, execute all excavations according to specifications, proceeding within work area so as to avoid disruption of existing materials to remain or newly installed items. At bases of trees, carefully remove any materials to be excavated with minimal damage to tree roots. Any roots over 1-inch diameter that are damaged shall be cleanly cut by

the Contractor's Arborist. Any items damaged by excavation which are to remain or are newly installed shall be replaced or repaired to existing conditions by Contractor at no cost to the Owner.

3.3 CONCRETE PAVING

- A. Coordinate complete installation of other site improvements prior to installing concrete paving.
- B. Reinforcing: Wire mesh shall be flat and held firmly in place and centered in concrete pad. Where mesh is spliced, it shall be lapped a minimum of 12 inches, secured firmly in place by approved means.
- C. Concrete installation: Concrete shall be planned to be installed so as to complete finishing of surfaces within scheduled work times. Surfaces shall be evenly screed to slope per requirements of the Drawings. Any surface trowelling shall be minimal to complete the work, but not to excess which will result in causing fine particles and water to surface. Protect adjacent plantings from construction of concrete paving.

3.4 FORMED JOINTS

- A. Place expansion joints at thirty (30) foot maximum intervals or as shown on plan to correct elevation and profile. Align joints as shown on the drawings.
- B. Place joint filler and sealant between paving components and building or other appurtenances.
- C. Apply joint sealer where indicated on drawings. Apply in accordance with manufacturer's instructions.

3.5 FINISHING

- A. When concrete is sufficiently set, broom finish in the direction of the slope.
- B. All joints, both longitudinal and transverse shall be saw-cut.
- C. Saw-cutting shall be performed between 7 and 24 hours after concrete is cast as per plans. Depth shall be 1-1/2" in depth and 3/8" in width.

END OF SECTION

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SECTION 32 14 13 - UNIT PAVING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 SECTION INCLUDES

- A. Provide all labor, materials, equipment and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, furnishing and installing the following:
 - 1. New Precast Concrete Permeable Unit Pavers.

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 02 41 13 - Site Preparation
 - 2. Section 03 30 00 - Cast In Place Concrete
 - 3. Section 03 45 00 – Precast Concrete Wall
 - 4. Section 31 00 00 – Earthwork
 - 5. Section 32 94 43 – Tree Grates
 - 6. Section 32 94 41 – Soil Cell System
 - 7. Section 32 94 56 – Soil Cells Planting Soil

1.4 REFERENCES

- A. Codes and Standards: Comply with the standards of the following associations except as otherwise required:
 - 1. American Association of State Highway and Transportation Officials (AASHTO):
 - M 43 Standard Size of Coarse Aggregate for Highway Construction
 - 2. American Society for Testing and Materials (ASTM):
 - C 33 Specification for Concrete Aggregates
 - C 136 Test Method for Sieve Analysis of Fine and Coarse Aggregates
 - C 936 Specification for Solid Concrete Interlocking Paving Units
 - D 1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort [56,000 ft-lbf/ft³ (2,700 kN-m³)]
 - 3. MassDOT: "Standard Specifications for Highways and Bridges", Massachusetts Department of Transportation, Commonwealth of Massachusetts, latest edition.

1.5 SUBMITTALS

A. Permeable Concrete Pavers:

1. Samples for Verification for the following items:
 - a. Furnish not less than three individual full-size concrete pavers of each type, color and finish required to Owner's Representative for approval. Samples shall exhibit the full color range of pavers to be provided.
2. Test Results of pavers from an independent testing laboratory for compliance of concrete pavers with ASTM C 936.
3. Manufacturer's catalog product data, installation instructions and material safety data sheets.
4. Colors of pavers shall be chosen from all available colors by Owner's Representative.

B. Permeable Joint Opening Aggregate:

1. Provide three representative one pound samples in containers of aggregate materials that indicate the range of color variation and texture expected upon project completion.
2. Test results from an independent testing laboratory for sieve analysis, including washed gradations per ASTM C 136.
3. Test results for void space percentage per ASTM C 29.

C. Permeable Setting Bed, Base and Subbase Aggregate:

1. Test results of samples from an independent testing laboratory for compliance with ASTM D 448 No. 8, No. 57 and No. 2.
2. Test results of samples from an independent testing laboratory for sieve analysis, including washed gradations per ASTM C 136.
3. Test results for void space percentage per ASTM C 29.

D. Paving Installation Contractor:

1. Job references shall be provided from a minimum of three projects similar in size and complexity. Provide Owner/Client/General Contractor names, postal address, phone and email address.

E. Manufacturer's Product Data: Manufacturer's product data shall be submitted for the following items:

1. Precast concrete unit pavers.
2. Color charts exhibiting full range of standard and premium colors and all finishes.
3. Filter fabric.
4. Permeable base aggregate and joint filler.
5. Permeable subbase aggregate.

1.6 QUALITY ASSURANCE

A. Installer must review installation procedures of all precast concrete unit paving and sequence of work with General Contractor to ensure proper coordination with other subcontractors and suppliers whose work is affected by the delivery schedule and installation of paving work.

B. Source Limitations:

1. Obtain Permeable Concrete Unit Pavers from one source location with the resources to provide products of consistent quality in appearance and physical properties.
2. Obtain Permeable Joint Opening Aggregate from one source with the resources to provide materials and products of consistent quality in appearance and physical properties.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Concrete paver units shall be packaged by strapping to manufacturer's standard and delivered on pallets. Pavers damaged in any manner will be rejected and shall be replaced with new material at no additional cost to the Owner.
- B. Store all paving units on raised platforms. Storage piles or stacks shall be located to avoid or be protected from heavy or unnecessary traffic. Store paving units on wood skids or pallets. Place and stack skids and units to distribute weight evenly and to prevent breakage or cracking of units. Materials shall be stored under an approved roof or covered with non-staining waterproof tarpaulins, at all times, except when materials are being installed. Protect paving units during storage and construction against moisture, soiling, staining and physical damage.
- C. Handle paving units to prevent chipping, breakage, soiling or other damage. Do not use pinch or wrecking bars without protecting edges of units with wood or other rigid materials. Lift with wide-belt type slings or vacuum lifts wherever possible; do not use wire cable or ropes containing tar or other substances which might cause staining. If required, use wood rollers and provide cushion at end of wood slides. Any paving unit chipped during delivery, storage, or handling will be rejected and replaced by the Contractor at no additional cost to the Owner.

1.8 PROJECT/SITE CONDITIONS

- A. Environmental Requirements:
 1. Install permeable pavers only on unfrozen permeable setting bed aggregate materials.
 2. Install permeable setting bed only on unfrozen permeable base and subbase aggregates.
 3. Install permeable base or subbase aggregates only over unfrozen subgrade.

1.9 PERMEABLE CONCRETE PAVER OVERAGE AND ATTIC STOCK

- A. Provide a minimum of 5% additional material for overage to be used during construction.
- B. Furnish fifty (50) square feet of each product, color, and size used to Owner for maintenance and repair. Furnish Permeable Concrete Pavers from the same production run as installed materials.
- C. Manufacturer shall supply maintenance and reinstatement manuals for Permeable Concrete Paver units.

1.10 PROTECTION OF ADJACENT SURFACES

- A. Finished surfaces adjacent to the concrete unit paving shall be adequately protected from soiling, staining, and other damage during construction.

PART 2 - PRODUCTS

2.1 PRECAST CONCRETE PERMEABLE UNIT PAVERS

- A. Concrete unit pavers shall be "Eco-Promenade" pavers in 'Umbriano' finish as manufactured by Unilock or approved equal. Local representative is Unilock New England, 35 Commerce Dr.,

Uxbridge MA, tel: 508-278-4536, ext. 4067., or approved equal meeting the following requirements:

1. Unit Paver dimensions: 3" x 12" x 3.875".
2. Provide two colors: Color A and Color B.

B. Pavers shall be a high density, hydraulically pressed concrete units. They shall be manufactured to a tolerance of less than one-eighth inch. Unit pavers shall have a minimum compressive strength not be less than 8,000 pounds per square inch with no individual unit under 7,200 psi. Maximum absorption shall be 5 percent. All unit pavers shall meet or exceed ASTM specification C 936, Standard Specification for Concrete Interlocking Paving Units.

1. Laminated units will not be accepted. Color matrix must be fully integrated throughout the paver units.

C. See Contract Documents for layout pattern. Contractor to ensure sufficient supply to install paver units in pattern indicated on the Drawings.

2.2 PERMEABLE JOINT OPENING AND SETTING BED AGGREGATE

A. Provide Joint Opening and Setting Bed Aggregate materials conforming to ASTM C 33 and gradation requirements of ASTM D 448 No. 8 as shown in table below:

Sieve Size	Percent Passing
1/2"	100
3/8"	85 to 100
No. 4	10 to 30
No. 8	0 to 10
No. 16	0 to 5

2.3 PERMEABLE BASE AGGREGATE

A. Provide Permeable Base Aggregate materials conforming to ASTM C 33 and gradation requirements of ASTM D 448 No. 57 as shown in table below:

Sieve Size	Percent Passing
1 1/2"	100
1"	95 to 100
1/2"	25 to 60
No. 4	0 to 10
No. 8	0 to 5

B. Stone shall be double washed crushed stone.

2.4 PERMEABLE SUBBASE AGGREGATE

A. Provide Permeable Base Aggregate materials conforming to ASTM C 33 and gradation requirements of ASTM D 448 No. 2 as shown in table below:

Sieve Size	Percent Passing
3"	100
2 1/2"	90 to 100
2"	35 to 70
1 1/2"	0 to 15
3/4"	0 to 5

- B. Stone shall be double washed crushed stone.

2.5 GEOTEXTILE

- A. Provide Geotextile material conforming to the following performance characteristics, measured per the test methods referenced:
 1. 4 ounce nonwoven needle punched geotextile composed of 100% polypropylene staple fibers.
 2. Grab Tensile Strength: ASTM D 4632: 115 pounds.
 3. Grab Tensile Elongation: ASTM D 4632: 50%.
 4. Trapezoidal Tear: ASTM D 4533: 50 pounds.
 5. Puncture: ASTM D 4833: 65 pounds.
 6. Apparent Opening Size: ASTM D 4751: 0.212 mm, 70 U.S. Sieve.
 7. Permittivity: ASTM D 4491: 2.0 sec-1.
 8. Flow Rate: ASTM D 4491: 140 gal/min/S.F.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine areas indicated to receive paving for compliance with requirements for installation tolerances and other conditions affecting performance for the following items before placing the Permeable Concrete Pavers.
 1. Verify that subgrade preparation, compacted density and elevations conform to the specified requirements.
 2. Verify that Geotextiles have been placed according to Drawings and Specifications.
 3. Verify that Permeable Base and Subbase Aggregate materials, thicknesses, compacted densities, surface tolerances and elevations conform to specified requirements.
 4. Verify written density test results for soil subgrade, permeable base and subbase aggregate materials to the Owner's Representative.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 1. Beginning of bedding aggregate and paver installation signifies acceptance of base and edge restraints including tree frames.

3.2 PREPARATION

- A. Verify that the subgrade soil is free from standing water.
- B. Stockpile Permeable Setting Bed, Jointing Material, Base and Subbase Aggregate materials such that they are free from standing water, uniformly graded, free of any organic material or sediment, debris, and ready for placement.
- C. Remove any excess thickness of soil applied over the excavated soil subgrade to trap sediment from adjacent construction activities before placing the Geotextile and Permeable Subbase Aggregate materials.
- D. Keep area where pavement is to be constructed free from sediment during the entire job. Remove and replace all Geotextile, Permeable Joint, Setting Bed, Base and Subbase Aggregate materials contaminated with sediment with clean materials.
- E. Base compaction and proof-rolling of the subgrade soil will be on the recommendations of the Owner's Representative.

3.3 INSTALLATION

- A. GEOTEXTILES: Provide separation geotextile on the bottom and sides of the prepared soil subgrade. Secure in place to prevent wrinkling or folding from equipment tires and tracks.

1. Overlap ends and edges a minimum of 18 inches in the direction of drainage.

B. PERMEABLE BASE AND SUBBASE AGGREGATE

1. Provide the Permeable Subbase Aggregate in uniform lifts not exceeding 6 inches, loose thickness and compact to at least 95 percent as per ASTM D 4254 to depths as indicated.
2. Compact the Subbase Aggregate materials with at least two passes in the vibratory roller until there is no visible movement. Do not crush aggregate with the roller.
3. Tolerance: Do not exceed the specified surface grade of the compacted Subbase Aggregate material more than $\pm \frac{3}{4}$ " over a 10 foot long straightedge laid in any direction.
4. Provide the Base Aggregate material in uniform lifts not exceeding 6 inches over the Subbase Aggregate materials and compact to at least 95 percent as per ASTM D 4254 to depths indicated.
5. Compact the Base Aggregate material with at least two passes in the vibratory mode then at least two in the static mode with a minimum 10 ton vibratory roller until there is no visible movement. Do not crush the aggregate with the compaction device.
6. Tolerance: Do not exceed the specified surface grade of the compacted Base Aggregate material more than $\frac{1}{2}$ " \pm over a 10 foot long straightedge laid in any direction.
7. Grade and compact the upper surface of the Base Aggregate material sufficiently to prevent infiltration of the Setting Bed Aggregate material both during construction and throughout its service life.

C. PERMEABLE SETTING BED AGGREGATE

1. Provide, spread and screed the Permeable Setting Bed aggregate evenly over the Base Aggregate course.
 - a. Protect the screeded Setting Bed Aggregate from being disturbed.
 - b. Screed only the area which can be covered by pavers in one day.
 - c. Do not use Setting Bed Aggregate material to fill depressions in the base surface.
 - d. Keep moisture content constant and density loose and constant until unit pavers are set and compacted.
 - e. Inspect the Setting Bed Aggregate course prior to commencing the placement of the permeable concrete pavers.
 - f. Acceptance of the Setting Bed Aggregate occurs with the initiation of Permeable Concrete Paver placement.

3.4 SETTING PAVERS

- A. Do not use unit pavers with chips, cracks, voids, discolorations or other defects which might be visible or cause staining in the finished work. No cracked, broken or chipped pavers will be allowed in the finished work.
- B. Mix concrete pavers from a minimum of three (3) bundles simultaneously drawing the paver vertically rather than horizontally, as they are placed, to produce uniform blend of colors and textures.

- C. Exercise care in handling face mix pavers to prevent surfaces from contacting backs or edges of other units.
- D. Provide Concrete Pavers using joint pattern as indicated. Adjust joint pattern at pavement edges such that cutting of edge pavers is minimized. Cut all pavers exposed to vehicular tires no smaller than one-third of a whole paver.
- E. Using string or chalk lines on Setting Bed aggregate to hold all pattern lines true.
- F. Set surface elevation of pavers 1/8 inch above adjacent concrete paving and curbs.
- G. Place paver units hand tight against spacer bars. Adjust horizontal placement of laid pavers to align straight.
 - 1. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.
- H. Provide a space between paver units of 1/32 inch to achieve straight bond lines.
- I. Prevent joint bond lines from shifting more than 1/2" +/- over 50 feet from string lines.
- J. Fill gaps between units or at edges of the paved area that exceed 3/8 inch with pieces cut to fit from full-size unit pavers.
- K. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting wherever possible. Hammer cutting is not acceptable.
 - 1. Lay out coursing so that at end conditions no paver will have to be cut to a width of less than 2 inches. Cut as required to provide pattern shown and to fit new and existing adjoining work neatly. Place pavers in the pattern indicated on the Drawings and with uniform top surface and alignment. Protect newly laid pavers at all times from damage or stain.
 - 2. All cutting and patching required to complete the work shall be done (including the filling and closing of all openings) with water-cooled radial cut-off type masonry saws with diamond-tipped blade for a sharp, straight edge. Cut edges shall be plumb and straight. Scoring and breaking will not be acceptable.
 - 3. Pavers shall meet other elements in the paved area neatly. Cut pavers shall be in line with each other at the respective element. No uneven joints shall be accepted.
 - 4. Provide joint
- L. Prevent all traffic on installed pavers until Joint Aggregate has been vibrated into the joints. Keep skid steer and forklift equipment off newly laid pavers that have not received initial compaction and Joint Aggregate material.
- M. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 5,000 lbf compaction force at 80 to 90 Hz. Perform at least three passes across paving with vibrator. Vibrate under the following conditions:
 - 1. After edge pavers are installed and there is a completed surface.
 - 2. Compact installed concrete pavers to within 6 feet of the laying face before ending each day's work. Cover pavers that have not been compacted and leveling course on which pavers have not been placed, with nonstaining plastic sheets to prevent Setting Bed Aggregate from becoming disturbed.

- N. Protect face mix Concrete Paver surface from scuffing during compaction by utilizing a urethane pad.
- O. Remove any cracked or structurally damaged pavers and replace with new units prior to installing Joint Opening Aggregate material.
- P. Provide, spread and sweep Joint Opening Aggregate into joints immediately after vibrating pavers into Setting Bed course until full. Vibrate pavers and add Joint Aggregate material until joints are completely filled, then remove excess material This will require at least 4 passes with a plate compactor.
- Q. Remove excess Joint Aggregate from surface when installation is complete.
- R. Newly laid pavers shall be protected at all times by panels of plywood. These panels may be advanced as work progresses; however, the plywood protection shall be kept in areas which will be subjected to continued movement of materials and equipment. All necessary precautions shall be taken in order to avoid depressions and protect paver alignment.
- S. Prior to acceptance, the paved area shall be flooded with water to assure that there are no depressions. Pavers with top surfaces greater than 1/16 inch above or below adjacent pavers shall be removed and reset. Remove and reset pavers as required until surface is true to line and grade. Refill sand in joints as necessary until all joints are filled to finish grade.

3.5 FIELD QUALITY CONTROL

- A. Verify final elevations for conformance to the Drawings after sweeping the surface clean. Prevent final concrete paver finished grade elevations from deviating more than 3/8" +/- under a 10 foot straightedge for finished surface of paving.
- B. Paver to Paver Lippage:
 - 1. No greater than 1/8 inch difference in height between adjacent pavers shall be allowed.
- C. Pavers shall be 1/8" above rim of tree grate frame.

3.6 REPAIRING AND CLEANING

- A. After completion of concrete paving, surfaces shall be carefully cleaned, removing all dirt, grout, sand and stains using an approved masonry cleaner and soft bristle brush.
- B. Remove and replace unit pavers that are loose, chipped, broken, stained or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.
- C. Cleaning: Remove excess dirt, debris, stains, grit etc. from exposed paver surface. Wash paver unit and scrub clean according to manufacturer's written recommendations.

3.7 PROTECTION

- A. Protect completed work from damage due to subsequent construction activity on the site.

END OF SECTION

SECTION 32 30 00 - SITE IMPROVEMENTS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 SECTION INCLUDES

- A. Provide all labor, materials, equipment and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, installing the following owner supplied items:
 - 1. Benches
 - 2. Bike Racks
 - 3. Waste Receptacles

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 02 41 13 - Site Preparation
 - 2. Section 03 30 00 - Cast in Place Concrete
 - 3. Section 31 10 00 – Earthwork
 - 4. Section 32 14 13 – Unit Paving

1.4 REFERENCES

- A. Codes and Standards: Comply with the standards of the following associations except as otherwise required:
 - 1. American Standards for Testing Materials, latest edition; Standards A-120, VA569, 1487-98 (S), and A-500 (ASTM).
 - 2. Standard Steel Composition, Society of American Engineers
 - 3. Massachusetts Architectural Access Board (MAAB)
 - 4. Massachusetts State Building Code, latest edition.

1.5 DEFECTIVE MATERIALS

- A. Do not install defective materials. No patching or hiding of defects will be permitted. Refer to Owner's Representative for decision on all materials showing flaws or imperfections upon delivery to the job site. The Owner's Representative's decision as to rejection of materials shall

be understood to be final. Remove rejected material from the site and replace with new material.

1.6 SPECIAL CONSIDERATIONS

- A. Products to be purchased by owner and installed by Contractor:
 - 1. Benches
 - 2. Bike Racks
 - 3. Waste Receptacle

1.7 QUALITY ASSURANCE

- A. Construction Tolerances:
 - 1. Variations from plumb: 1/4 inch in 10 feet.
 - 2. Variations from level: 1/4 inch in 20 feet.
 - 3. Variation of linear line: 1/2 inch in 20 feet.
 - 4. Variations from slope as indicated for finished surface of paving: 1/4 inch in 10 feet.
 - 5. Variations from flush in unit to unit offset: 1/32 inch.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Handle and ship all items so as to prevent damage in transit. Use only material that is not subject to staining or discoloration for blocking and packing. Deliver materials to site in manufacturer's original containers with labels intact and seals unbroken.
- B. Unload and handle all items carefully so as to prevent chipping and breakage. Protect all items during handling, storage and construction against moisture, soiling, staining and physical damage. Store on wood skids or pallets, covered with non-staining, waterproof membrane. Place and stack to distribute weight evenly and to prevent breakage or cracking. Protect stored materials from weather with waterproof, non-staining covers or enclosures, but allow air to circulate around materials. Replace materials damaged in any manner.
- C. Locate storage piles, stacks or bins to avoid and be protected from heavy and unnecessary traffic.

PART 2 - MATERIALS

2.1 BENCHES

- A. Benches shall be purchased by the Owner and provided to the Contractor.
- B. Benches shall be the "FGP" bench, 6' length each, by Landscapeforms. Owner shall supply two benches.
- C. Benches shall be secured to a concrete pad below the permeable concrete unit pavers as specified in the Drawings.
- D. Concrete pad shall be in accordance with Section 03 30 00 – CAST IN PLACE CONCRETE.
- E. Concrete unit pavers shall be in accordance with Section 32 13 14 – UNIT PAVERS.

2.2 BIKE RACK

- A. Bike Racks shall be purchased by the Owner and provided to the Contractor.
- B. Bike Racks shall be the FGP Bike Rack by Landscapeforms. Owner shall supply two bike racks for installation by the Contractor.
- C. Bike racks shall be secured to concrete pavement as specified in the Drawings. Contractor shall provide tamper-proof hardware for installation.
- D. Concrete pad shall be in accordance with Section 03 30 00 – CAST IN PLACE CONCRETE.

2.3 WASTE RECEPTACLES

- A. Waste Receptacles shall be purchased by the Owner and provided to the Contractor.
- B. Waste Receptacles shall be the Big Belly Element by Big Belly, Needham MA. Owner shall supply one complete unit for installation by the Contractor.
- E. Waste Receptacle shall be secured to concrete pavement as specified in the Drawings. Contractor shall provide tamper-proof hardware for installation.
- F. Concrete pad shall be in accordance with Section 03 30 00 – CAST IN PLACE CONCRETE.

2.4 MISCELLANEOUS MATERIALS

- A. FASTENERS: Provide all nuts, bolts, fasteners and fittings of AISI Type 304 stainless steel with vandal resistant design as required for a complete and secure installation of sign elements.
- B. EPOXY GROUT shall conform to ASTM C-881 and equal to "Sikadur 32, Hi-Mod" high strength adhesive as manufactured by Sika Corporation, Lyndhurst NJ.

PART 3 - EXECUTION

3.1 INSTALLATION OF SITE IMPROVEMENTS - GENERAL

- A. Assemble and install site improvements in accordance with the Drawings and manufacturer's written instructions as required.
- B. Fasten items securely together by anchoring and fastening as shown and as required by recognized standards. Make tight connections between members. Discard units of material with defects which might impair quality of work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.
- C. Coordinate casting of supports for surface mounting site furnishings onto new concrete pad or paving.
- D. Install epoxy and sealants in strict accordance with manufacturer's written instructions.
- E. Repair damaged surfaces and finishes after completion of installation, or replace damaged members as directed where damage is beyond satisfactory repair.

- F. Perform all excavation of every description and through whatever materials encountered to the depths indicated on the Drawings. In all other respects excavation shall conform to the requirements of Section 31 00 00 – Earthwork of these Specifications.
- G. Perform all work by workmen skilled and experienced in the trade in a neat and clean fashion. Install all work in accordance with the Drawings in straight and true lines, plumb and true to line and grade. Fasten items securely together.

3.3 FOUNDATIONS

- A. Concrete foundations shall be in accordance with Section 03 30 00 – CAST IN PLACE CONCRETE.
- B. Where site furnishing is installed on unit pavers, Unit Pavers shall be in accordance with Section 32 13 14 - UNIT PAVERS.

3.4 CLEANING AND PROTECTION

- A. Protect work in progress and after completion. Keep the premises neat and clean at all times.

END OF SECTION

SECTION 32 90 00 – LAWNS AND PLANTING

PART 1 - GENERAL

1.1 REFERENCE

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 SECTION INCLUDES

- A. Provide all labor, materials, equipment and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, furnishing and installing the following:
 - 1. Preparation of final subgrades in lawns.
 - 2. Furnishing and spreading of topsoil.
 - 3. Finish grading.
 - 4. Application of soil conditioners.
 - 5. Seeding.
 - 6. Planting.
 - 7. Maintenance.
 - 8. Guarantee.

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 02 41 13 - Site Preparation.
 - 2. Section 31 10 00 – Earthwork.
 - 3. Section 32 30 00 - Site Improvements.
 - 4. Section 32 94 43 – Tree Grates and Frames.

1.4 REFERENCES

- A. Codes and Standards: Comply with the standards of the following associations except as otherwise required:
 - 1. ASNS: "American Standard for Nursery Stock", American Association of Nurserymen, 1973 Edition.
 - 2. ASTM: American Society for Testing and Materials.
 - 3. Federal Specification JJJ-S-181b, Seeds, Agricultural.
 - 4. Federal Specification O-F-241c(1), Fertilizers, Mixed, Commercial.
 - 5. SPN: "Standardized Plant Names", American Joint Committee on Horticultural Nomenclature, 1942 Edition.

6. SRA-156: U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act

1.5 SUBMITTALS

- A. At least 90 DAYS PRIOR TO INTENDED USE, the Contractor shall provide the following samples and submittals for approval in conformance with the requirements of Division 1 Section, SUBMITTALS. Do not order materials until Resident Engineer's approval of samples, certifications or test results has been obtained. Delivered materials shall closely match the approved samples. Acceptance of the Submittals shall not constitute final acceptance. The Owner's Representative reserves the right to reject on or after delivery any material that does not meet these Specifications.
 1. Mycorrhizal Fungal Inoculant Product Literature
- B. At least 90 DAYS PRIOR TO INSTALLATION, the Contractor shall submit confirmation of availability for all plants on the plant list, accompanied by written certification as to source of plant material. When the specified types and sizes of plants are not available, substitutions are strongly discouraged but may be considered upon written request by the Contractor and approval by the Owner's Representative. Request for substitution shall be accompanied with a list of nurseries contacted in the search for the required plant and a record of other attempts to locate the required material. Requests shall also include sources of plants found that may be of a smaller or larger size, or a different shape or habit than specified, or plants of the same genus and species, or which may otherwise not meet the requirements of the specifications, but which may be available for substitution. Substitutions proposed by the Contractor shall have equivalent overall form, height, horticultural characteristics, and value and must be approved in writing by the Owner's Representative prior to tagging. If substitutions are approved by the Owner's Representative, the Contractor shall submit an updated plant list. Acceptance of the Submittals shall not constitute final acceptance. The Owner's Representative reserves the right to reject on or after delivery any plant material that does not meet the requirements of these Specifications. Plant tagging shall be in accordance with 2.7.A.1 of this Specification.
- C. Submit samples of the following materials in the quantities indicated for approval prior to use.
 1. Mulch for planting: 1 cubic foot.
- D. SAMPLES:
 1. Planting Soil, imported and amended Loam Borrow, and Organic Compost proposed for use, complete with any necessary amendments and additives. Provide two 10-pound representative samples from each proposed source for testing and analysis. Provide a 2-pound sample for comparison with delivered soil. The Owners Representative may examine each planting soil delivery to the site, and may request further testing. No planting soil shall be delivered until the review of samples and test results by the Owner's Representative, but such review shall not constitute final acceptance. The Owner's Representative reserves the right to reject on or after delivery any material which does not meet specifications or match the sample.

1.5 CERTIFICATES, INSPECTIONS, AND TESTS

- A. The subgrade shall be given a complete soil analysis by a competent laboratory approved by the Owner's Representative. The analysis shall include but not be limited to tests for soluble salts and other toxic elements or conditions which may be detrimental to plant growth. The report of the analysis shall include recommendations for the kinds and quantities of soil amendments to be used. The cost of the laboratory shall be paid by the Contractor. Submit the report of the analysis to the Owners Representative for approval.

- B. Topsoil from all sources shall be given a complete soil analysis by a competent laboratory approved by the Owner's Representative. The analysis shall be in accordance with ASTM D422. The analysis shall include, but not be limited to, tests for physical properties, grain size, hydrogen-ion value, organic matter content and available nitrogen, phosphoric acid, potash and iron. The analysis shall also include tests for soluble salts and other toxic elements or conditions which may be detrimental to plant growth. The report of the analysis shall include recommendations for the kinds and quantities of soil amendments to be used. The cost of the laboratory tests shall be paid by the Contractor. Submit the report of the analysis to the Owner's Representative at least 30 days prior to delivery of topsoil to the site or use in the work.
 - C. If requested, furnish Owner's Representative with duplicate copies of invoices for soil amendments used. Each lot shall be subject to sampling and testing at the discretion of the Owners Representative.
 - 1. If and when bulk delivery and/or custom mixing of soil amendments is authorized, provide Owners Representative with written notarized affidavit certifying the weight, analysis, name of manufacturer and warranty for each item.
 - D. Furnish Owner's Representative with manufacturer's certification of compliance to the Specifications prior to sowing seed. Furnish Owner's Representative with producer's test reports indicating the results of seed purity, germination tests and weed content dated within 9 months of sowing.
 - E. Plants and seed mixes shall comply with all applicable State and Federal laws in respect to inspection for plant diseases and infestation. Certificates of inspection shall accompany the invoice for each shipment as may be required by laws for transportation. File certificates with the Owners Representative prior to acceptance of material. Inspection by State and Federal governments at place of growth does not preclude rejection of material at the site.
 - F. Furnish full and complete written instructions for maintenance of lawn areas and plantings to the Owner's Representative at least 30 days prior to the end of the contractual maintenance period in order to familiarize the Owner with the maintenance requirements for the proper care and development of lawn areas and plantings.
- 1.6 DELIVERY, STORAGE AND HANDLING
- A. Do not deliver TOPSOIL to the site until soil analysis has been approved by the Owner's Representative. Do not deliver topsoil to the site in a frozen or muddy condition.
 - B. Deliver all SOIL AMENDMENTS and WOOD CELLULOSE FIBER MULCH to the site in manufacturer's standard containers showing weight, analysis, name of manufacturer and warranty. Append a summary of this product information to each invoice. Store in a weatherproof storage place in such a manner that they will be kept dry and their effectiveness not impaired. Caked or otherwise damaged soil amendments shall be rejected.
 - C. Deliver SEED in original sealed standard sized containers. Label all seed in accordance with State regulations and SRA-156. Store seed in such a manner that it will be protected from damage by heat, moisture, rodents or other causes. Seed which has become wet, moldy or otherwise damaged shall be rejected.
 - D. PLANT MATERIAL:
 - 1. Cover all plant material while in transit.
 - 2. After delivery to job site, Contractor shall protect plants at all times from sun or drying winds. Keep plants that cannot be planted immediately upon delivery in the shade, well

protected with soil, wet moss or other acceptable material and keep well watered. Plants shall not remain unplanted for longer than 3 days after delivery.

3. Do not bind plants with wire or rope at any time so as to damage the bark or break branches. Lift and handle plants from the bottom of ball only. Plants with cracked or broken balls before or during planting operations shall be rejected.

1.7 QUALIFICATIONS

- A. The fine grading, lawn installation and planting shall be performed by personnel familiar with the accepted procedure of lawn construction and planting and shall be under the constant supervision of a qualified foreman.

PART 2 - MATERIALS

2.1 TOPSOIL

- A. TOPSOIL stripped and stockpiled as required by Section 31 00 00 of these Specifications shall be used for part of this work. It shall be free of any admixture of subsoil, stones larger than one (1) inch, clods of hard earth, plant roots, sticks or other extraneous materials.

1. If additional topsoil is required it shall be provided by the Contractor at no extra cost and shall be fertile, friable, natural loam capable of sustaining vigorous plant growth. Topsoil shall be a "sandy loam" or a "fine sandy loam" of uniform composition as determined by mechanical analysis and based on the USDA classification system. In addition it shall meet the requirements above as well as the following mechanical analysis:

<u>Sieve Size</u>	<u>% Retained</u>
1 inch	0
1/2 inch	0-3
No. 100	40-60

The clay content of the material passing U.S.S. No. 100 mesh shall not be greater than 60% as determined by the Bouyoucous Hydrometer or by the Decantation Method. The organic content shall be 5% to 20% as determined by the Thomas Rapid Test Method or by loss on ignition on moisture free samples dried at 100 degrees C. The pH value shall be between pH 6.0 and pH 6.5. It shall contain no toxic materials. Soluble salts shall not be greater than 75 parts per million. If soil amendments are required, they shall be added at no additional cost to the Owner.

2. The Contractor shall be responsible for estimating the quantity of topsoil stockpiled.

2.2 SOIL AMENDMENTS

- A. General: All soil amendments shall conform to the standards of the Association of Agricultural Chemists and shall comply with State and Federal regulations.
- B. LIMESTONE, if required, shall be free flowing Agricultural Grade Dolomitic Limestone ground to such fineness that 50% will pass a 100 mesh sieve and 98% will pass a 20 mesh sieve. Limestone shall contain at least 50% total oxides and not less than 85% total carbonates.
- C. ALUMINUM SULFATE, if required, shall be unadulterated commercial grade.
- D. GYPSUM, if required, shall be unadulterated commercial grade Calcium Sulfate.
- E. COMMERCIAL FERTILIZER shall be a complete fertilizer, uniform in composition and free flowing. At least 50% of the Nitrogen shall be derived from natural or synthetic organic sources.

Available Phosphoric Acid shall be from superphosphate, bone or tankage. Potash shall be derived from Muriate of Potash containing at least 60% Potash. Percentages of Nitrogen, Available Phosphoric Acid and Water-soluble Potash in the fertilizer mix shall be based on laboratory test recommendations as approved by the Owners Representative.

- F. BONEMEAL shall be finely ground commercial raw bonemeal with 4% minimum Nitrogen and 20% minimum Phosphoric Acid.
- G. ORGANIC COMPOST shall be mature leaf compost, mature composted animal manure, other aged, composted vegetable materials that meet the requirements of the EPA and the State of Massachusetts for intended use. Raw (uncomposted or unprocessed) organic matter shall not be accepted.
 - 1. Peat moss or other material the harvesting of which depletes natural wetlands shall not be used.
 - 2. Organic material shall contain no bulking agents, such as visible, uncomposted wood chips, and be free from hard lumps. It may be shredded or granular in form. No plastic shall be present. The material shall be free of noxious odor. Organic compost shall be tested for % organics, carbon: nitrogen ratio, ammonium nitrate, moisture content, pH, and sieve analysis and test results shall be submitted for review before use may be approved as a soil component.
 - 3. Manure shall be well rotted, unleached cattle manure, free of harmful chemicals and other injurious substances. Manure shall be free of sawdust and refuse of any kind and shall not contain more than 25% straw, shavings, leaves or other organic material. Manure shall be not be aged more than 2 years or less than 9 months.
- H. MYCORRHIZAL FUNGI shall be 'PHC Tree Saver' manufactured by Plant Health Care, Inc.

2.3 PLANTING SOIL

- A. PLANTING SOIL shall consist of eight (8) parts topsoil and one (1) part compost by volume. It shall have a pH value between 6.0 and 6.
- B. See Section 32 94 56 – SOIL CELLS PLANTING SOIL for soil in area indicated for Soil Cells.

2.4 ANTI-TRANSPIRANT

- A. ANTI-TRANSPIRANT shall be suitable for spray application which upon drying shall produce a gas permeable, but water retarding, colorless film, having a moisture vapor transmission value of not more than 2.5 in accordance with ASTM E96. It shall be equal to "Wilt Pruf" by Nursery Specialty Products, Inc., Greenwich Conn. Apply in accordance with manufacturer's instructions.

2.5 GRASS SEED

- A. GRASS SEED: shall be the 'Valley Green Dark and Durable' seed mix, available at Valley Green, 642 S. Summer St., Holyoke MA, tel: 413-533-0726, or approved equal. Apply seed at 6-8 pounds per 1,000 square feet minimum.
 - 1. Mix contains: 26% Fury Tall Fescue, 26% Falcon IV Tall Fescue, 26% Pixie Tall Fescue, 10% Revenge GLX Perennial Rye and 10% Bonaire Kentucky Bluegrass.
 - 2. Weed seed shall not exceed 0.5% by weight.
 - 3. If special conditions exist which may warrant a variance in the above seed mixture, submit a written request to the Owners Representative stating conditions and proposed variance. Permission will be given if, in the opinion of the Owner's Representative, the variance is warranted.

2.6 MULCH FOR SEEDED AREAS

- A. MULCH for seeded areas shall be natural and suited to horticultural use. It shall not contain lumps, roots or other foreign matter over one (1) inch in diameter. It shall be free from noxious weeds, seeds and other elements harmful to lawns. Mulch shall be subject to inspection and approval by the Owners Representative at the source and upon delivery. Mulch shall contain not more than 35% moisture by weight. Mulch shall be one of the following at the Contractor's option:
1. Hay: Mowed and properly cured grass, clover or other acceptable plants. Salt hay is not acceptable.
 2. Straw: Stalks or stems of grain after threshing.
 3. Wood cellulose fiber: "Conwed Hydro Mulch" by Conwed Corporation, Minneapolis, Minnesota; "Silva-Fiber Mulch" by Weyerhaeuser Company, Tacoma, Washington; or approved equal.

2.7 PLANT MATERIALS

- A. Selection of the Nursery Stock
1. At least thirty (30) days prior to the expected planting date, the Contractor shall request, in writing, that the Owner's Representative provide a representative to select and tag stock to be planted under this Section. This request shall be made ten (10) days prior to the date on which stock selections are to be made. The Contractor shall arrange for and bear the cost of transportation, meals in transit, and overnight accommodations, if necessary, for the Owner's Representative during the period of time required to select and tag the required number of sized stock. The letter of request shall also have attached a letter of certification from the supplier attesting to the fact that the stock to be selected from is, in fact, the patented tree or plant required under this Section. The Contractor shall supply the necessary tags or seals which shall be durable and capable of accepting weather-resistant ink or an embossed process. The tags or seals shall be attached directly and securely to each selected plant. The Owner's Representative will make up to two tagging trips. The Owner's Representative reserves the right to seek compensation from the Contractor for additional tagging trips caused by the mismanagement of the Contractor.
- B. PLANTS shall be of specimen quality, exceptionally heavy, symmetrical, tightly knit plants so trained or favored in development and appearance so as to be unquestionably and outstandingly superior in form, number of branches, compactness and symmetry.
1. Plants shall be nursery grown in accordance with good horticultural practices, unless specifically authorized to be collected, and grown under climatic conditions similar to those in the locality of the project for at least two years. They shall have been root pruned within the past two years.
 2. Plants shall be freshly dug at time of delivery. No heeled-in plants or plants from cold storage will be accepted.
 3. Plants shall be sound, healthy and vigorous, well branched and densely foliated when in leaf. They shall be free of disease, insect pests, eggs or larvae and shall have healthy, well developed fibrous root systems. They shall be free from physical damage or adverse conditions that would prevent thriving with the specified result.
 4. Plants shall be true to species and variety and shall conform to the measurements specified in the Plant List except that plants larger than specified may be used without an increase in Contract price if approved by the Owners Representative. Substitutions of plant materials will not be permitted unless authorized in writing by the Owners Representative.
 5. Plants shall be measured when branches are in their normal position. Height and spread dimensions specified refer to the main body of the plant and not from branch tip to tip.
 6. If a range of size is given, no plant shall be less than the minimum size and not less than 50% of the plants shall be as large as the upper half of the specified range. The

measurements specified are the minimum size acceptable and are the measurements after pruning where pruning is required.

7. Plants that meet the measurements specified, but do not possess a normal balance between height and spread shall be rejected. Thin, poorly branched or sparsely rooted plants will be rejected, regardless of whether they meet the minimum technical requirements of ASNS.
8. Container grown material shall have sufficient roots to hold the soil together, firm and intact after removal, without being root bound.
9. In case of any discrepancy between the Plant List and the Planting Plan, the Planting Plan will govern.

2.8 MULCH FOR PLANTED AREAS

- A. MULCH for planting shall be shredded pine bark, passing a one inch square mesh and retained on a 1/8 inch square mesh. Moisture content shall not exceed 35%. Mulch shall contain no dye.

2.9 GUYING APPARATUS

- A. WOOD STAKES shall be 2" x 2" x 8 feet in length from sound Cedar pointed at one end and reasonably free of knots. Binding and guying shall be with biodegradable webbing. Stake fastenings shall be galvanized 10 penny nails. Trees shall not be wrapped.

2.10 WATER

- A. WATER shall be free of substances harmful to plant growth. It shall be provided by the Contractor. Furnish all necessary hose, hose connections and watering equipment.

2.11 WATERING BAGS

- A. Watering Bags shall be provided equal to the Treegator by Treegator.com, or approved equal. Contractor shall provide one watering bag per newly installed tree. Bag shall be sized to fit a 2 to 3 inch caliper tree.

PART 3 - INSTALLATION

3.1 PREPARATION OF SITE

- A. After the subgrade of the areas required to be seeded or planted has been brought to the grades shown on the Drawings, thoroughly till the subgrade to a depth of 6 inches by an approved method. Loosen subgrade which has been consolidated or compacted during construction so as to interfere with the porosity of the soil, or where the natural void ratio has been changed, to a depth of no less than 12 inches. The top 3 inches shall be free from stones, rock or other foreign matter 2 inches or greater in dimension.
- B. Thoroughly and evenly incorporate soil amendments into subgrade by an approved method if indicated necessary by the subgrade analysis. Perform this work only when soil is in a friable condition. If the subgrade analysis recommends the incorporation of soil amendments, the Contract Price will be adjusted.
- C. When tilling within the branch spread of trees scheduled to remain, do so in a manner which will cause minimum damage to root systems.
- D. Before spreading topsoil, establish new finish grades and regrade subgrade as necessary to a true smooth slope parallel to and to the required depth below lawn areas and to eliminate depressions and ridges. Spread topsoil to meet finish grades smoothly and evenly. Provide

- A. Fine grade and seed the areas as indicated on the Drawings within the limit of work not covered by structures, paving and all areas disturbed by construction inside and outside the limit of work.
- B. Employ an approved method of sowing, using approved mechanical power seeders, mechanical hand seeders or other approved methods. When delays in operations extend the work beyond the most favorable planting season for species designated or when conditions are such that satisfactory results are not likely to be obtained, halt work as directed and resume only when conditions are favorable or when approved alternate or corrective measures and procedures have been effected. No seeding shall be done when the ground is frozen, excessively wet or otherwise nontillable.
- C. Broadcast seeding: Broadcast seed either by hand or with other approved sowing or hydraulic seeding equipment at the specified rate. Distribute seeds uniformly over designated areas. Sow half the seed with the sower moving in one direction and the remainder with the sower moving at right angles to the first sowing. Do not broadcast seed when wind velocity exceeds 15 mph. Use wood cellulose fiber mulch when hydroseeding at a rate of one ton per acre. Use hay or straw mulch with other seeding methods at a rate of one and one half tons per acre.
- D. On banks having a slope of 3:1 or greater in areas to be seeded, or if seeding is authorized between May 15 and August 15, add one (1) pound of annual rye grass per 1,000 square feet to the specified seed mix.

3.5 EROSION CONTROL

- A. It shall be the responsibility of the Contractor to render all lawn areas and plant beds erosion free. The Contractor may accomplish this by any of several alternate methods, any of which may be used provided such method is acceptable to the Owners Representative. Approval of method by Owners Representative does not free Contractor of responsibility for controlling erosion.

3.6 PLANTING

- A. Inform the Owner's Representative when planting will commence and the anticipated delivery date of plant material. Failure to notify the Owner's Representative in advance, in order to arrange proper scheduling, may result in loss of time or removal of any plant or plants not installed as specified or directed.
- B. EXCAVATION OF PLANT PITS:
 - 1. Stake out on the ground locations for plants and obtain approval of Owner's Representative before excavation is begun. Make adjustments in locations as directed.
 - 2. Establish finish grades for plant beds and tree pits. Excavate to depths required and regrade subgrade as necessary. Separate subgrade soils from upper "topsoil" portions and remove subgrade soils immediately wherever encountered during planting operations. Loosen top 6 inches of subgrade in pits and beds immediately prior to placing planting soil.
 - 3. If stone, underground construction work, tree roots, poor drainage or obstructions are encountered in the excavation of plant pits, alternate locations may be selected by the Owner's Representative without additional cost. Where locations cannot be changed as determined by the Owner's Representative submit cost required to remove obstructions to a depth of not less than 6 inches below the required pit depth. Proceed with work only after approval of Owners Representative.
 - 4. Notify Owner's Representative in writing of all soil or drainage conditions which the Contractor considers detrimental to the growth of plant material.

C. PLANTING OPERATIONS FOR TREES

1. Set plants at the same relationship to finished grade as they bore to the ground from which they were dug. After settlement, the crown of the plant ball shall not be more than one inch lower than the surrounding finished grade. Backfill planting soil in layers of not more than 8 inches and tamp each layer before the next layer is placed. When plants have been backfilled approximately 2/3 full, water thoroughly before installing remainder of planting soil to top of bed, eliminating all air pockets.
2. Set plants in the center of pits, plumb and straight. Brace rigidly in position until the planting soil has been tamped solidly around the ball and roots. Cut ropes or strings from top of ball after plant has been set. Leave burlap wrapping intact around ball. Turn under and bury portions of burlap exposed at top of ball.
3. Mulch and water all plants immediately after planting. Flood plants with water twice within 24 hours of planting. Smooth planting areas to conform to specified grades after full settlement has occurred and mulch has been applied. Form saucers around trees and shrubs planted in lawn areas.
4. After plants have been installed and prior to placement of mulch, place 1 packet of "PHC Tree Saver" around in the top 1/2" of planting soil. Work into planting soil so that the material is incorporated.
5. After installation and spreading of mulch in saucer, Contractor shall place one watering bag around new tree and fill bag to capacity with water.

D. FERTILIZING:

1. For Spring planting only add commercial fertilizer to the planting soil at the rate recommended in the topsoil analysis. Mix thoroughly.
2. Fertilize Fall planting the following Spring. Use commercial fertilizer at the following rates:

Trees: 2 pounds per inch of caliper

E. PRUNING

1. Prune new plants only at time of planting and in accordance with American Association of Nurserymen standards in such a manner as to preserve the natural character of the plant. Pruning shall be done by experienced personnel under the supervision of the Owners Representative.
2. Remove all dead wood, suckers and badly bruised or broken branches. In addition, remove approximately 1/4 of all small branching leaf canopy of deciduous plants by thinning out and shortening branches. Do not cut the leader. Trees with leaders removed shall be rejected. Use only clean sharp tools. Make all cuts flush with the trunk or branch.
3. Paint cuts over 3/4 inch diameter with tree paint as specified. Cover all exposed cambium as well as other exposed living tissue.

- F. CLEANUP: Upon completion of planting and pruning operations, remove all excess soil and debris from the site and repair any damage caused by these operations.

3.7 MAINTENANCE AND PROTECTION

- A. Maintenance and protection shall begin immediately upon completion of seeding operations and after each plant is planted and shall continue until acceptance or for at least 30 days or as much longer as necessary to establish a uniform stand of the specified grasses or until substantial completion, whichever is later with the following requirements.

1. In the event that lawn operations are completed too late in the Fall for adequate germination and/or growth of grass, maintenance shall continue into the following Spring.
2. Maintenance of lawn areas shall consist of watering, weeding, cutting, raking of leaves, repair of all erosion, reseeding as necessary to establish a uniform and knitted stand of the specified grass mix.

3. Maintenance of new planting shall consist of pruning, watering, cultivating, weeding, mulching, resetting plants to proper grades and/or upright position and restoration of planting saucers.
4. Furnish and apply such pesticides as are necessary to keep these areas free of insects and disease. Pesticides shall be approved by the Owner's Representative prior to use. Use in accordance with the specifications of the prevailing Public Health Authority.
5. Provide temporary protection fences, barriers and signs, where deemed necessary and all other work incidental to proper maintenance. Remove temporary protection devices at the completion of maintenance period.
6. Protect planting areas and plants at all times against trespassing and damage of all kinds for the duration of the maintenance period. If any plants become damaged or injured, treat or replace them as directed by the Owner's Representative at no additional cost to the Owner.
7. In seeded areas, keep soil moist during germination period. After germination, supplement natural rainfall to produce a total of 2 inches per week. Water lawns not less than twice per week until acceptance.
8. Do not attempt first mowing until seeded areas reach 2-1/2 inches in height. Do not remove more than 40% of the grass leaf in initial or subsequent mowings. Maintain grass at 2 inches in height. Remove grass clippings. Lawns shall receive at least 3 mowings before acceptance.
9. Reseed areas greater than one foot square which fail to show a uniform stand of grass. To be acceptable, a stand of grass shall have a uniform count of at least 100 plants per square foot.
10. Immediately prior to the end of the maintenance period after Spring seeding, or early the following Spring for lawns established in the Fall, apply ammonium nitrate at the rate of 20 pounds per 1,000 square feet over lawn areas. Apply only when grass blades are dry. Water thoroughly after application.

3.8 INSPECTION AND ACCEPTANCE

- A. At the end of the maintenance and protection period, submit a written request to the Owners Representative to inspect all work for acceptance at least 10 calendar days before the anticipated date of inspection.
- B. Until this portion of the work is finally accepted, the Contractor shall be required to repair and replace any lawn area that is defective or becomes damaged when, in the judgment of the Owners Representative, such defects or damages are the result of poor workmanship or failure to meet the requirements of the specifications. The cost of necessary repairs or replacements shall be borne by the Contractor.
- C. Acceptance of plant material by the Owners Representative shall be for general conformance to the specified size, character and quality and shall not relieve the Contractor of responsibility for full conformance to the Contract Documents including correct species.
- D. If a substantial number of plants are sickly or dead at the time of inspection, acceptance will not be granted, and the Contractor's responsibility for maintenance of all plants shall be extended until replacements are made. Replacements shall conform in all respects to the Specifications for new plants and shall be planted in the same manner.
- E. Upon acceptance of the work, the Contractor shall be relieved of further responsibility for care and maintenance of the accepted areas. The Owner will be responsible for the maintenance of new lawns and planting upon acceptance of the work, and continuing through the guarantee period.

3.9 GUARANTEE PERIOD AND REPLACEMENTS

- A. The guarantee period for plant material shall begin at the date of acceptance. All plant material shall be guaranteed by the Contractor, for a period of one year from the date of acceptance, to be in a good healthy and flourishing condition.
 - B. Lawn turf installed in the spring, shall be guaranteed until the fall.
 - C. Replace without cost to the Owner, and as soon as weather permits, and within a specified planting period, all dead plants and all plants not in a vigorous, thriving condition, as determined by the Owners Representative during and at the end of the guarantee period. Plants shall be free of dead or dying branches and branch tips, and shall bear foliage of a normal density, size and color. Replacements shall closely match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this Specification. Make all necessary repairs due to plant replacements at no additional cost to the Owner.
 - D. The guarantee of all replacement plants shall extend for an additional period of one year from the date of their acceptance after replacement. In the event that a replacement plant is not acceptable during or at the end of said extended guarantee period, the Owner may elect subsequent replacement or credit for each item.
 - E. Make periodic inspections as necessary, at no extra cost to the Owner, during the guarantee period to determine what changes, if any, should be made to the Owner's maintenance program. Submit in writing to the Owner's Representative and Owner any recommended changes.
- 3.10 FINAL INSPECTION AND ACCEPTANCE
- A. At the end of the guarantee period, submit a written request to the Owner's Representative to inspect all guaranteed work for final acceptance at least 10 calendar days before the anticipated date for final inspection.

END OF SECTION

SECTION 32 94 43 - TREE GRATES AND FRAMES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 – GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.
- B. Examine all other Sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 SECTION INCLUDES

- A. Provide all labor, materials, equipment, and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, furnishing and installing the following:
 - 1. Tree grate and frame for trees in plaza

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 03 30 00 – Cast In Place Concrete.
 - 2. Section 31 00 00 – Earthwork.
 - 3. Section 32 14 13 – Unit Paving.
 - 4. Section 32 94 51 – Soil Cells
 - 5. Section 32 94 56 – Soil Cells Planting Soil.

1.4 REFERENCES

- A. Codes and Standards: Comply with the standards of the following associations except as otherwise required:
 - 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 Society for Testing and Materials (ASTM):
 - A 36 Structural Steel
 - 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 312 Seamless and Welded Austenitic Stainless Steel Pipe

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 554 Welded Stainless Steel Mechanical Tubing
A 743 Castings, Iron-Chromium, Iron-Chromium Nickel, and Nickel-Base Corrosion-Resistant for General Application

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements.
- B. Shop Drawings: Provide large scale shop drawings for fabrication, installation and erection of all parts of the wood seating and tree grates. Provide plans, elevations, and details of anchorages, connections and accessory items. Provide installation templates for work installed by others. Show all interfaces and relationships to work of other trades.
- C. Field Measurements: Take all necessary field measurements before preparation of shop drawings and fabrication. Do not delay progress of the job. If field measurements are not possible prior to fabrication, allow for field cutting and fitting.
- D. Initial Selection Samples: Submit samples showing complete range of colors, textures, and finishes available for each shop finished material used.
- E. Verification Samples: Submit representative samples of each shop finished material that is to be exposed in the completed work. Show full color ranges and finish variations expected. Provide sample sizes appropriate to their application.

1.6 GENERAL REQUIREMENTS

- A. The Contractor shall verify all measurements and shall take all field measurements necessary before fabrication. 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.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 15 years tree grate manufacturing experience.
- B. Installer Qualifications: Minimum 2 years' experience installing tree grates and support frames.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Store work off of the ground and under cover. Protect from damage. Maintain shop applied coatings until installation is complete. Sequence deliveries to avoid delays, but minimize on-site storage.

1.9 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with ornamental metal by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating railings without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.

1.10 COORDINATION

- A. Coordinate installation of tree grate frames with other trades, particularly concrete pavement. Furnish setting drawings, templates, and directions for installing anchorages, including items with integral anchors, which are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 FASTENERS

- A. Fastener Materials: Unless otherwise indicated, provide the following:
 - 1. Stainless-Steel Items: Type 316 stainless-steel fasteners.
 - 2. Dissimilar Metals: Type 316 stainless-steel fasteners.
- 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 2 (A4).
- 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. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).
- H. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).
- I. 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.
 - J. 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 Exterior Locations: Alloy Group [1 (A1)] [2 (A4)] stainless-steel bolts complying with ASTM F 593 (ASTM F 738M) and nuts complying with ASTM F 594 (ASTM F 836M).
 - K. Provide anchors, bolts, sockets, sleeves, and other parts required for securing each item of work to other construction. Furnish inserts and sleeves to be set into concrete formwork and concrete under Section 03 30 00, CAST-IN-PLACE CONCRETE. Furnish anchors, bolts, and other items required to be built-into masonry under 32 14 13, UNIT PAVING.
 1. Anchor bolts, bolts smaller than 5/8 in., and fasteners shall be steel castings conforming to ASTM A 307. Bolts larger than 5/8 in. shall conform to ASTM A 325.
 - L. Fasteners for Anchoring to Other Construction: Unless otherwise indicated, select fasteners of type, grade, and class required to produce connections suitable for anchoring indicated items to other types of construction indicated.
 - M. Provide concealed fasteners for interconnecting components and for attaching ornamental metal items to other work, unless otherwise indicated.
 1. Provide tamper-resistant flat-head machine screws for exposed fasteners, unless otherwise indicated.
 - N. 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 Owner's Representative.
- 2.2 TREE GRATES AND FRAMES:
- A. Manufacturer: Tree grates and frames shall be as supplied by Iron Age Designs, 2104 SW 152nd Street, Burien, WA 98166, ironagegrates.com, or approved equal.
 - B. Tree grates shall be:
 1. SPIN, 4' x 4' HEEL PROOF, Product ID SPX48-48I99TGHP, quantity as indicated on the drawings.
 - C. Tree grates material shall be cast aluminum. All tree grate castings shall be manufactured true to pattern and component parts, and shall fit together in a satisfactory manner. The castings shall be of uniform pattern and quality, free from blowholes, hard spots, shrinkage, distortion or other defects. Castings shall be cleaned by shot blasting.
 - D. Finish: Grates are to natural aluminum finish.
 - E. Grate shall be fully ADA compliant.
 - F. Matching steel angle frames provided by tree grate manufacturer:

1. 48" x 48" Grate Frame: Model "SOE", Stand Off Embed, shall be provided with installation details per plans.

G. Frames to be Powder coat dark bronze.

2.3 CONCRETE COLLAR

- A. Concrete for concrete collar shall be in accordance with Section 03 30 00 – Cast In Place Concrete.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of ornamental metal.
1. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Clean surfaces thoroughly prior to installation
- C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.2 INSTALLATION

- A. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- B. Install grates and frames where indicated on plans flush and leveled with surrounding pavement surface. Secure grate frame to concrete collar with non-shrink epoxy grout.
- C. Install steel angle frame
1. Flush and leveled with surrounding paving surfaces, maintain flush and leveled at all times. Frames MUST NOT slope in more than one direction. Frame to be affixed on all four sides to cast-in-place concrete pavement. Frame to be flush with adjacent Porous Unit Paving.
 2. Use spreaders or stakes to keep frame from being distorted by concrete pressure.
 3. Install frames per details on plans and manufacturer's recommendations
- D. Clean concrete and debris from frame prior to tree grate installation.
- E. If needed, grind pads on underside of tree grates to level and prevent rocking in frame.

3.3 CLEANING

- A. Unless otherwise indicated, clean metals by washing thoroughly with clean water and soap, rinsing with clean water, and drying with soft cloths.
- B. DO NOT ALLOW water from new concrete to run off or wash onto tree grates to prevent damage from concrete exudates, lime, and efflorescence.
- C. Touch up, repair or replace damaged products.

3.4 PROTECTION

- A. Protect finishes of tree grates and frames from damage during construction period with temporary protective coverings approved by manufacturer. Remove protective covering at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION

SECTION 32 94 51 – SOIL CELLS

PART 1 - GENERAL

1.1 REFERENCE

- A. The GENERAL DOCUMENTS, as listed on the Table of Contents, and applicable parts of Division 1, GENERAL DOCUMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements which affect the work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all trades affecting or affected by the work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 SECTION INCLUDES

- A. Contractor shall install the following:
 - 1. Soil cell system for planting and paving, including Soil cell assemblies and related accessories.
 - 2. Other materials including, but not limited to, geotextile, geogrid, aggregate, subbase material, backfill, root barrier, Water + Air System, and planting soil.
- B. Materials Installed But Not Furnished Under This Section:
 - 1. Planting soils are furnished in Section 32 94 56 - Planting Soil for Soil cell system.

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 02 41 13 - Site Preparation
 - 2. Section 03 30 00 - Cast in Place Concrete
 - 3. Section 31 00 00 – Earthwork
 - 4. Section 32 14 13 – Unit Paving
 - 5. Section 32 93 00 – Lawns and Planting
 - 6. Section 32 94 56 – Planting Soil for Soil Cells

1.4 REFERENCES

- A. Codes and Standards: Comply with the standards of the following associations except as otherwise required:
 - 1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. AASHTO H-20
 - 2. ASTM International (ASTM):
 - a. ASTM D448-12, Standard Classification for Sizes of Aggregate for Road and Bridge Construction
 - b. ASTM D698-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ [600 kN-m/m³])
 - c. ASTM D1241-07, Standard Specification for Materials for Soil-Aggregate Subbase, Base, and Surface Courses

- d. ASTM D3786/D3786M-13, Standard Test Method for Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method
- e. ASTM D4491-99a(2014)e1, Standard Test Methods for Water Permeability of Geotextiles by Permittivity
- f. ASTM D4533-D4533M-15, Standard Test Method for Trapezoid Tearing Strength of Geotextiles
- g. ASTM D4632-D4632M-15, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
- h. ASTM D4751-12, Standard Test Method for Determining Apparent Opening Size of a Geotextile
- i. ASTM D4833/D4833M-07(2013)e1, Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products
- j. ASTM D5262-07(2012), Standard Test Method for Evaluating the Unconfined Tension Creep and Creep Rupture Behavior of Geosynthetics
- k. ASTM D6241-14, Standard Test Method for Static Puncture Strength of Geotextile and Geotextile-Related Products Using a 50mm Probe
- l. ASTM D6637-11, Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method

3. MAAB - Massachusetts Architectural Access Board

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protect and handle materials, during loading, shipping, unloading at the site, storage and erection as required to prevent damage to finish surfaces, section contours, squareness, straightness and flatness of fabricated members
- B. Soil Cell System: Protect Soil Cell system components from damage during delivery, storage and handling.
 - 1. Store components on smooth surfaces, free from dirt, mud and debris. Store under tarp to protect from sunlight when time from delivery to installation exceeds one week.
 - 2. Perform handling with equipment appropriate to the size (height) of Soil cell system and site conditions; equipment may include, hand, handcart, forklifts, extension lifts, or small cranes, with care given to minimize damage to Soil cell bases, posts, decks and adjacent assembled Soil cell system.
- C. Packaged Materials: Deliver packaged materials in original, unopened containers indicating weight, certified analysis, name and address of manufacturer, and indication of conformance with State and Federal laws, if applicable. Protect materials from deterioration during delivery and while on the Project site.
 - 1. Do not deliver or place backfill, soils, or soil amendments in frozen, wet, or muddy conditions.
 - 2. Provide protection including tarps, plastic and/or matting between bulk materials and finished surfaces sufficient to protect the finish material.
 - 3. Bring planting soil to the site using equipment and methods that do not overly mix and further damage soil peds within the soil mix.
- D. Provide erosion-control measures to prevent erosion or displacement of bulk materials and discharge of soil-bearing water runoff or airborne dust to adjacent properties, water conveyance systems, and walkways. Provide additional sediment control to retain excavated material, backfill, soil amendments and planting mix within the Project limits as needed.

1.6 DEFECTIVE MATERIALS

- A. Do not install defective materials. No patching or hiding of defects will be permitted. Refer to Owner's Representative for decision on all materials showing flaws or imperfections upon

delivery to the job site. The Owner's Representative's decision as to rejection of materials shall be understood to be final. Remove rejected material from the site and replace with new material.

1.7 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Conference: Prior to installation of the Soil cell system and associated Work, meet with the Contractor, Soil cell system installer and their field supervisor, manufacturer's technical representative, the Owner's Representative, the Owner at the Owner's discretion, and other entities concerned with the Soil cell system performance.
1. Provide at least 72 hours advance notice to participants prior to convening preinstallation conference.
 2. Introduce and provide a roster of individuals in attendance with contact information.
 3. The preinstallation conference agenda will include, but is not limited to the review of:
 - a. Required submittals both completed and yet to be completed.
 - b. The sequence of installation and the construction schedule.
 - c. Coordination with other trades.
 - d. Details, materials and methods of installation.
 1. Review requirements for substrate conditions, special details, if any, installation procedures.
 2. Installation layout, procedures, means and methods.
 - e. Mock-up requirements.
- B. Sequencing and Scheduling:
1. General: Prior to beginning Work of this Section, prepare a detailed schedule of the Work involved for coordination with other trades.
 2. Schedule utility installations prior to beginning Work of this Section.
 3. Where possible, schedule the installation of the Soil cell system after the area is no longer required for use by other trades and Work. Where necessary to prevent damage, protect installed system if Work must occur over or adjacent to the installed Soil cell system.

1.8 SUBMITTALS

- A. Submit these to the Owner's Representative for review and acceptance not less than 45 days prior to start of installation of materials and products specified in this Section.
1. Product Data: For each type of product, submit manufacturer's product literature with technical data sufficient to demonstrate that the product meets these specifications.
 2. Test and Evaluation Reports:
 - a. Submit results of compaction testing required by the Specifications for approval.
 - b. Include analysis of bulk materials including soils and aggregates, by a recognized laboratory that demonstrates that the materials meet the Specification requirements.
 3. Samples:
 - a. One full size sample of an assembled Soil cell system (copy of manufacturers brochure with images of product may be accepted in lieu of product sample).
 - b. Manufacturer's product data/specification sheet for geogrid.
 - c. Manufacturer's product data/specification sheet for geotextile.
 - d. Manufacturer's product data/specification sheet for Water+Air System components (when specified as part of the system)
 4. Manufacturer's Report: Submit Soil cell system system manufacturer's letter of review and approval of the Project, including Drawings and Specifications, Addenda, Clarifications and Modifications, and for compliance with product installation requirements.
 5. Qualification Statements:
 - a. Manufacturer:

- 1) Submit list of completed projects demonstrating durability and longevity of in-place systems.
 - a) Include project name, location, and date of completion.

1.9 QUALITY ASSURANCE

- A. Comply with applicable requirements of the laws, codes, ordinances and regulations of Federal, State and Municipal authorities having jurisdiction. Obtain necessary permits/approvals from these authorities.
- B. Manufacturer Qualifications:
 1. A manufacturer whose product is manufactured in an ISO/TS 16949 compliant and ISO 9001 - 2008 registered factory.
 2. A manufacturer with not less than 100 Soil cell system systems in-place, in the United States. Each system in use for not less than 7 years, confirming durability and longevity of the system.
 3. A manufacturer with documented written approval of their product for use as a stormwater treatment device by a minimum of 3 governmental jurisdictions.
 4. A manufacturer with an established and demonstrated utility service and repair process, including written procedure and photographs demonstrating work.
 5. A manufacturer with a published operating and maintenance manual
- C. Installer Qualifications: A qualified installer with not less than 5 years of successful experience installing Soil cell system systems or related products and materials, and whose work has resulted in successful installation of underground piping, chambers and vault structures, planting soils, and planter drainage systems of a similar scope and scale in dense urban areas.
- D. Installer's Field Supervisor: A full-time supervisor employed by the installer with not less than 5 years of successful experience similar to that of the installer and present at the Project site when Work is in progress. Utilize the same field supervisor throughout the Project, unless a substitution is submitted to and approved in writing by the Owner's Representative.
- E. Mock-Up: Prior to the installation of the Soil cell system system, construct a mock-up of the complete installation at the Project site in the presence of the Owner's Representative.
 1. Size and Extent: Minimum of 100 sq. ft. (10 sq. m.) in area and including the complete Soil cell system system installation with subbase, aggregate subbase, drainage installation, Soil cell system decks, posts, and bases, base course aggregate, geotextile, geogrid, backfill, planting soil, and necessary accessories.
 2. The mock-up area may remain as part of the installed Work at the end of the Project provided that it remains undamaged and meets the requirements of the Drawings and Specifications.

1.10 FIELD CONDITIONS

- A. Existing Conditions: Do not proceed with Work when subgrades, soils, and planting soils are in a wet, muddy, or frozen condition.

1.11 WARRANTY

- A. The Contractor shall warrant the Soil cell system system to be free of faults and defects in accordance with the General Conditions, except that the warranty shall be extended by manufacturer's written warranty against defects in materials and workmanship as follows:
 1. The product manufacturer shall warrant to the original purchaser of its Soil cell system product that such product will be free from defects in materials and workmanship, and perform to manufacturer's written specifications for the warranted product, when installed and used as specifically provided in the product's installation guidelines for a period of 20

years from the date of purchase. This warranty does not cover wear from normal use, or damage caused by abuse, mishandling, alterations, improper installation and/or assembly, accident, misuse, or lack of reasonable care of the product. This warranty does not apply to events and conditions beyond DeepRoot's control, such as ground subsidence or settlement, earthquakes and other natural events, acts of third parties, and/or Acts of God. If this warranty is breached, DeepRoot® will provide a replacement product. Incurred costs, such as labor for removal of the original product, installation of replacement product, and the cost of incidental or other materials or expenses are not covered under this warranty.

2. Deeproot® makes no other warranties, express or implied, and specifically disclaims the warranty of merchantability or fitness for a particular purpose. Deeproot® shall not be liable either in tort or in contract for any direct, incidental or consequential damages, lost profits, lost revenues, loss of use, or any breach of any express or implied warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Acceptable Manufacturers:

DeepRoot Green Infrastructure, LLC
101 Montgomery Street, Suite 2850
San Francisco, CA, 94104

Phone: 415.781.9700
Toll Free: 800.458.7668
Fax: 415.781.0191
www.deeproot.com, or approved equal.

2.2 DESCRIPTION

- A. The term Soil cell system shall be used to refer to a single Soil cell.
- B. Soil cell system shall be designed for the purpose of growing healthy trees and providing stormwater management.
- C. Soil cell system shall be modular, structural systems.
- D. Each soil cell shall be structurally-independent from all adjacent Soil cell system for incorporating utilities and other site features as well as for future repairs.
- E. Soil cell system shall be capable of supporting loads up to and including AASHTO H-20 (United States) or CSA-S6 87.5 kN (Canada) when used in conjunction with approved pavement profiles.
- F. Soil cell system shall be open on all vertical faces and horizontal planes and shall have no interior walls or diaphragms.
- G. Soil cell system shall be capable of providing a large, contiguous, continuous volume of planting soil that does not inhibit or prevent the following:
 1. Placement of planting soil
 2. Walk through compaction
 3. Compaction testing of planting soil, once in place
 4. Movement and growth of roots
 5. Movement of water within the provided soil volume, including lateral capillary movement

6. Installation and maintenance of utilities placed within, adjacent to, or below the soil cell.

H. Soil cell system shall be able capable of being filled with a variety of soil types and soils that include peds 2 inches (50 mm) or larger in diameter as is appropriate for the application, location of the installation, and tree species.

2.3 SOIL CELL MATERIALS AND ACCESSORIES

A. Soil cell System Components: Each soil cell module (hereafter soil cell or "cell") is composed of one base, 6 post assemblies, and one deck.

1. 1x Soil cell System:

- a. Components: One base, six 1x posts, and one deck.
- b. Assembled Dimensions (Each Cell): 47.2 inches long by 23.6 inches wide by 16.7 inches high (1200 mm long by 600 mm wide by 424 mm high).

B. Soil cell Materials and Fabrication:

1. Bases and Posts: Homopolymer polypropylene.
2. Decks: Fiberglass reinforced, chemically-coupled, impact modified polypropylene.

C. Manufacturer's Related Soil cell Installation Accessories:

1. Strongbacks: An accessory designed to stabilize the Soil cell posts temporarily, during soil placement, and removed for reuse prior to placing decks.
2. Anchoring Spikes: 10" landscape spike for securing assembled Soil cell system to subbase.

2.4 RELATED PRODUCTS

A. Root Barrier: Recyclable, black, injection molded panels manufactured with a minimum 50 percent post-consumer recycled polypropylene plastic with UV inhibitors, and integrated zipper joining system which allows instant assembly by sliding one panel into another; for redirecting tree roots down and away from hardscapes.

1. Panel Sizes:

- a. No. UB12-2: 24 inches long by 12 inches deep by 0.080 inches thick (61 cm long by 30 cm deep by 2.03 mm thick); for use with 1x systems and for pavement profiles less than 12 inches (30 cm) deep.
- b. No. UB18-2: 24 inches long by 18 inches deep by 0.080 inches thick (61 cm long by 46 cm deep by 2.03 mm thick); for use with 2x and 3x systems, and for pavement profiles 12 inches or more in depth.

2. Products meeting this specification:

- a. DeepRoot Tree Root Barrier (DeepRoot Green Infrastructure, LLC)

B. Geogrid: Net-shaped woven polyester fabric with PVC coating, uniaxial or biaxial geogrid, inert to biological degradation, resistant to naturally occurring chemicals, alkalis, and acids; used to provide a stabilizing force within soil structure as the fill interlocks with the grid.

1. Tensile strength at ultimate (ASTM D6637):

- a. 1850 lbs/ft (27.0 kN/m) minimum

2. Creep reduced strength (ASTM D5262):

- a. 1000 lbs/ft (14.6 kN/m) minimum

3. Long term allowable design load (GRI GG-4):

- a. 950 lbs/ft (13.9 kN/m) minimum

4. Grid aperture size (MD):

- a. 0.8 inch (20 mm) minimum

5. Grid aperture size (CD):

- a. 1.28 inch (32 mm) maximum

6. Roll size: 6-foot (1.8-m) width is preferred, up to 18-foot (5.4-m).

7. Products meeting this specification:
 - a. Stratagrid SG 150; <http://www.geogrid.com>
 - b. Miragrid 2XT; <http://www.tencate.com>
 - c. Fortrac 35 Geogrid; (<http://www.hueskerinc.com>)
 - d. SF 20 Biaxial Geogrid; <http://www.synteen.com>

- B. Geotextile: composed of high tenacity polypropylene yarns which are woven into a network such that the yarns retain their relative position and is inert to biological degradation and resistant to naturally encountered chemicals, alkalis, and acids.
 1. Tensile strength at ultimate (ASTM D4595):
 - a. 4800 lbs/ft (70.0 KN/m) MD minimum
 - b. 4800 lbs/ft (70.0 KN/m) CD minimum
 2. Tensile strength at 5% strain (ASTM D4595)
 - a. 2400 lbs/ft (35.0 KN/m) MD minimum
 - b. 2700 lbs/ft (43.8 KN/m) CD minimum
 3. Flow rate (ASTM D4491):
 - a. 30 gal/min/ft² (2648 l/min/m²) minimum
 4. Apparent opening size (ASTM D4751):
 - a. 30 sieve (0.60 mm)
 5. UV Resistance (at 500 hours):
 - a. 80 percent strength retained
 6. Products meeting this specification:
 - a. Mirafi HP570; <http://www.tencate.com>
 - b. Geolon PP40; <http://www.tencate.com>
 - c. Nilex Woven 2044 (Nilex); <http://www.nilex.com>

- C. Plastic Cable Ties: A tensioning device or tool used to tie similar or different materials together with a specific degree of tension.

2.5 OTHER RELATED MATERIALS

- A. Wood Blocking: Nominal dimensioned untreated lumber used for spacing assembled Soil cell system.
- B. Aggregate Subbase (Below Soil cell Base):
 1. Aggregate meeting one of the following specifications:
 - a. Complying ASTM D1241, Type I, Gradation B; Type I mixtures shall consist of stone, gravel, or slag with natural or crushed sand and fine mineral particles passing a No. 200 sieve.

<u>Sieve</u>	<u>Percent Passing</u>
1-1/2 inches (37.5 mm)	100
1 inch (25 mm)	75 to 95
3/8 inch (9.5 mm)	40 to 75
No 4 (4.75 mm)	30 to 60
No 10 (2 mm)	20 to 45
No 40 (425 µm)	15 to 30
No 200 (75 µm)	5 to 15

- b. Local Department of Transportation (DOT) virgin aggregate that most closely meets the gradation of ASTM D1241.
- c. Ontario Provincial Standard Specification (OPSS) 1010 Granular A. Dense graded aggregates intended for use as granular base within the pavement structure, granular shouldering, and backfill.

<u>Sieve</u>	<u>Percent Passing</u>
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26.5 mm	100
19 mm	85 to 100
13.2 mm	65 to 90
9.5 mm	50 to 73
4.75 mm	35 to 55
1.18 mm	15 to 40
300 µm	5 to 22
75 µm	2 to 8

- C. Aggregate Base Course (Above Soil cell Deck):
1. Same as aggregate subbase specified above.
- D. Aggregate Base Course for Porous Pavement (Above Soil cell Deck):
1. Aggregate complying with ASTM D448, No. 57.

<u>Sieve</u>	<u>Percent Passing</u>
1-1/2 inches (37.5 mm)	100
1 inch (25 mm)	95 to 100
1/2 inch (12.5 mm)	25 to 60
No 4 (4.75 mm)	0 to 10
No 8 (2.36 mm)	0 to 5

- E. Setting Bed for Unit Pavers (Above Soil cell Deck):
1. Aggregate complying with ASTM D448, No. 8.

<u>Sieve</u>	<u>Percent Passing</u>
1/2 inch (12.5 mm)	100
3/8 inch (9.5 mm)	85 to 100
No 4 (4.75 mm)	10 to 30
No 8 (2.36 mm)	0 to 10
No 16 (1.18 mm)	0 to 5

- F. Backfill Material (Adjacent to Soil cell system): Clean, compactable, coarse grained fill soil free of organic material, trash and other debris, and free of toxic material injurious to plant growth.
- G. Planting Soil: Refer to Section 32 94 56 - Planting Soil for Soil Cells.
- H. Concrete for Concrete Collar: Refer to Section 03 30 00 – Cast In Place Concrete.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the conditions under which the Soil cell system are to be installed.
1. Carefully check and verify dimensions, quantities, and grade elevations.
 2. Carefully examine the Drawings to become familiar with the existing underground conditions before digging. Verify the location of aboveground and underground utility lines, infrastructure, other improvements, and existing trees, shrubs, and plants to remain including their root system.
 3. Notify the Contractor and the Owner's Representative in writing in the event of conflict between existing and new improvements, of discrepancies, and other conditions detrimental to proper and timely completion of the installation.
 4. Obtain written approval of changes to the Work prior to proceeding. Proceed with installation only after changes have been made and unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Take proper precautions as necessary to avoid damage to existing improvements and plantings.
- B. Prior to the start of Work, layout and stake the limits of excavation and horizontal and vertical control points sufficient to install the complete Soil cell system.
- C. Coordinate installation with other trades that may impact the completion of the Work.

3.3 TEMPORARY PROTECTION

- A. Protect open excavations and Soil cell system from access and damage both when Work is in progress and following completion, with highly visible construction tape, fencing, or other means until related construction is complete.
- B. Do not drive vehicles or operate equipment over the Soil cell system until the final surface material has been installed.

3.4 EXCAVATION

- A. General: Excavate to the depths and shapes indicated on the Drawings. Provide smooth and level excavation base free of lumps and debris.
- B. Confirm that the depth of the excavation is accurate and includes the full section of materials required to place the subbase aggregate, Soil cell, and pavement profile as indicated on the Drawings.
- C. Over-excavate beyond the perimeter of the Soil cell to allow for:
 - 1. The extension of aggregate subbase beyond the Soil cell layout as shown on the Drawings.
 - 2. Adequate space for proper compaction of backfill around the Soil cell system.
- D. If unsuitable subgrade soils are encountered, consult the Owner's geotechnical consultants for directions on how to proceed.
- E. If conflicts arise during excavation, notify the Owner's Representative in writing and make recommendations for action. Proceed with Work only when action is approved in writing.

3.5 SUBGRADE COMPACTION

- A. Compact subgrade with a minimum of 3 passes with a vibratory plate compactor; or as directed by the project geotechnical consultant.
- B. Do not exceed 10 percent slope for subgrade profile in any one direction. If the 10 percent slope is exceeded, contact manufacturer's representative for directions on how to proceed.

3.6 INSTALLATION OF GEOTEXTILE OVER SUBGRADE

- A. Install geotextile over compacted subgrade.
 - 1. Lay geotextile flat with no folds or creases.
 - 2. Install the geotextile with a minimum joint overlap of 18 inches (450 mm).

3.7 INSTALLATION OF AGGREGATE SUBBASE BELOW SOIL CELL BASES

- A. Install aggregate subbase to the depths indicated on the Drawings.
- B. Extend subbase aggregate a minimum of 6 inches (150 mm) beyond the base of the Soil cell layout.
- C. Compact aggregate subbase to a minimum of 95 percent of maximum dry density at optimum moisture content in accordance with ASTM D698, Standard Proctor Method.
- D. Do not exceed 10 percent slope on the surface of the subbase. Where proposed grades are greater than 10 percent, step the Soil cell system to maintain proper relation to the finished grade.

3.8 INSTALLATION OF SOIL CELL BASE

- A. Install the Soil cell system in strict accordance with manufacturer's instructions and as specified herein; where requirements conflict or are contradictory, follow the more stringent requirements.
- B. Layout and Elevation Control:
 - 1. Provide layout and elevation control during installation of the Soil cell system to ensure that layout and elevations are in accordance with the Drawings.
- C. Establish the location of the tree openings in accordance with the Drawings. Once the trees are located, mark the inside dimensions of the tree openings on the prepared subbase.
- D. Locate and mark other Project features located within the Soil cell layout (e.g. light pole bases, utility pipes). Apply marking to identify the extent of the Soil cell layout around these features. Follow the layout as shown on the Drawings to ensure proper spacing of the Soil cell bases. Refer to the Drawings for offsets between these features and the Soil cell system.
- E. Check each Soil cell component for damage prior to placement. Reject cracked or chipped units.
- F. Place the Soil cell bases on the compacted aggregate subbase. Start at the tree opening and place Soil cell bases around the tree openings as shown on the Drawings.
- G. Working from tree opening to tree opening, place Soil cell bases to fill in the area between tree openings.
 - 1. Maintain spacing no less than 1 inch (25 mm) and no more than 6 inches (150 mm) apart, assuming geotextile covering the decks meets the specifications in section 2.04 paragraph C.
- H. Follow the Soil cell layout plan as shown on the Drawings.
- I. Install Soil cell bases around, over, or under existing or proposed utility lines, as indicated on the Drawings.
- J. Level each Soil cell base as needed to provide full contact with subbase. Adjust subbase material, including larger pieces of aggregate, so each base sits solidly on the surface of the subbase. Soil cell bases that rock or bend over any stone or other obstruction protruding above the surface of the subbase material are not allowed. Soil cell bases which bend into dips in the subbase material are not allowed. The maximum tolerance for deviations in the plane of the subbase material under the bottom of the horizontal beams of each Soil cell base is 1/4 inch in 4 feet (6 mm in 1200 mm).
- K. Anchor Soil cell base with 2 anchoring spikes per base.
 - 1. For applications where Soil cell system are installed over waterproofed structures, use wood blocking or similar spacing system consistent with requirements of the waterproofing system to maintain required spacing.

3.9 INSTALLATION OF SOIL CELL POSTS

- A. 1x Soil cell System:
 - 1. Attach 1x posts to the installed Soil cell base. Each base will receive six 1x posts. Place the end of the post with tabs into the base. Rotate post clockwise to snap in place.

3.10 INSTALLATION OF STRONGBACKS, GEOGRID, BACKFILL AND PLANTING SOIL

- A. Install strongbacks on top of the Soil cell posts by snapping into place over installed posts prior to installing planting soil and backfill.
 - 1. Strongbacks are required only during the placement and compaction of the planting soil and backfill.
 - 2. Move strongbacks as the Work progresses across the installation.
 - 3. Remove strongbacks prior to the installation of the Soil cell decks.
- B. Install geogrid around the perimeter of the Soil cell system where the compacted backfill and planting soil interface.

1. Do not place geogrid between the edge of the Soil cell system and adjacent planting areas.
 2. Cut the geogrid to allow for a 6-inch (150-mm) overlap at the Soil cell base and a 12-inch (300-mm) overlap at the Soil cell deck.
 3. Provide a minimum 12-inch (300-mm) overlap between adjacent sheets of geogrid.
 4. Secure geogrid with cable ties below the top of the posts, along the post ridges.
- C. Place the first lift of backfill material loosely around the perimeter of the Soil cell system, between the geogrid and the sides of the excavation. Place backfill to approximately the midpoint of the Soil cell post. Do not compact.
- D. Place the first lift of planting soil in the Soil cell system to approximately the midpoint of the Soil cell post.
1. Level the planting soil throughout the system.
 2. Walk-through the placed planting soil to remove air pockets and settle the soil.
 - a. Lightly compact soils by walking through the soil following placement.
 - b. Walk through compaction shall result in 75-85 percent of maximum dry density in accordance with ASTM D698, Standard Proctor Method. Do not exceed root limiting compaction for the given soil type.
- E. Compact the first lift of backfill material, previously spread, to 95 percent of maximum dry density in accordance with ASTM D698, Standard Proctor Method or in accordance with Project Specifications for hardscape areas, whichever is greater.
- F. Add and compact additional backfill material so that the final finished elevation is at approximately the same level of the placed planting soil within the Soil cell system.
1. Maintain the geogrid between the Soil cell system and the backfill material at all times.
- G. Place the second lift of backfill material loosely around the perimeter of the Soil cell system, between the geogrid and the sides of the excavation so that the material is 2 to 3 inches below the top of the posts. Do not compact.
- H. Place the second lift of planting soil inside of the Soil cell to the bottom of the strongbacks. Walk through compact.

3.11 INSTALLATION OF SOIL CELL DECK

- A. Obtain final approval by the Owner's Representative of planting soil installation prior to installation of the Soil cell decks.
- B. Remove strongbacks, level out the planting soil, and immediately install decks over the posts below. Place deck over the top of the posts. Push decks down until the deck clips lock into the posts, snapping the deck into place.
- C. Fold the 12 inches (300 mm) of geogrid onto the top of the decks.

3.12 FINAL BACKFILL PLACEMENT AND COMPACTION

- A. Place and compact final lift of backfill material to 95 percent of maximum dry density in accordance with ASTM D698, Standard Proctor Method, such that the backfill is flush with the top of the installed deck. Do not allow compacting equipment to come in contact with the decks.

3.13 INSTALLATION OF GEOTEXTILE AND AGGREGATE BASE COURSE OVER THE DECK

- A. Ensure geotextile meets the specifications in section 2.04 paragraph C.
- B. Place geotextile over the top of the deck and extend to the edge of the excavation. Overlap joints a minimum of 18 inches (450 mm). Leave enough slack in the geotextile for the aggregate base course to push the geotextile down in the gaps in between the decks.
- C. Install the aggregate base course (including aggregate setting bed if installing unit pavers) over the geotextile immediately after completing the installation of the fabrics. Work the aggregate from one side of the layout to the other so that the fabric and aggregate conform to the Soil cell deck contours.

- D. Maintain equipment used to place aggregate base course completely outside the limits of the Soil cell excavation area to prevent damage to the installed system.
- E. For large or confined areas, where aggregate cannot easily be placed from the edges of the excavated area, obtain approval for the installation procedure and types of equipment to be used in the installation from the Soil cell manufacturer.
- F. Compact aggregate base course(s) to 95 percent of maximum dry density in accordance with ASTM D698, Standard Proctor Method. Utilize a vibration or plate compactor with a maximum weight of 800 lbs (362.87 kg).
- G. Do not drive vehicles or operate equipment over the completed aggregate base course.

3.14 INSTALLATION OF CONCRETE CURBS AT TREE OPENINGS, AGGREGATE SUBBASE AND PAVEMENT ABOVE THE SOIL CELL SYSTEM

- A. Place concrete curbs along planting areas and tree openings as shown on the Drawings to retain the aggregate base course from migrating into the planting soil.
- B. When staking concrete forms (e.g. curbs around the tree openings), prevent stakes from penetrating the Soil cell decks.
- C. Turn down edge of concrete paving to the Soil cell deck along the edges of tree openings or planting areas to retain the aggregate base course material.
- D. When paving type is a unit paver or other flexible material, provide a concrete curb under the paving at the edge of the Soil cell deck to retain the aggregate base course material at the tree opening.
- E. Place paving material over Soil cell system in accordance with the Drawings.
 - 1. The Soil cell system does not fully meet loading strength until the final paving is installed. Do not operate construction equipment on top of the Soil cell system until paving installation has been completed.
- F. Use care when placing paving or other backfill on top of Soil cell system to prevent damage to the Soil cell system or its components.

3.15 INSTALLATION OF ROOT BARRIERS

- A. Install root barrier in accordance with manufacturer's installation instructions.

3.16 INSTALLATION OF PLANTING SOIL WITHIN THE TREE PLANTING AREA

- A. Remove rubble, debris, dust and silt from the top of the planting soil within the tree opening that may have accumulated after the initial installation of the planting soil within the Soil cell system.
- B. Install additional planting soil within the tree openings, to the depths indicated on the Drawings.
 - 1. Use the same soil used within the Soil cell system for planting soil within the tree openings.
- C. Compact planting soil under the tree root ball as needed to prevent settlement of the root ball.
- D. Place trees in accordance with the Drawings.

3.17 PROTECTION

- A. Keep construction traffic away from the limits of the Soil cell system until the final pavement profile is in place. The Soil cell system does not fully meet loading strength until the final paving is installed.
 - 1. Do not operate equipment directly on top of the Soil cell system until paving installation has been completed.
 - 2. Provide fencing and other barriers to prevent vehicles from entering into the Soil cell area.

- B. When the Soil cell installation is completed and the permanent pavement is in place, limit traffic and construction related activities to only loads less than the design loads.

3.18 CLEAN UP

- A. Perform clean up during installation and upon completion of the Work. Maintain the site free of soil, sediment, trash and debris. Remove excess soil materials, debris, and equipment from the site following completion of the Work of this Section.
- B. Repair damage to adjacent materials and surfaces resulting from installation of this Work using mechanics skilled in remedial work of the construction type and trades affected.

END OF SECTION

SECTION 32 94 56 – PLANTING SOILS FOR SOIL CELLS

PART 1 - GENERAL

1.1 REFERENCE

- A. The GENERAL DOCUMENTS, as listed on the Table of Contents, and applicable parts of Division 1, GENERAL DOCUMENTS, shall be included in and made a part of this Section.
- B. Examine all Drawings and all other Sections of the Specifications for requirements which affect the work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all trades affecting or affected by the work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.2 SECTION INCLUDES

- A. Provide all labor, materials, equipment and supervision necessary to complete work specified in this Section.
- B. Scope of work includes, but is not necessarily limited to, furnishing and installing the following associated with the Soil Cell System.
 - 1. Locate, purchase, deliver and install imported planting soil and soil amendments.
 - 2. Harvest and stockpile existing site soils suitable for planting soil.
 - 3. Modify existing stockpiled site soil.

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 31 00 00 – Earthwork
 - 2. Section 32 93 00 – Lawns and Planting
 - 3. Section 32 94 51 – Soil Cells

1.4 SUBMITTALS

- A. Action Submittals: Submit these to the Owner's Representative for review and acceptance not less than 45 days prior to start of installation of materials and products specified in this Section.
 - 1. Product Data: For each type of product, submit manufacturer's product literature with technical data sufficient to demonstrate that the product meets these specifications.
 - a. For each compost product submit the manufacturer's
 - b. certification that the compost meets the requirements for US Compost Council STA/TMECC criteria for "Compost as a Landscape Backfill Mix Component" and other requirements of the Specification.
 - c. For coarse sand product submit the following analysis by a recognized laboratory:
 - 1) pH
 - 2) Manufactures Fines Modulus Index
 - 3) Particle size distribution (percent passing the following sieve sizes):
 - 3/8 inch (9.5 mm)

No 4	(4.75 mm)
No 8	(2.36 mm)
No 16	(1.18 mm)
No 30	(0.60 mm)
No 50	(0.30 mm)
No 100	(0.15 mm)
No 200	(0.075 mm)

2. Test and Evaluation Reports:
 - a. Include analysis of bulk materials including soils and aggregates, by a recognized laboratory that demonstrates that the materials meet the Specification requirements.
 - b. Submit required soil test analysis report for each sample of imported topsoil, existing site soil, and planting soil mixes from an approved soil-testing laboratory as follows:
 - 1) Do not submit planting soil mixes, for testing until all topsoil, compost, and coarse sand have been approved.
 - 2) If tests fail to meet the Specifications, obtain other sources of material, retest and resubmit until accepted by the Owner's Representative.
 - 3) All testing shall be performed following the requirements of *Methods of Soil Analysis*, The Soil Science Society of America.
 - 4) Provide a particle size analysis (percent dry weight) and USDA soil texture analysis. Soil testing of planting soil mixes shall also include USDA gradation distribution of gravel, coarse sand, medium sand, and fine sand in addition to silt and clay. Reports of partial size distribution shall use USDA size nomenclature and analysis protocols.
 - 5) Provide the following other soil properties:
 - a.) pH and buffer pH.
 - b.) Percent 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 the testing laboratory recommendations for supplemental additions to the soil for optimum growth of the plantings specified.
 - d.) Soluble salt by electrical conductivity of a 1:2 soil water sample measured in Milliohm per cm.
 - 6) All soil testing will be at the expense of the Contractor.
3. Samples:
 - a. Each sample shall be double bagged packaged in two plastic zip loc style bags. Each bag shall be clearly marked with the project name, date, contractors name and telephone number, and product name.
 - b. Samples of all existing site soil, topsoil, coarse sand and, compost and planting soil mixes shall be submitted at the same time as the particle size and physical analysis of that material.
 - c. Samples of the existing site soil that are under existing pavement to be removed may be submitted as soon as possible after the paving is removed.
 - d. Samples will be reviewed for appearance only.
 - e. Provide samples for the following products.
 - 1) One-gallon (3.79-liter) sample of each type of existing site soil prior to adding amendments.
 - 2) One-gallon (3.79-liter) sample of imported topsoil.
 - 3) One-gallon (3.79-liter) sample of compost.
 - 4) One-gallon (3.79-liter) sample of coarse sand.
 - 5) One-gallon (3.79-liter) sample of unscreened planting soil mix.
 - 6) One-gallon (3.79-liter) sample of screened planting soil mix.
4. Qualification Statements:
 - a. Soil supplier:

- 1) Submit documentation of the qualifications of the planting soil supplier and their field supervisor, sufficient to demonstrate that both meet the requirements specified in Article 1.05 QUALITY ASSURANCE.
- 2) Submit list of completed projects of similar scope and scale demonstrating capabilities and experience.

1.5 QUALITY ASSURANCE

- A. Supplier: Soil mixes shall be supplied by a firm that specializes in the production of mixes of planting soils and have at least 5 years experience in providing soil mixes soils to projects of similar size and scope to this Work.
- B. Soil Testing Laboratory Qualifications: The testing laboratory shall specialize in agricultural soil testing and be a member of the Soil Science Society of America's, North American Proficiency Testing Program (NAPT). Testing results for soil particle size shall be reported using USDA sizes for sand, silt, and clay.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Weather: Do not mix or deliver soil when frozen or muddy.
- B. Protect soil and soil stockpiles, from wind, rain and washing that can erode soil or separate fines and coarse material, and contamination by chemicals, dust and debris that may be detrimental to plants or soil drainage. Confine delivered materials to neat piles in areas coordinated with the site supervisor. Cover stockpiles with plastic sheeting or fabric at the end of each Workday.
- C. All manufactured packaged products and material shall be delivered to the site in unopened containers and stored in a dry enclosed space suitable for the material and meeting all environmental regulations.
 1. Biological and chemical additives shall be protected from extreme humidity, cold, or heat. All products shall be freshly manufactured and dated for the year in which the products are to be used. Chemical amendments shall have original labels intact and legible, stating the guaranteed chemical analysis.

PART 2 - PRODUCTS

2.1 EXISTING SITE SOIL

- A. Existing site soil: Soil at the site including the possibility of subgrade soil under existing paving that is of a texture and chemical composition that can support roots provided that compost and or fertilizer is added and the soil compaction loosened.
- B. Existing site soil shall meet the following criteria:
 1. Soil objects larger than 1/4 inch (6.24 mm) in diameter: Existing site soil shall contain less than 5 percent total volume of the combination of all objects 1 to 8 inches (25 mm – 200 mm) in their largest dimension including clumps/clods of heavy clay, sandy clay or silty clay subsoil, debris, refuse, roots, stones, sticks, brush, and or litter. The soil shall contain less than 8 percent by volume total of the above objects 1/4 inch (6.24 mm) to 1 inch (25 mm) in diameter. Remove objects larger than 8 inches (200 mm) in its longest dimension.
 2. Seedlings that germinated from seeds in the soil shall be removed within one month of germination whether during the period the soil is being stored or after installation including during the plant warranty period.
 3. The Owner's Representative shall verify that the soil in the designated areas is suitable at the beginning of planting bed preparation Work. The decisions to specify the use of existing site soils is based on assumptions made during the

- design phase about the quality of soil which may have been covered by paving at that time or where construction activity earlier in the Project may have altered this soil.
- a. Areas and depths to which existing site soil can be harvested for use in the Silva Cells is indicated on the soil plan.
4. Soil testing results and soil observation notes that describe the preconstruction soil conditions in the existing soil areas are included as an appendix to this Specification:
- C. If the Owner's Representative determines the soil to be unacceptable or the Work of this Project has damaged areas designated for use as existing site soil to the point where the soil is no longer suitable to support the plants specified, the Owner's Representative may require modification of the damaged soil up to and including removal and replacement with soil of equal quality to the soil that existed prior to construction.
1. Examples of damage include further compaction, contamination, grading, creation of hardpan or drainage problems, or lack of previously assumed O, A and or B-horizon soils.
 2. Do not begin Work on additional modifications or soil replacement until changes, if any, to the Contract price are approved.
- D. Protect existing soil from contamination, and degradation during the construction process.
- E. Excavation and storage of existing site soil:
1. Remove existing plants, roots, stumps, paving, and non-soil debris from the surface layers of the soil.
 2. Excavate the soil over the areas and depths indicated on the plan or as directed by the Owner's Representative. Utilize techniques and equipment that retains peds (clumps/clods) of soil.
 3. During the excavation process, soils in the approved areas and depths of different color and texture should be loosely mixed to create a more uniform single soil while still retaining soil peds (clumps/clods). The Owner's Representative may request that soils encountered that are not in accordance with the soil assumptions not be included in the mixing process. Such soils should be removed from the site or may be used as fill soils if approved by the Owner's Representative.
 4. Do not screen the soil unless approved in advance by the Owner's Representative. Encountered volumes of soil that do not meet the requirement for soil objects larger than 1/4 inch (6.24 mm) in diameter should be segregated during the excavation process and removed from the site. If approved, soil may be screened through a 2-inch (50 mm) square or larger opening in order to allow the soil to meet the requirements. Isolated large objects shall be removed from the soil by hand.
 5. Stockpile the soil in locations approved in advance by the General Contractor.
- F. Amending existing site soil:
1. Amendments for existing site soil should be calculated for a composite mix of all soils to be used.
 2. Add compost to existing site soil, up to 20 percent by moist volume to bring soil organic matter to a minimum of 3 percent by dry weight.
 - a. Each 10 percent moist volume of added compost is assumed to raise the percent dry weight soil organic matter by 1.5 percent.
 - b. Spread compost over the stockpile in amounts that achieve the required organic matter content. As soil is being scooped from the pile to bring to the Silva Cells, mix the compost loosely into the soil with the loader bucket. Add additional compost to the stockpile as the Work progresses to achieve even compost distribution within the mix.
 - c. Do not over mix the soil. Maintain as many large soil peds (clumps/clods) as possible in the mix.
 3. Add fertilizer of the types and quantity recommended by the soil test at the time of mixing.

- G. Submittal Requirements: Provide a one-gallon (3.79-liter) sample of each type of existing site soil prior to adding amendments with testing data that includes recommendations for compost volumes and chemical additives for the types of plants to be grown. Samples and test samples shall represent the composite mixing of the available soils. Samples and testing data shall be submitted at the same time.

2.2 IMPORTED TOPSOIL

- A. Imported topsoil: Fertile, friable soil loam topsoil suitable for the germination of seeds and the support of vegetative growth meeting the following criteria:
1. Soil texture: USDA loam, sandy clay loam or sandy loam with clay content between 15 and 35 percent; a combined clay/silt content of no more than 60 percent; and sand between 35 and 65 percent.
 2. Except where noted, imported topsoil shall NOT have been screened and shall retain soil peds (clumps/clods) larger than 2 inches (50 mm) in diameter throughout the stockpile after harvesting.
 - a. Light screening through a 2-inch (50 mm) square or larger opening will be permissible in soils with clay content of 20 percent or greater if required to break up large peds (clumps/clods) or remove coarse roots and stones.
 - b. Retained soil peds (clumps/clods) shall be the same color on the inside as is visible on the outside surface of the ped.
 3. Soil objects larger than 1/4 inch (6.24 mm) in diameter: Imported topsoil shall contain less than 5 percent total volume of the combination of all objects 1 to 8 inch (25 mm to 200 mm) in their largest dimension including clumps/clods of heavy clay, sandy clay or silty clay subsoil, debris, refuse, roots, stones, sticks, brush, and or litter. The soil shall contain less than 8 percent by volume total of the above objects 1/4 inch to 1 inch (6.24 mm to 25 mm) in diameter. Remove all objects larger than 8 inch (200 mm) in its longest dimension.
 - a. Meet the above requirement by utilizing acceptable soils sources rather than soil screening.
 4. Imported topsoil may be a harvested soil from fields or development sites or purchased from suppliers who collect and process soil. The organic content and particle size distribution shall be the result of natural soil formation. Manufactured soils where sand, composted organic material or other additives have been added to the soil to meet the requirements of imported topsoil shall not be acceptable.
 5. pH value shall be between 5.5 and 7.5.
 6. Percent Organic Matter (OM): 3 to 5 percent, by dry weight.
 7. Soluble Salt Level: Less than 2 mmho/cm.
 8. Soil nutrient chemistry suitable for growing the plants specified or after modification.
 9. Germinating seedlings from seeds in the soil shall be removed within one month of germination whether during the period the soil is being stored or after installation, including during the warranty period of the plants.
- B. Stockpiled existing topsoil at the site meeting the above criteria may be acceptable.
- C. Submittal Requirements: Provide a one-gallon (3.79-liter) sample from each imported topsoil source with required soil testing results. The sample shall be a mixture of the random samples taken around the source stockpile or field. The soil sample shall be delivered with soil peds (clumps/clods) intact that represent the size and quantity of expected peds (clumps/clods) in the final delivered soil. The sample shall represent the expected amount of objects larger than 1/4 inch (6.24 mm).

2.3 COMPOST

- A. Compost: Blended and ground leaf, wood and other plant based material, composted for a minimum of 9 months and at temperatures sufficient to break down woody fibers, seeds and leaf structures, free of toxic material at levels that are harmful to plants or humans. Compost feed stock shall be yard waste trimmings, blended with other plant and or manure feed stock designed to produce compost high in fungal material.
 - 1. Compost shall be commercially prepared compost and meet US Compost Council STA/TMECC criteria or as modified in this Section for "Compost as a Landscape Backfill Mix Component".
http://compostingcouncil.org/admin/wp-content/plugins/wp-pdfupload/pdf/191/LandscapeArch_Specs.pdf
 - 2. Submittal Requirements: Provide one-gallon (3.79-liter) sample with manufacturer's literature and material certification that the product meets the requirements.

2.4 COARSE SAND

- A. Clean, washed, natural sand, free of toxic materials.
 - 1. Coarse concrete sand, ASTM C33 Fine Aggregate, with a Fines Modulus Index of 2.8 and 3.2.
 - 2. Coarse sand, free of limestone, shale and slate particles. Manufactured Sand shall not be permitted.
 - 3. pH shall be lower than 7.4.
 - 4. Shall be Mass DOT M104.0
- B. Submittal Requirements: Provide a one-gallon (3.79-liter) sample with manufacturer's literature and material certification that the product meets the requirements.

2.5 FERTILIZER

- A. If noted by the soil test recommendations, add slow-release, organic fertilizer based on soil test and plant requirements.
- B. Fertilizers should NOT be added to Bio-retention soils.
- C. Submittal Requirements: Provide manufacturer's literature that the product meets the requirements.

2.6 BIOLOGICAL AMENDMENTS

- A. Amendments such as Mycorrhizal additives, compost tea or other products intended to change the soil biology.

2.7 UNSCREENED PLANTING SOIL MIX

- A. A mixture of imported topsoil, coarse sand, and compost to make a new soil that meets the Project goals for the indicated planting area.
 - 1. The approximate mix ratio of imported topsoil, coarse sand and compost shall be:

Mix component	Percent by moist volume
Imported topsoil unscreened	50 to 60 percent
Coarse sand	30 to 40 percent
Compost	10 percent
 - 2. Final Tested Soil Organic Matter (OM): 2.75 to 4 percent (by dry weight loss ash burn).
- B. Mix the coarse sand and compost together first and then add to the topsoil. Mix with a loader bucket to loosely incorporate the topsoil into the coarse sand/compost Mix. DO NOT OVER MIX.

Do not mix with a soil-blending machine. Do not screen the soil. Peds (clumps/clods) of Soil, and loosely mixed Compost and coarse sand will be permitted in the overall mix.

- C. At the time of soil installation, add fertilizer or biological amendments, if required, to the planting soil mix at rates recommended by the testing results for the plants to be grown.
- D. Submittal Requirements: Provide a one-gallon (3.79-liter) sample with testing data that includes recommendations for chemical additives for the types of plants to be grown. Samples and testing data shall be submitted at the same time. The sample shall be a mixture of the random samples taken around the source stockpile or field. The sample shall be delivered with soil peds (clumps/clods) intact that represent the size and quantity of expected peds (clumps/clods) in the final delivered soil mix.

2.8 SCREENED PLANTING SOIL MIX

- A. A mixture of imported topsoil, coarse sand, and compost mixed off site to make a new soil that meets the Project goals for the indicated planting area.
 - 1. A mix of imported topsoil, coarse sand and compost. The approximate Mix ratio shall be:

<u>Mix component</u>	<u>Percent by moist volume</u>
Imported topsoil screened	40 to 45 percent
Coarse Sand	40 to 50 percent
Compost	10 to 15 percent
 - 2. Final Tested Organic Matter: 3 to 4.5 percent (by dry weight loss ash burn).
 - 3. Final mix shall be thoroughly screened, mixed and blended.
- B. At the time of soil installation, add fertilizer or biological amendments, if required, to the planting soil mix at rates recommended by the testing results for the plants to be grown.
- C. Submittal Requirements: Provide a one-gallon (3.79-liter) sample with testing data that includes recommendations for chemical additives for the types of plants to be grown. Samples and testing data shall be submitted at the same time. The sample shall be a mixture of the random samples taken around the source stockpile or field.

PART 2 - EXECUTION

3.1 INSTALLATION OF PLANTING SOIL IN SILVA CELLS

- A. Refer to Section 32 94 51 – Soil Cells and Section 32 93 00 – Lawns and Planting.

END OF SECTION

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Not Used



FOOT OF THE ROCKS

ARLINGTON, MASSACHUSETTS

BID DOCUMENTS 10-04-2024

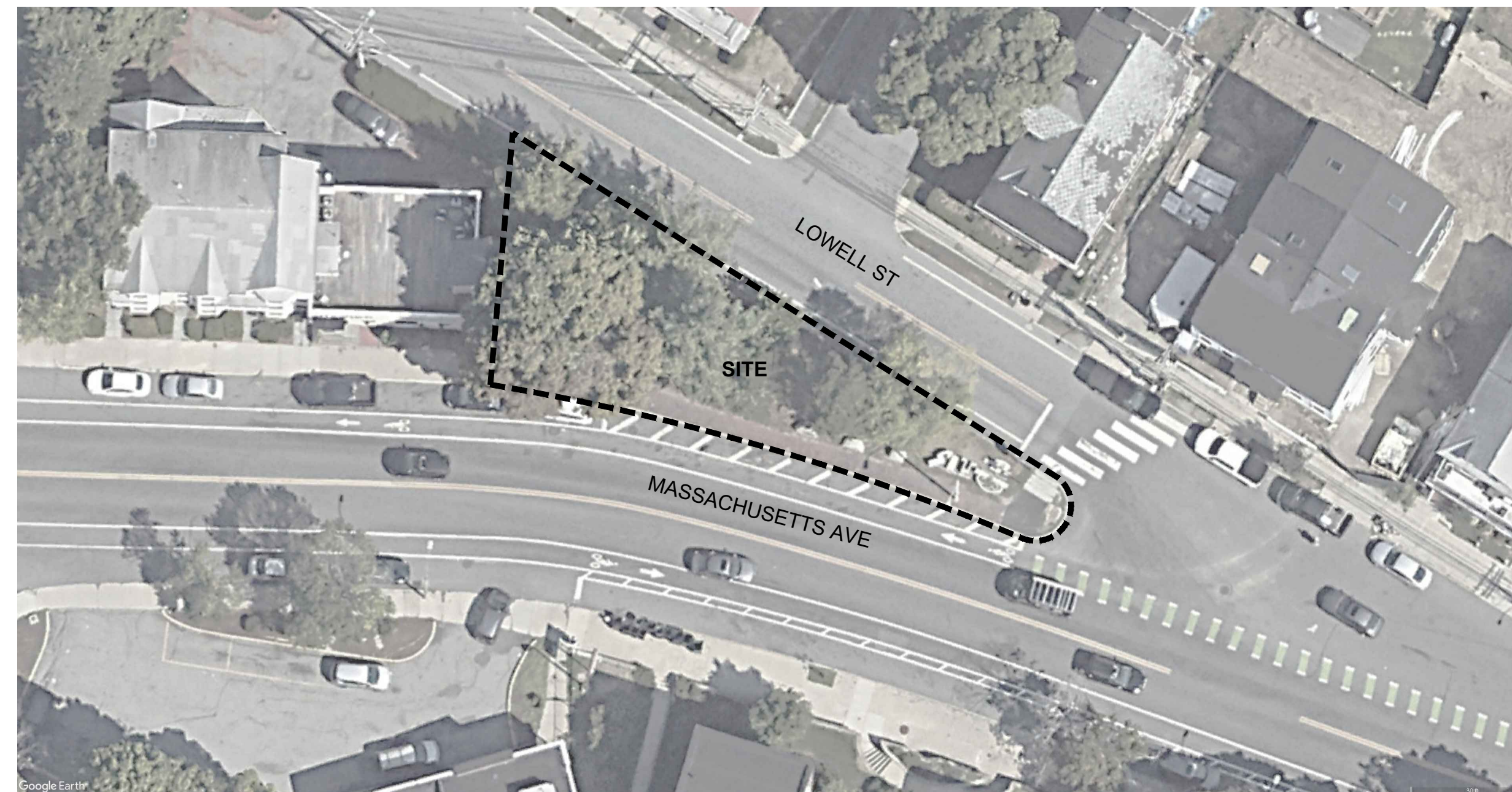
PREPARED FOR:

**TOWN MANAGER
JIM FEENEY**

PREPARED BY:

**LANDSCAPE ARCHITECT
RAY DUNETZ LANDSCAPE
ARCHITECTURE, INC.**

**179 GREEN STREET
BOSTON, MA 02130
617-524-6265 T**



LOCATION MAP

**MASSACHUSETTS AVE & LOWELL ST,
ARLINGTON, MA 02476**



DRAWING INDEX

- L-0.0 COVER SHEET**
- L-1.0 NOTES, LEGENDS AND ABBREVIATIONS**
- L-2.0 EXISTING CONDITIONS**
- L-3.0 SITE PREPARATION PLAN**
- L-4.0 LAYOUT AND MATERIALS PLANS**
- L-5.0 GRADING AND PLANTING PLANS**
- L-6.0 SITE DETAILS**
- L-6.1 SITE DETAILS**
- L-6.2 SITE DETAILS**
- L-6.3 SITE DETAILS**



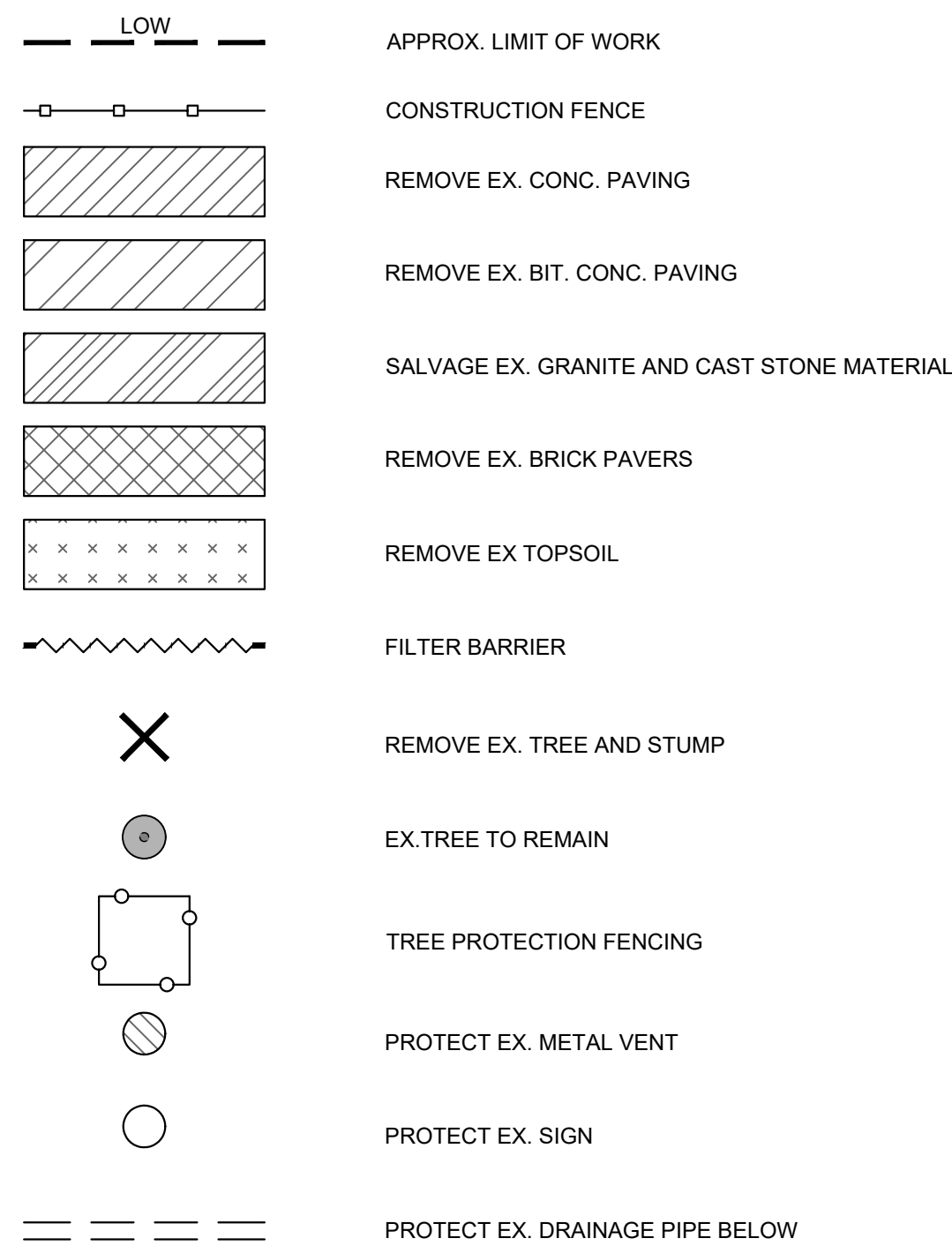
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Contract No.	Date	Scale	Drawn
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Checked			RD
Project Name:		FOOT OF THE ROCKS ARLINGTON, MA	

LIST OF ABBREVIATIONS

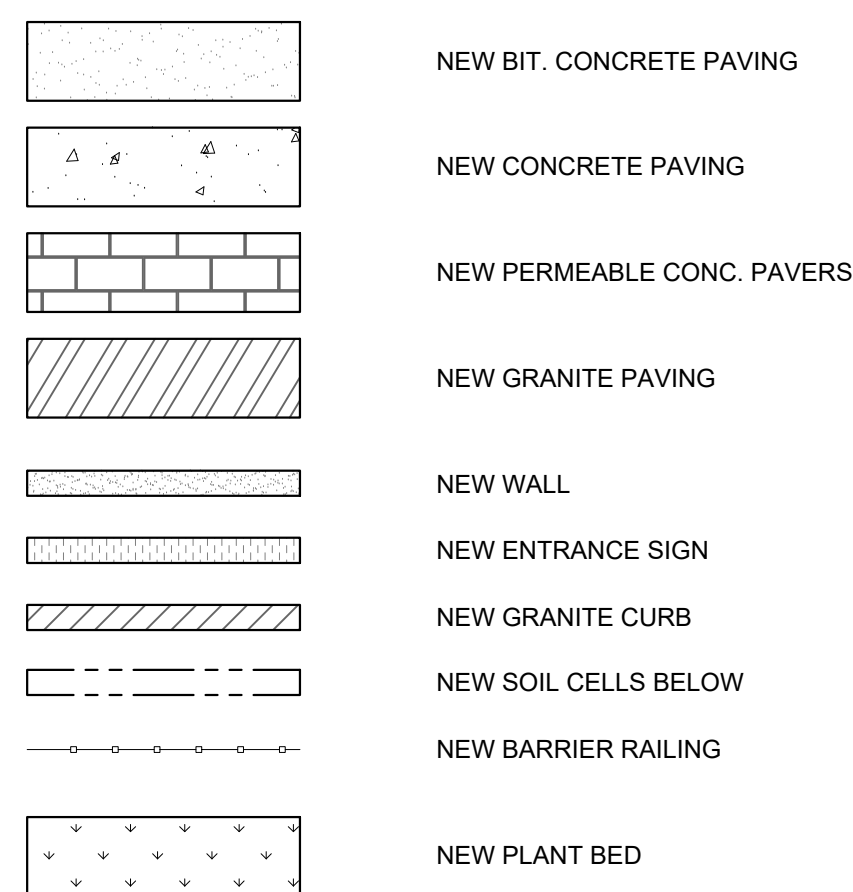
@ AT
 & AND
 Δ ANGLE
 ⌒10' ARC LENGTH
 APPROX APPROXIMATE
 B&B BALLED AND BURLAPPED
 B.C. BOTTOM OF CURB
 BLDG BUILDING
 BF BOTTOM OF FENCE
 B.O.F. BOTTOM OF FOOTING
 BW BOTTOM OF WALL
 B/S BOTH SIDES
 BS BOTTOM OF STEP
 BW BOTH WAYS
 BIT, CONC. BITUMINOUS CONCRETE
 CAL CALIPER
 C.I.P. CAST IN PLACE
 CB CATCH BASIN
 CL CENTERLINE
 CLF CHAIN LINK FENCE
 CIR CIRCLE
 CLR CLEAR
 CNTL CONTROL
 COMP COMPACTED
 CONC CONCRETE
 CONT CONTINUOUS
 CW COLD WATER
 DIA DIAMETER
 DIM DIMENSION
 DIMEN DIMENSION
 E.F. EACH FACE
 EJ EXPANSION JOINT
 EA EACH
 EL ELEVATION
 ELEC ELECTRICAL LINE
 ELEV ELEVATION
 EQ EQUAL
 EX EXISTING
 FDN FOUNDATION
 FG FINISH GRADE
 FIN. GR. FINISH GRADE
 FTG FOOTING
 FTN FOUNTAIN
 H.D. GALV. HOT DIP GALVANIZED
 HH HANDHOLE
 HP HIGH POINT
 HORIZ HORIZONTAL
 HR HANDRAIL
 HT HEIGHT
 I.D. INSIDE DIAMETER
 INV INVERT ELEVATION
 JT JOINT
 L LENGTH
 L.P. LIGHT POLE
 LOW APPROXIMATE LIMIT OF WORK
 LP LOW POINT
 MAX MAXIMUM
 MH MANHOLE
 MIN MINIMUM
 NIC NOT IN CONTRACT
 NO NUMBER
 NTS NOT TO SCALE
 O.C. ON CENTER
 O.D. OUTSIDE DIAMETER
 OWH OVERHEAD WIRES
 OPP OPPOSITE
 % PERCENT
 PC POINT OF CURVATURE
 PERF PERFORATED
 PLTG PLANTING
 P.O.B. PLACE OF BEGINNING
 PVG PAVING
 PVMT PAVEMENT
 R RADIUS
 RP RADIUS POINT
 REINF REINFORCEMENT
 REQ REQUIRED
 SC SAWCUT
 SIM SIMILAR
 SPRD SPREAD
 S.S. STAINLESS STEEL
 T TANGENT
 TC TOP OF CURB
 TH THRESHOLD
 T.O.B. TOP OF BENCH
 TF TOP OF FENCE
 T.O.F. TOP OF FOOTING
 TS TOP OF STEP
 TW TOP OF WALL
 TYP TYPICAL
 UP UTILITY POLE
 VERT VERTICAL
 V VERIFY
 W WATER LINE
 W/ WITH
 WIG WATER GATE

DRAWING LEGENDS

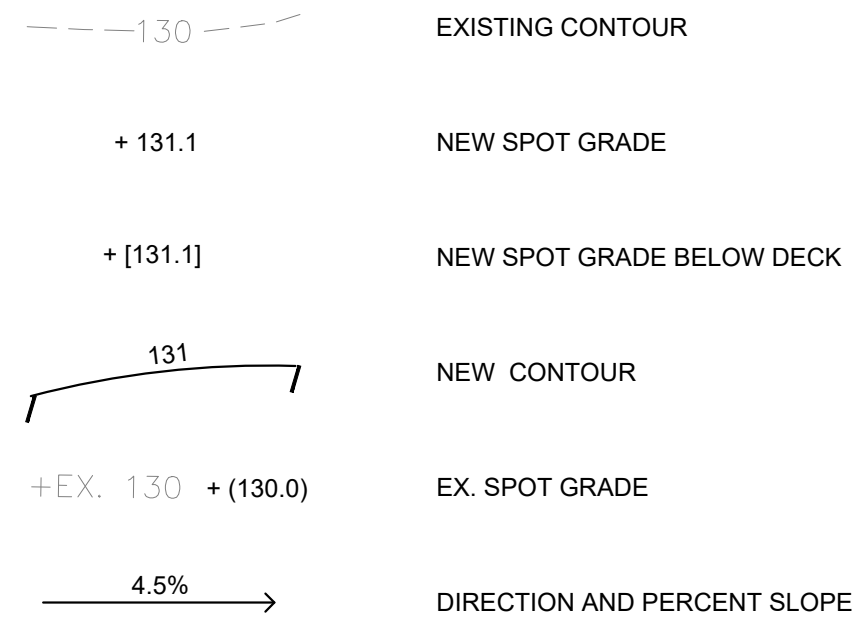
SITE PREPARATION



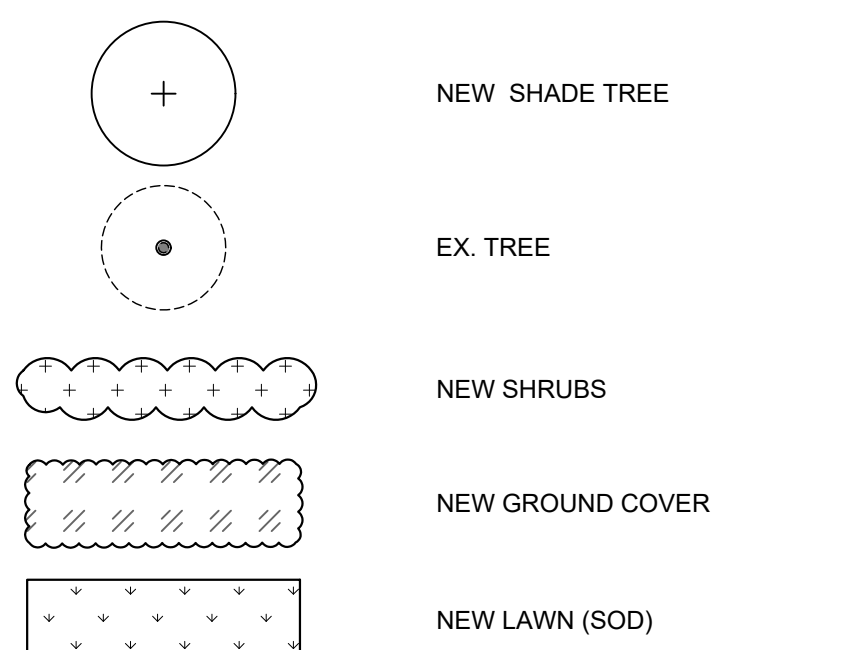
LAYOUT & MATERIALS



GRADING



PLANTING



GENERAL NOTES

- CONTRACTOR SHALL BECOME FAMILIAR WITH DRAWINGS AND SPECIFICATIONS BEFORE BIDDING.
- CONTRACTOR SHALL CONFORM TO ALL FEDERAL, STATE AND LOCAL CODES.
- CONTRACTOR SHALL SECURE ALL PERMITS THAT MAY BE REQUIRED FROM ALL JURISDICTIONS AFFECTED BY THIS WORK.
- PRIOR TO COMMENCING ANY WORK, THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES IN ACCORDANCE WITH THE "DIG SAFE" NOTIFICATION PROCEDURES PROMOTED BY RESPECTIVE UTILITY COMPANIES. THE DIG SAFE TELEPHONE NUMBER FOR MASSACHUSETTS IS 811.
- STORAGE AREAS FOR CONTRACTOR'S EQUIPMENT AND MATERIALS SHALL BE IN AND WITHIN THE MATERIALS AND STORAGE AREA AS SHOWN ON PLANS AND AS APPROVED BY THE OWNER'S REPRESENTATIVE.
- ALL POINTS OF CONSTRUCTION INGRESS AND EGRESS SHALL BE PROTECTED TO PREVENT TRACKING OF MUD ONTO PUBLIC WAYS. ANY MUD ON PUBLIC WAYS ORIGINATING FROM THE JOB SITE SHALL BE CLEANED BY THE CONTRACTOR.
- CONTRACTOR'S EQUIPMENT AND VEHICLES SHALL BE PARKED ON PAVED SURFACES ONLY.
- CONTRACTOR CAN REQUEST TO UTILIZE ADDITIONAL STAGING AREAS WITHIN THE LIMIT OF WORK. ALL STAGING AREAS, AS SHOWN ON THE PLANS OR ADDITIONAL AREAS REQUESTED BY THE CONTRACTOR, SHALL PROVIDE PROTECTION OF THE GROUND PER THE SPECIFICATIONS. NO ADDITIONAL COST SHALL BE REQUESTED FOR ADDITIONAL STAGING AREAS WITHIN THE LIMIT OF WORK.
- THE GENERAL CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS IN THE FIELD AND REPORT ANY DISCREPANCIES BETWEEN PLANS AND ACTUAL CONDITIONS TO THE OWNER'S REPRESENTATIVE PRIOR TO STARTING WORK.
- APPROXIMATE LIMIT OF WORK IS SHOWN ON THE DRAWINGS. CONTRACTOR IS RESPONSIBLE FOR ALL DAMAGE DUE TO OPERATIONS INSIDE AND OUTSIDE OF THE CONTRACT LIMIT LINE. ANY AREA OUTSIDE THE LIMIT OF WORK THAT IS DISTURBED SHALL BE RESTORED TO ITS ORIGINAL CONDITION AT NO ADDITIONAL COST TO THE OWNER.
- THE CONTRACTOR IS RESPONSIBLE FOR THE WORK SITE TO BE SECURE DURING CONSTRUCTION.

TREE PROTECTION NOTES:

- THE PURPOSE OF TREE PROTECTION IS TO PROTECT THE ROOTS OF TREES ON THIS PROPERTY AND NEIGHBORING PROPERTIES. TREE ROOTS ARE EASILY DAMAGED BY SOIL COMPACTION, PROLONGED COVERING BY SOIL, AND EXPOSURE TO WASTE MATERIALS.
- IT IS THE GENERAL CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT EACH SUBCONTRACTOR WORKING AT THE SITE UNDERSTANDS AND COMPLIES WITH THE TREE PROTECTION DRAWINGS AND SPECIFICATIONS.
- SET UP TREE PROTECTION FENCE PRIOR TO THE START OF OPERATIONS AND MAINTAIN IN GOOD CONDITION UNTIL WORK IS COMPLETE. BUILD FENCE TO WITHSTAND WEATHER, NORMAL WEAR AND TEAR AND TO PROVIDE A SUBSTANTIAL AND VISIBLE BARRIER TO INTRUSION BY PEOPLE AND VEHICLES. CHECK AND REPAIR FENCE AT THE START AND END OF EACH WORK DAY.
- LAYOUT TREE PROTECTION FENCE AS SHOWN IN THE DRAWINGS. WHERE TREE PROTECTION FOLLOWS EDGE OF PAVEMENT, INSTALL AT THE EDGE OF PAVEMENT.
- ARBORISTS AND LANDSCAPE CONTRACTORS MAY ENTER TREE PROTECTION ZONES ONLY TO PERFORM TREE WORK AND ROUTINE LANDSCAPE MAINTENANCE.
- DURING EXCAVATION, CUT ROOTS AT EDGE OF EXCAVATION USING SHARP HAND TOOLS FOR A CLEAN CUT.
- ONCE ERECTED, DO NOT MOVE TREE PROTECTION FENCING.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING TREES AND PLANTS DESIGNATED TO REMAIN FOR THE LENGTH OF THE CONSTRUCTION PERIOD. PROTECTION TO INCLUDE TRUNK, ROOTS, AND OVERHEAD BRANCHES. THE PLACEMENT OF PROTECTION DEVICES ADDITIONAL TO THOSE NOTED SHALL, HOWEVER, BE AT THE CONTRACTOR'S DISCRETION.
- NO PLANTS TO BE SAVED SHALL BE USED FOR CRANE STAYS, GUYS OR OTHER FASTENINGS. VEHICLES SHALL NOT BE PARKED WITHIN THE DRIP LINE OR WHERE DAMAGE MAY RESULT TO TREES TO BE SAVED. CONSTRUCTION MATERIALS SHALL NOT BE STORED BENEATH TREES TO BE SAVED.
- CONTRACTOR SHALL IDENTIFY ALL TREE LIMBS LOWER THAN 10' ABOVE THE GROUND SURFACE THAT MAY BE VULNERABLE TO EQUIPMENT DAMAGE. NOTIFY THE OWNER'S REPRESENTATIVE PRIOR TO STARTING WORK BENEATH ANY OF THESE LIMBS. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO TREE LIMBS THAT ARE DUE TO CONTRACTOR OPERATIONS.

SITE PREPARATION NOTES:

- ALL ITEMS REQUIRING REMOVAL SHALL BE REMOVED TO FULL DEPTH TO INCLUDE BASE MATERIAL AND FOOTINGS OR FOUNDATIONS AS APPLICABLE, AND REUSED AS DIRECTED BY THE OWNER'S REPRESENTATIVE OR LEGALLY DISPOSED OF OFF-SITE BY CONTRACTOR.
- AT ALL LOCATIONS WHERE NEW CURBING OR PAVEMENT ABUTS NEW CONSTRUCTION, THE EDGE OF THE EXISTING CURB OR PAVEMENT SHALL BE SAWCUT TO A CLEAN, SMOOTH EDGE.
- THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO EXISTING CONDITIONS THAT ARE DUE TO CONSTRUCTION OPERATIONS.
- CONTRACTOR SHALL SALVAGE ALL ITEMS SHOWN IN DRAWINGS OR REQUESTED BY OWNER'S REPRESENTATIVE.

LAYOUT AND MATERIALS NOTES:

- ALL NEW SITE IMPROVEMENTS SHALL BE LAID OUT BY A REGISTERED CIVIL ENGINEER OR SURVEYOR ENGAGED BY THE CONTRACTOR.
- ALL LINES AND DIMENSIONS ARE PARALLEL OR PERPENDICULAR TO THE LINES FROM WHICH THEY ARE MEASURED UNLESS OTHERWISE INDICATED.
- THE CONTRACTOR SHALL ESTABLISH PERMANENT CONSTRUCTION BENCHMARKS. MAINTAIN ALL ESTABLISHED BOUNDS AND BENCHMARKS AND REPLACE AS DIRECTED ANY WHICH ARE DESTROYED OR DISTURBED.

GRADING NOTES:

- CONTRACTOR SHALL VERIFY ALL EXISTING GRADES IN THE FIELD AND SHALL REPORT ANY DISCREPANCIES BETWEEN EXISTING AND PROPOSED CONDITIONS TO THE OWNER'S REPRESENTATIVE PRIOR TO CONSTRUCTION.
- PITCH EVENLY BETWEEN SPOT GRADES. ALL PAVED AREAS MUST PITCH TO DRAIN AT A MINIMUM SLOPE OF ONE-EIGHTH INCH (1/8") PER FOOT. ANY DISCREPANCIES NOT ALLOWING THIS TO OCCUR SHALL BE REPORTED TO THE OWNER'S REPRESENTATIVE PRIOR TO CONTINUING WORK.
- CONTRACTOR SHALL BLEND NEW EARTHWORK SMOOTHLY INTO EXISTING, PROVIDING VERTICAL CURVES OR ROUNDINGS AT ALL TOP AND BOTTOM OF SLOPES.
- MAXIMUM CROSS PITCH OF ALL SIDEWALKS IS 2%. ANY DISCREPANCIES NOT ALLOWING THIS TO OCCUR SHALL BE REPORTED TO THE OWNER'S REPRESENTATIVE.
- ALL GRADING SHALL COMPLY WITH THE RULES AND REGULATIONS OF THE MASSACHUSETTS ARCHITECTURAL ACCESS BOARD(AAB) AND THE AMERICANS WITH DISABILITIES ACT(ADA) STANDARDS FOR BUILDINGS AND FACILITIES, LATEST EDITIONS. IN CASE OF CONFLICT BETWEEN REGULATIONS, THE GUIDELINE PROVIDING GREATER ACCESS SHALL APPLY.
- CONTRACTOR SHALL MAINTAIN OR ADJUST TO PROPOSED FINISH GRADE AS NECESSARY. ALL UTILITY AND SITE STRUCTURES SUCH AS LIGHT POLES, SIGN POSTS, MANHOLES, CATCH BASINS, HAND HOLES, WATER AND GAS GATES, HYDRANTS, ETC., FROM MAINTAINED UTILITY AND SITE SYSTEMS UNLESS OTHERWISE NOTED ON UTILITY DRAWINGS OR AS DIRECTED BY THE OWNER'S REPRESENTATIVE.

PLANTING NOTES:

- IF DISCREPANCIES EXIST BETWEEN THE NUMBER OF PLANTS DRAWN ON THE PLANTING PLAN AND THE NUMBER OF PLANTS IN THE PLANT SCHEDULE, THE PLANTING PLAN SHALL GOVERN.
- THE CONTRACTOR SHALL SUPPLY ALL NEW PLANT MATERIAL IN QUANTITIES SUFFICIENT TO COMPLETE THE PLANTING SHOWN ON THE DRAWINGS.
- ANY PROPOSED SUBSTITUTIONS OF PLANT SPECIES SHALL BE MADE WITH PLANTS OF EQUIVALENT OVERALL FORM, HEIGHT, BRANCHING HABIT, FLOWER, LEAF, COLOR, FRUIT AND CULTURE, AS THAT WHICH IS ON THE LIST. ALL SUBSTITUTIONS SHALL REQUIRE WRITTEN APPROVAL OF THE OWNER'S REPRESENTATIVE.
- CONTRACTOR SHALL STAKE LOCATIONS OF ALL PROPOSED PLANTING FOR APPROVAL BY OWNER'S REPRESENTATIVE PRIOR TO THE COMMENCEMENT OF PLANTING.
- TREES SHALL BE SET 3" HIGHER THAN PREVIOUS GRADE. NO TREE SHALL BE PLANTED BEFORE ACCEPTANCE OF ROUGH GRADING.
- CONTRACTOR SHALL PROVIDE FULL DEPTHS OF LOAM AS NOTED ON DETAILS AND AS SPECIFIED, FOR ALL PLANTING.

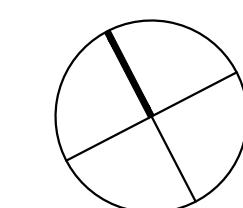


RAY DUNETZ LANDSCAPE ARCHITECTURE, INC.
 179 GREEN STREET
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 T:617-524-6265

10.04.24 BID DOCUMENTS

DATE REVISION

REVISIONS



NORTH



STAMP

FOOT OF THE ROCKS
 ARLINGTON, MA

PROJECT

NOTES, LEGENDS AND ABBREVIATIONS

DRAWING TITLE

CONTRACT NO.

DATE 10.04.24

DRAWN SD, PZ

CKD RD

SCALE AS SHOWN

L-1.0

SHEET NO.



325 Wood Road
Suite 109
Braintree, MA 02184
t: 781.380.7766
f: 781.380.7757

PREPARED FOR:

Stantec
65 Newtork Drive
2nd floor
Burlington, MA 01803

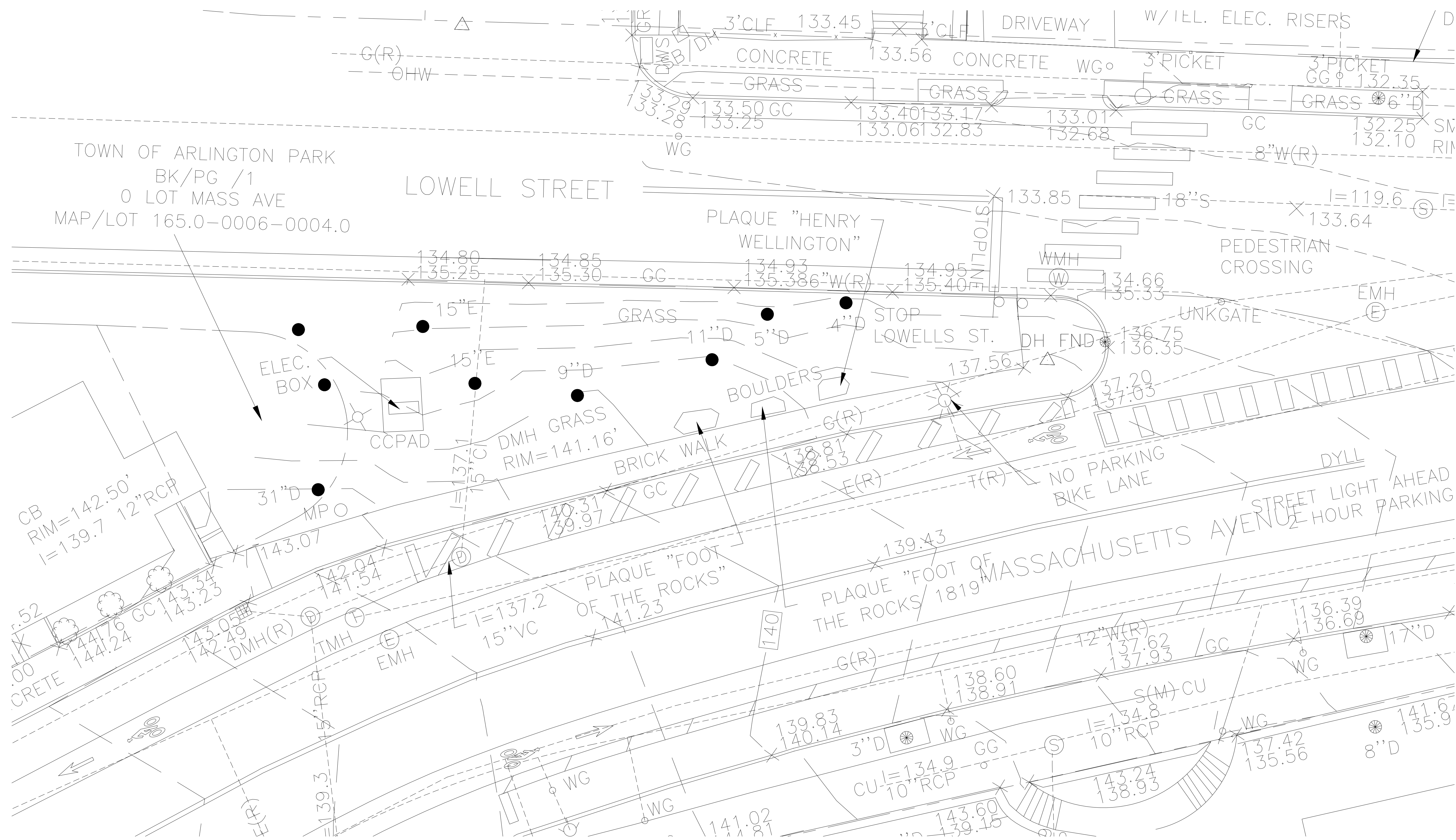
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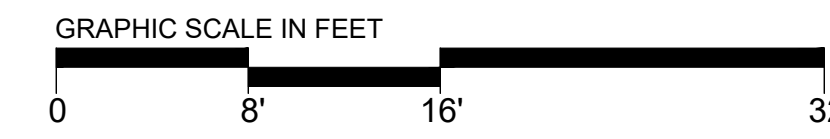
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- ELEVATIONS, IN U.S. SURVEY FEET, ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) BASED ON THE KeyNetGPS VIRTUAL REFERENCE SYSTEM (VRS) NETWORK.
- SUBSURFACE UTILITY LINES AND FEATURES, AS SHOWN HEREON, WERE COMPILED FROM OBSERVED SURFACE EVIDENCE AND/OR AVAILABLE RECORD INFORMATION (SEE REFERENCES), AND THEIR LOCATIONS ARE ONLY APPROXIMATE. ACTUAL LOCATIONS MUST BE DETERMINED IN THE FIELD.
DAWOOD ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN.
BEFORE DESIGNING FUTURE CONNECTIONS, THE APPROPRIATE UTILITIES MUST BE CONSULTED.
BEFORE CONSTRUCTION, ALL UTILITIES, PUBLIC AND PRIVATE, MUST BE NOTIFIED (SEE MASSACHUSETTS GENERAL LAWS, CHAPTER 82 SECTION 40). CALL "DIG SAFE" 1-888-DIG-SAFE. (888-344-7233).
- THIS SURVEY HAS BEEN COMPILED FROM MOBILE LIDAR POINT CLOUD DATA AND IMAGERY CAPTURED WITH SMC'S TRIMBLE MX50 MOBILE LIDAR AND SPATIAL IMAGING SYSTEM, SUPPLEMENTED WITH FIELD SURVEY TO LOCATE UTILITIES AND FEATURES NOT CAPTURED IN LIDAR POINT CLOUD DATA IN JULY 2022.
- ABUTTING PROPERTY LINES ARE SHOWN APPROXIMATELY HEREON FROM TOWN ASSESSORS' GIS INFORMATION.

LEGEND:

- | | | | |
|-----------|-------------------------------------|---------|------------------------------|
| ---x--- | GAS UNDERGROUND | ---x--- | TELEPHONE COMMUNICATION |
| ---x--- | CHAIN LINK FENCE | ⊕ | CATCHBASIN |
| ---x--- | CURB WITH TOP AND BOTTOM ELEVATIONS | ⊕ | DRAIN MANHOLE |
| --- | DRAINAGE | ⊕ | FOUND MONUMENT (TYPE) |
| --- | ELETRIC | ⊕ | GUARD POST |
| x 101.00 | SPOT ELEVATION | ⊕ | HANDICAPPED PARKING |
| ---100--- | MAJOR CONTOUR | ⊕ | HYDRANT |
| ---101--- | MINOR CONTOUR | ⊕ | LIGHTPOLE |
| ---- | OVERHEAD STRUCTURE | ⊕ | LIGHTPOLE WITH CONCRETE BASE |
| --- | RETAINING WALL | ⊕ | SEWER MANHOLE |
| --- | ROW FROM GIS | ⊕ | SIGN |
| --- | TREELINE | ⊕ | TRAFFIC SIGNAL |
| ● | DECIDUOUS TREE | ⊕ | TRAVERSE POINT |
| ● | EVERGREEN TREE | ⊕ | UTILITY POLE |
| ⊕ | BUSH | ⊕ | WATER GATE |
| | | ⊕ | METAL POST |



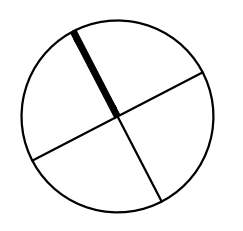
1 EXISTING CONDITIONS PLAN
SCALE: 1/8"=1'-0"



rdla RAY DUNETZ LANDSCAPE ARCHITECTURE, INC.
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FOOT OF THE ROCKS
ARLINGTON, MA

PROJECT

EXISTING CONDITIONS

DRAWING TITLE
CONTRACT NO.

DATE 10.04.24

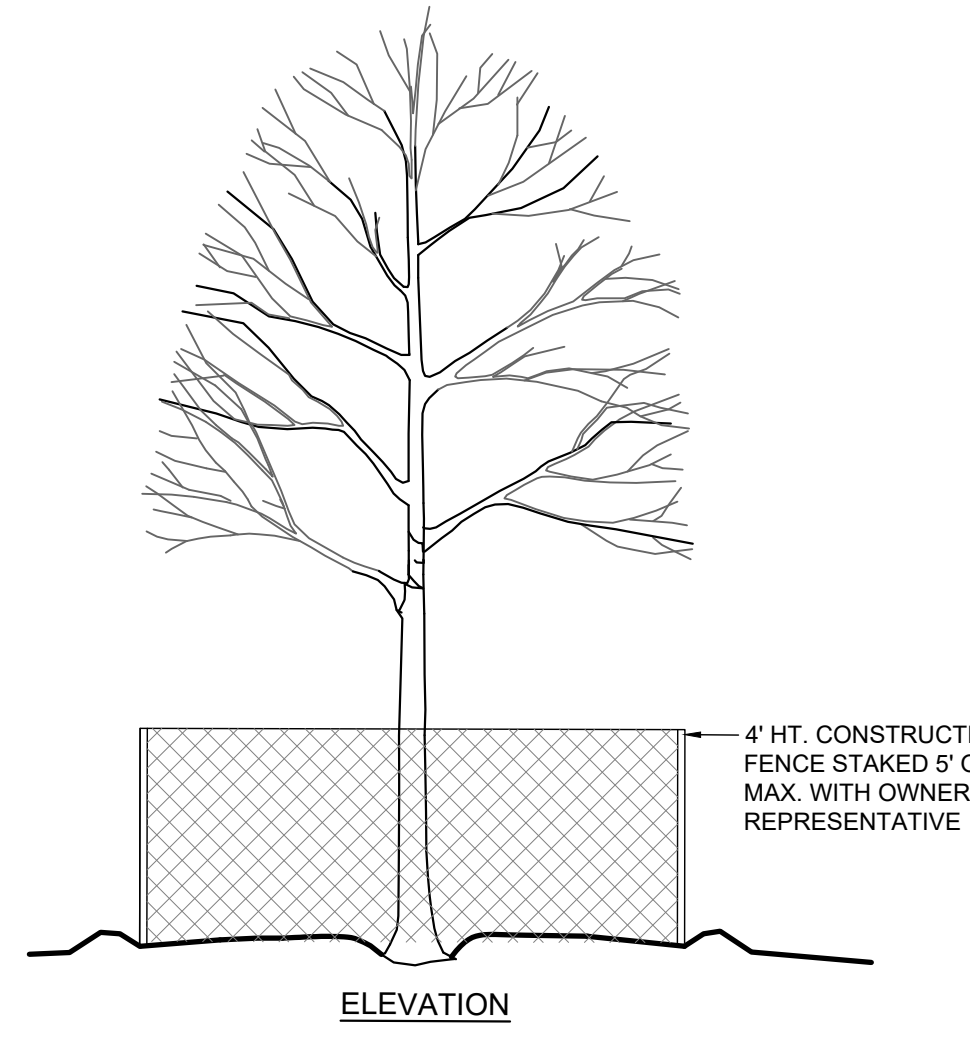
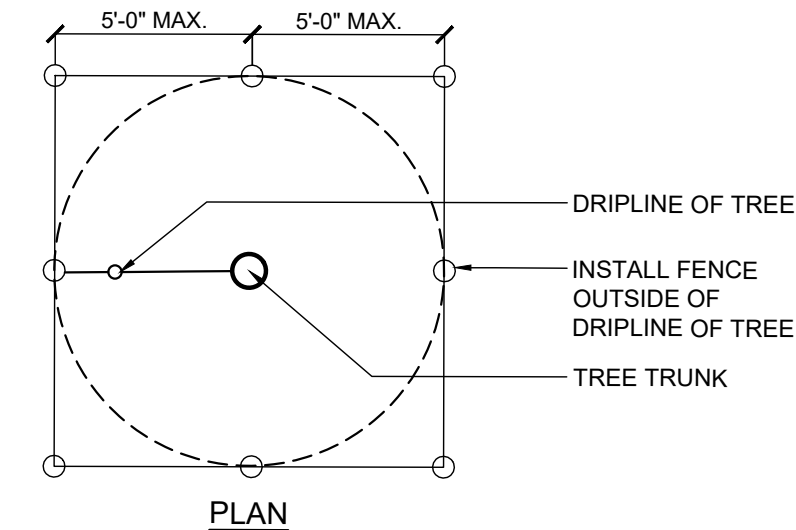
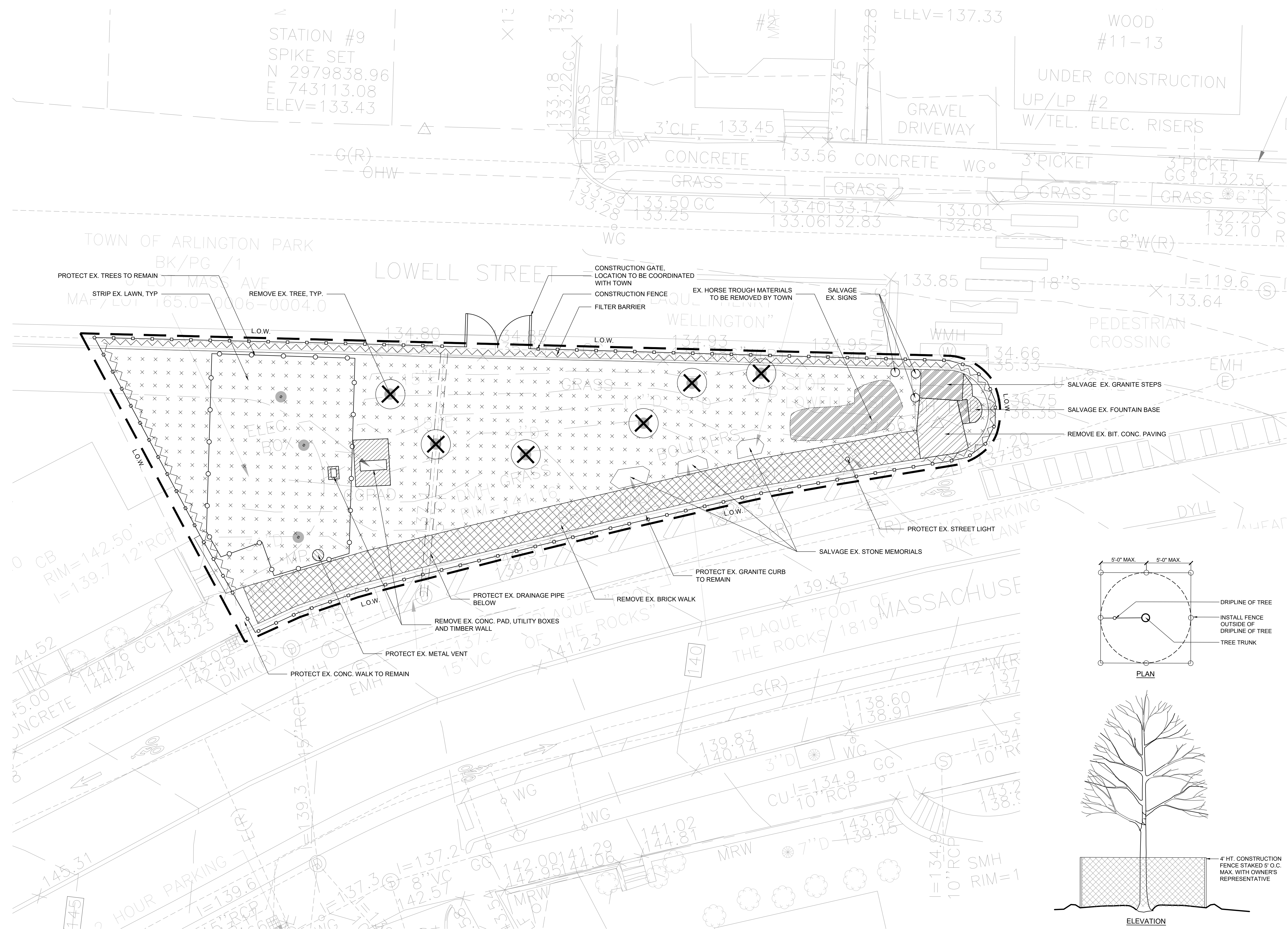
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CKD RD

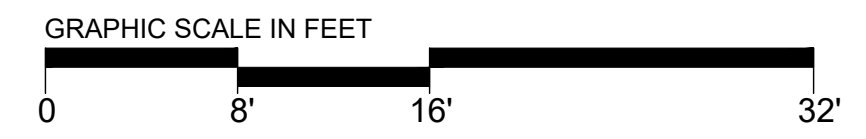
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L-2.0

NOTES:
1. SEE L-0.1 FOR NOTES, LEGENDS AND ABBREVIATIONS.



2 SITE PREPARATION PLAN
SCALE: 1/8"=1'-0"



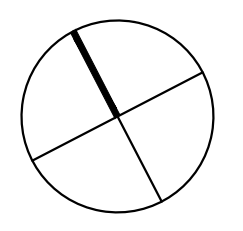
2 TREE PROTECTION FENCE
SCALE: NTS



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10.04.24 BID DOCUMENTS
DATE REVISION

REVISIONS



NORTH



STAMP

FOOT OF THE ROCKS
ARLINGTON, MA

PROJECT

SITE PREPARATION PLAN

DRAWING TITLE
CONTRACT NO.

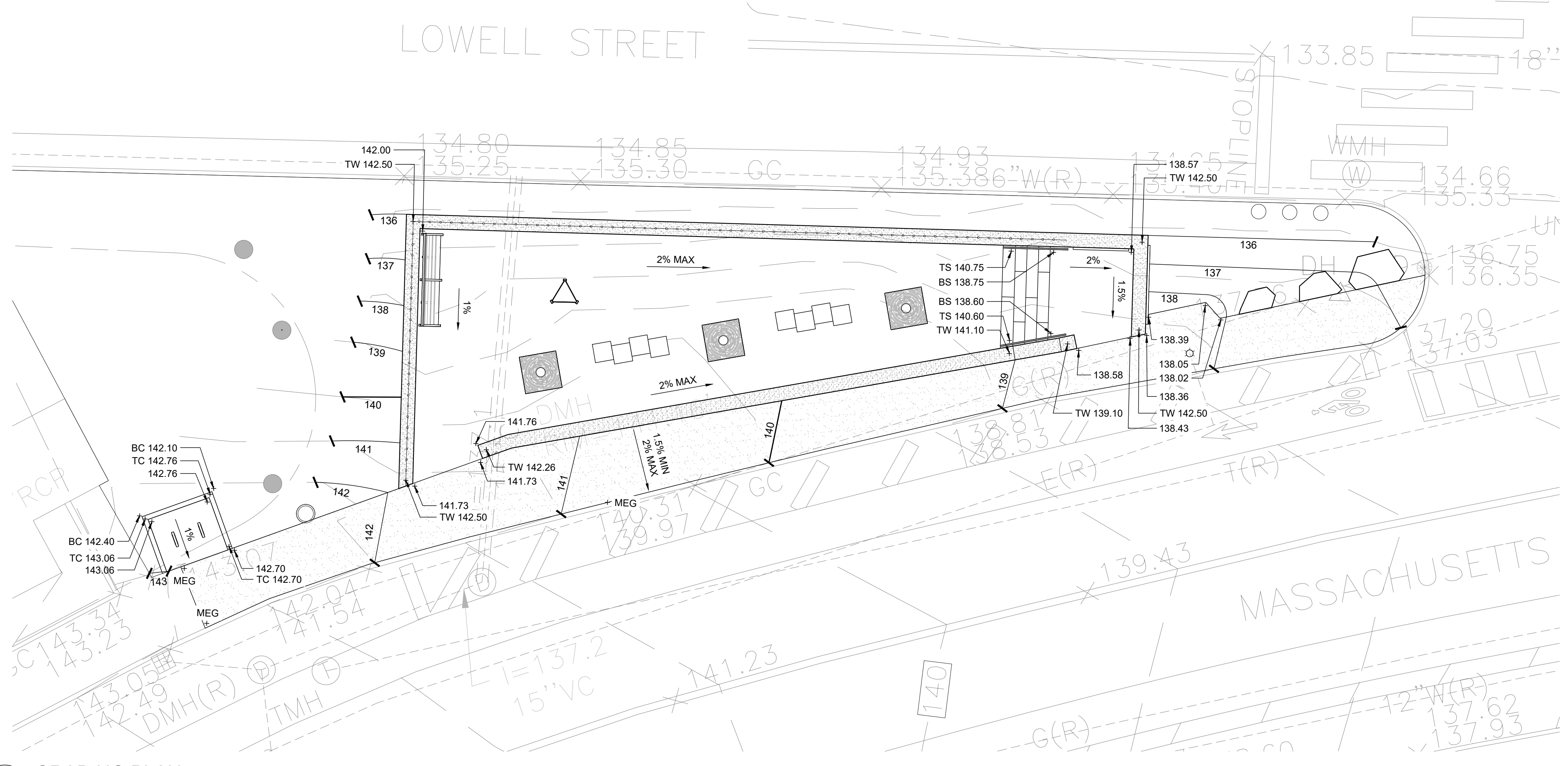
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DRAWN SD, PZ

CKD RD

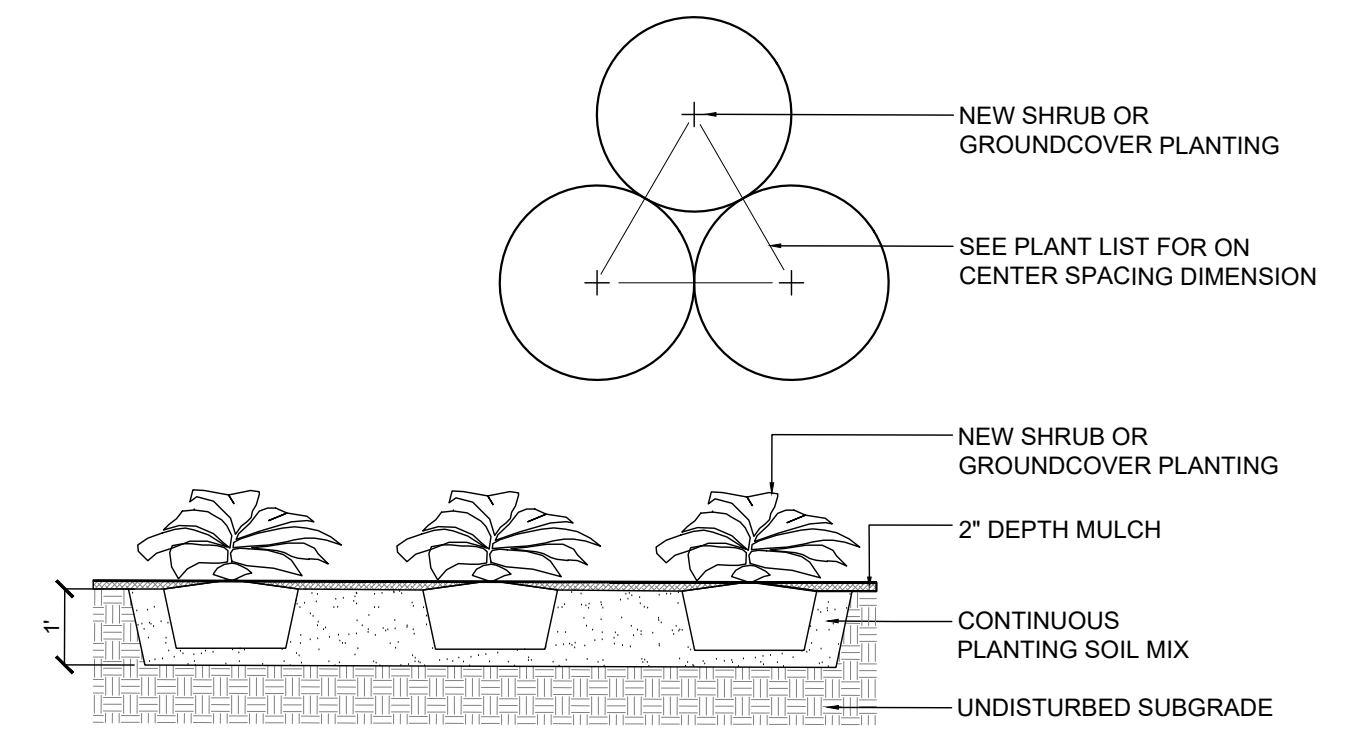
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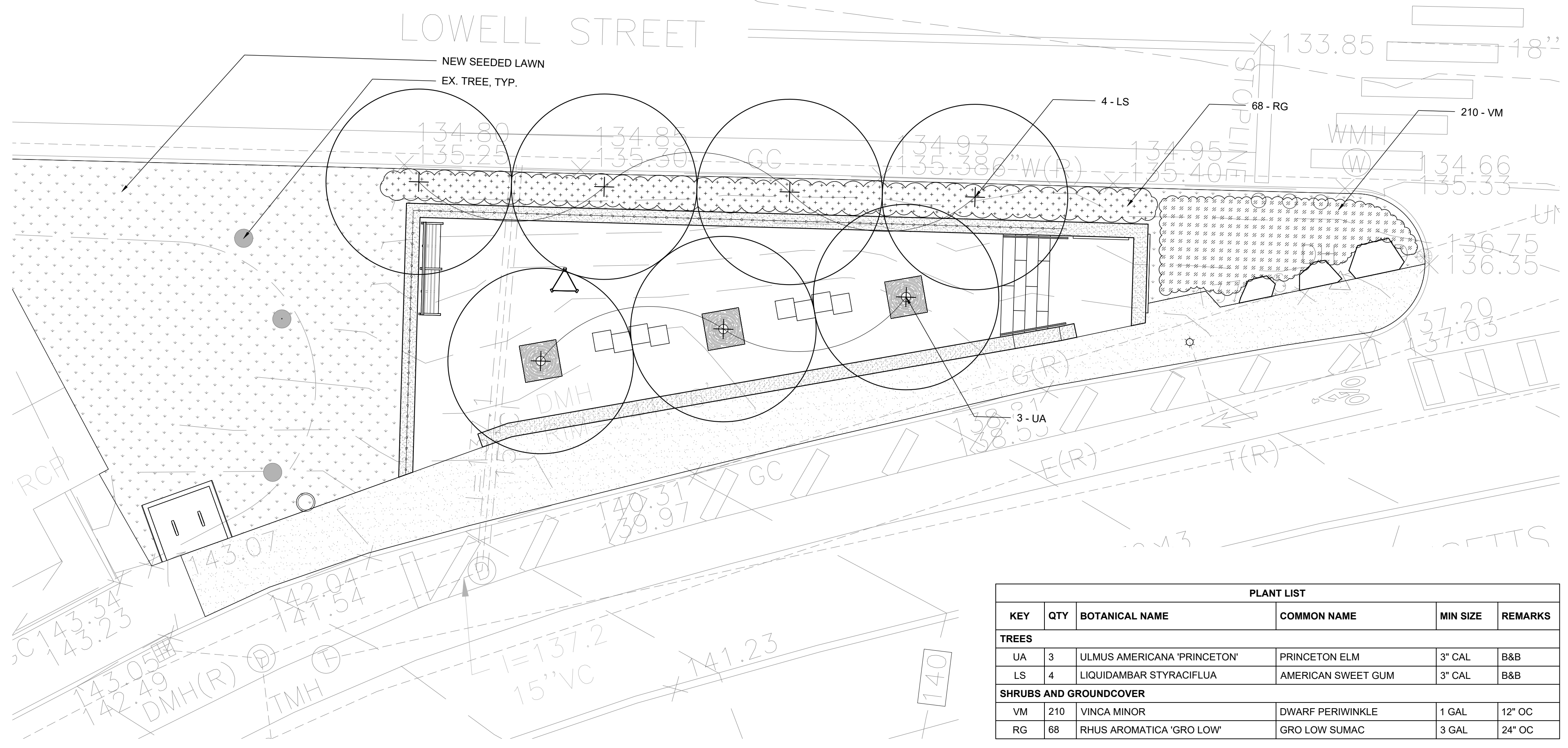


1 GRADING PLAN
SCALE: 1/8"=1'-0"

- NOTES:
- SEE L-0.1 FOR NOTES, LEGENDS AND ABBREVIATIONS.
 - SEE DETAIL #3 & #4 ON SHEET L-5.0 FOR PLAZA TREE PLANTING DETAIL.

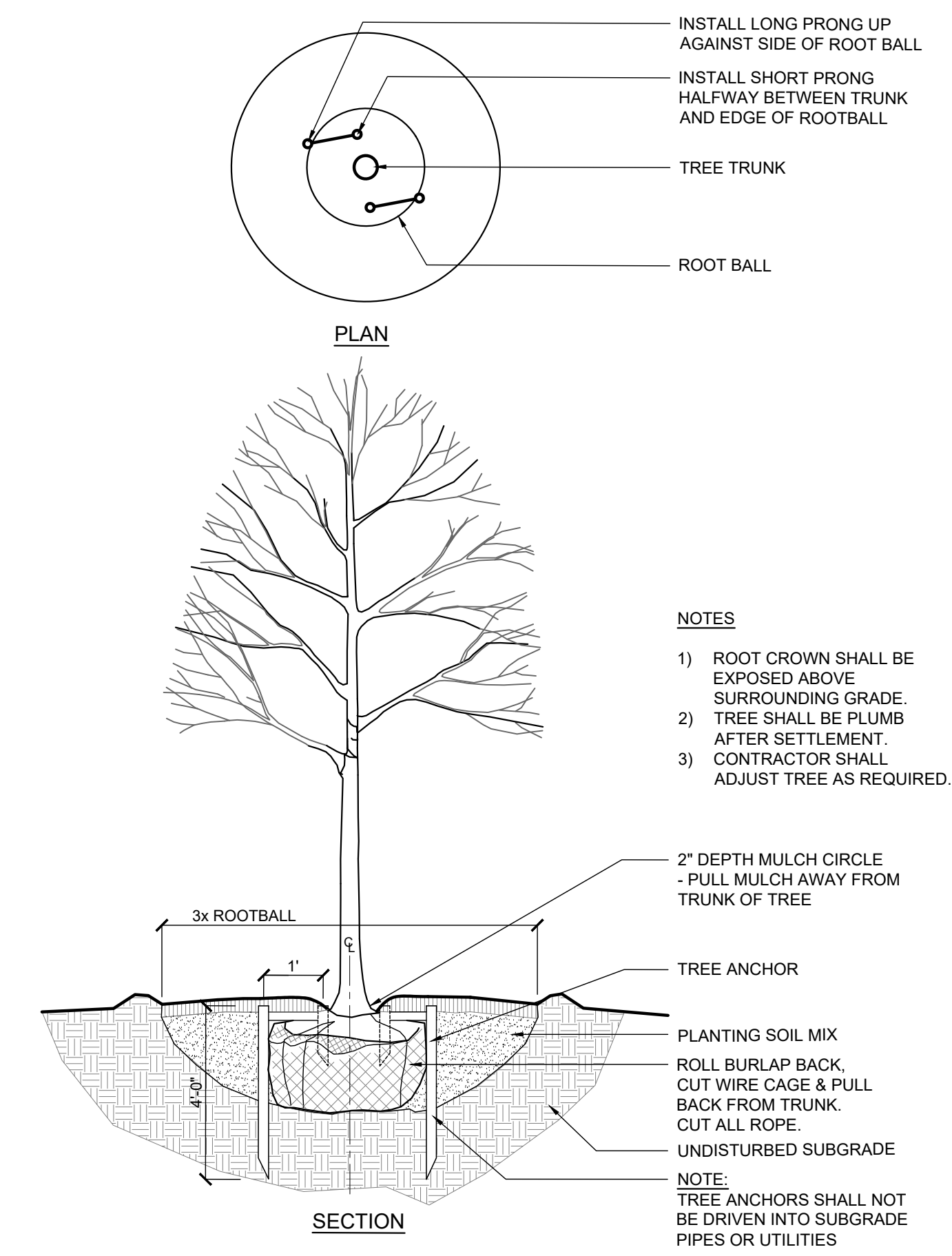
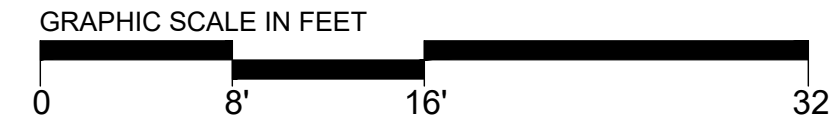


3 SHRUB AND GROUND COVER PLANTING
SCALE: NTS



2 PLANTING PLAN
SCALE: 1/8"=1'-0"

PLANT LIST					
KEY	QTY	BOTANICAL NAME	COMMON NAME	MIN SIZE	REMARKS
TREES					
UA	3	ULMUS AMERICANA 'PRINCETON'	PRINCETON ELM	3" CAL	B&B
LS	4	LIQUIDAMBAR STYRACIFLUA	AMERICAN SWEET GUM	3" CAL	B&B
SHRUBS AND GROUND COVER					
VM	210	VINCA MINOR	DWARF PERIWINKLE	1 GAL	12" OC
RG	68	RHUS AROMATICA 'GRO LOW'	GRO LOW SUMAC	3 GAL	24" OC



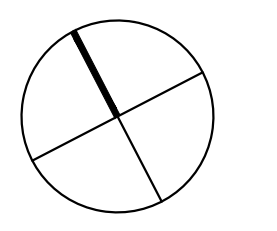
4 TREE PLANTING IN PLANT BED
SCALE: NTS



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FOOT OF THE ROCKS
ARLINGTON, MA

PROJECT

GRADING & PLANTING PLANS

DRAWING TITLE
CONTRACT NO.

DATE 10.04.24

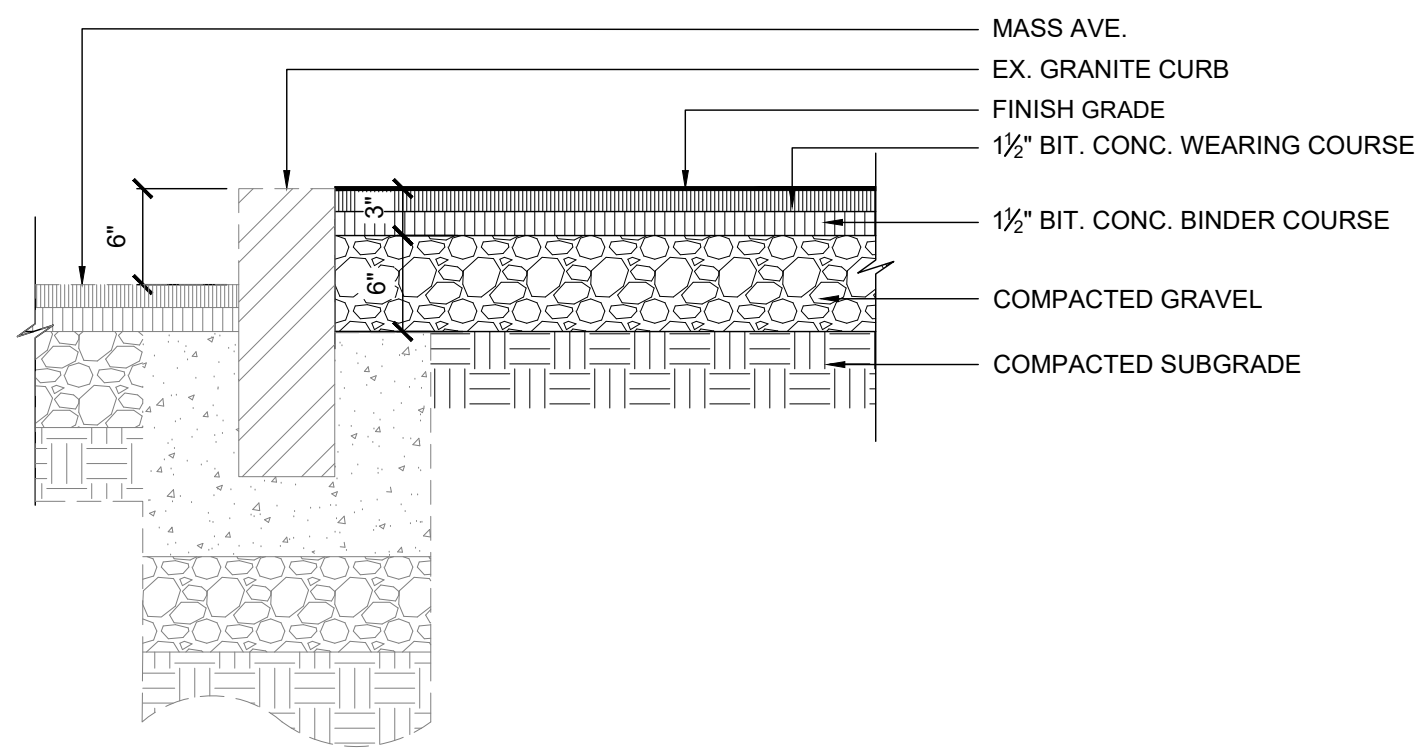
DRAWN SD, PZ

CKD RD

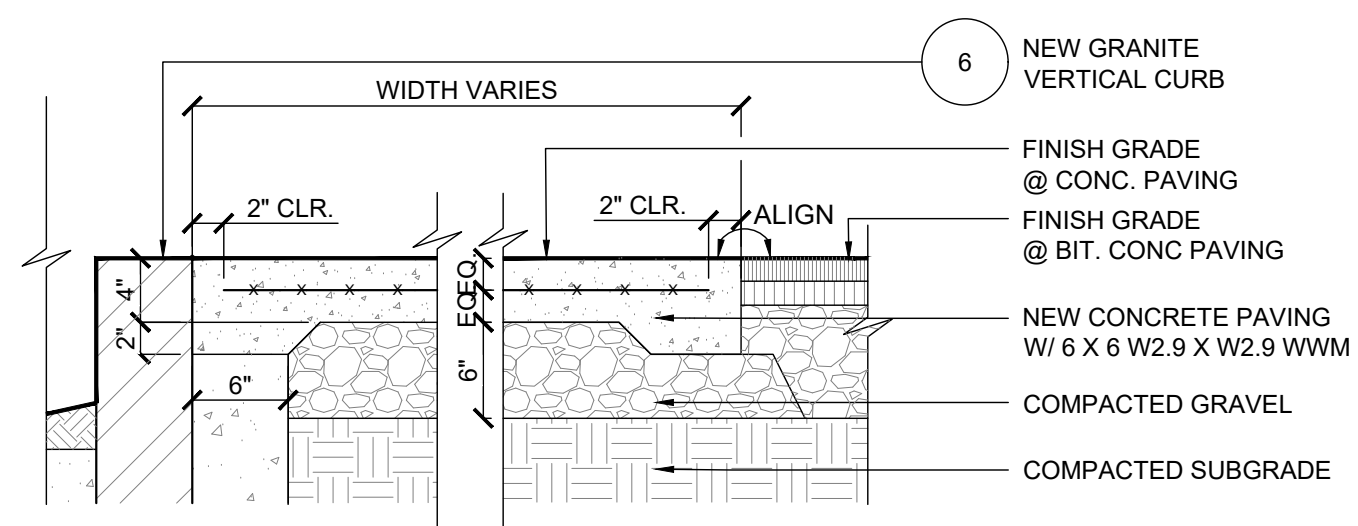
SCALE AS SHOWN

L-5.0

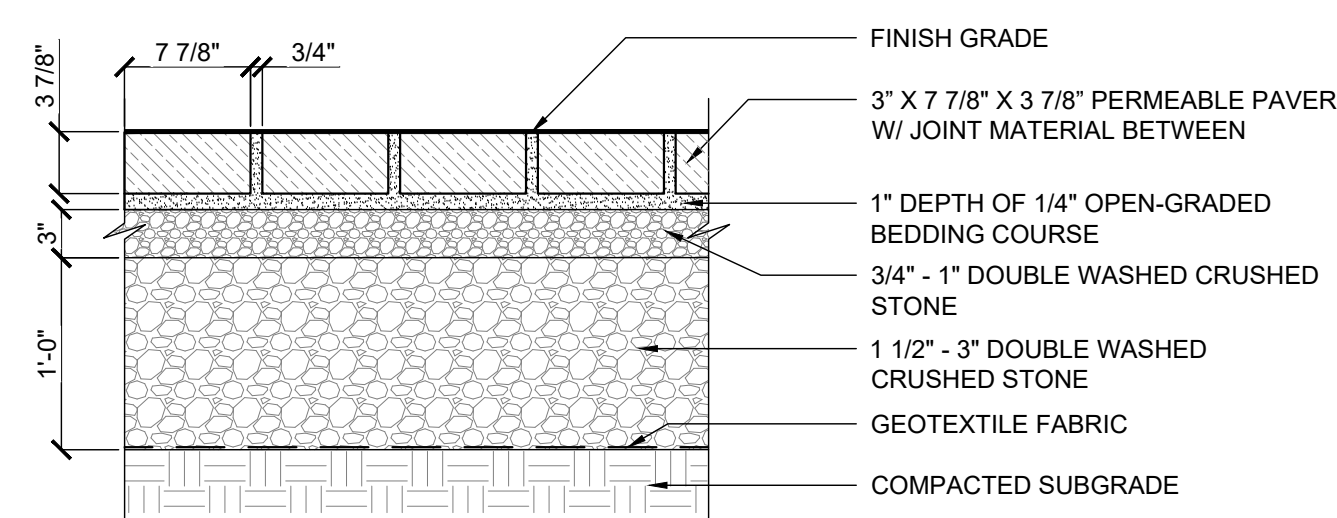
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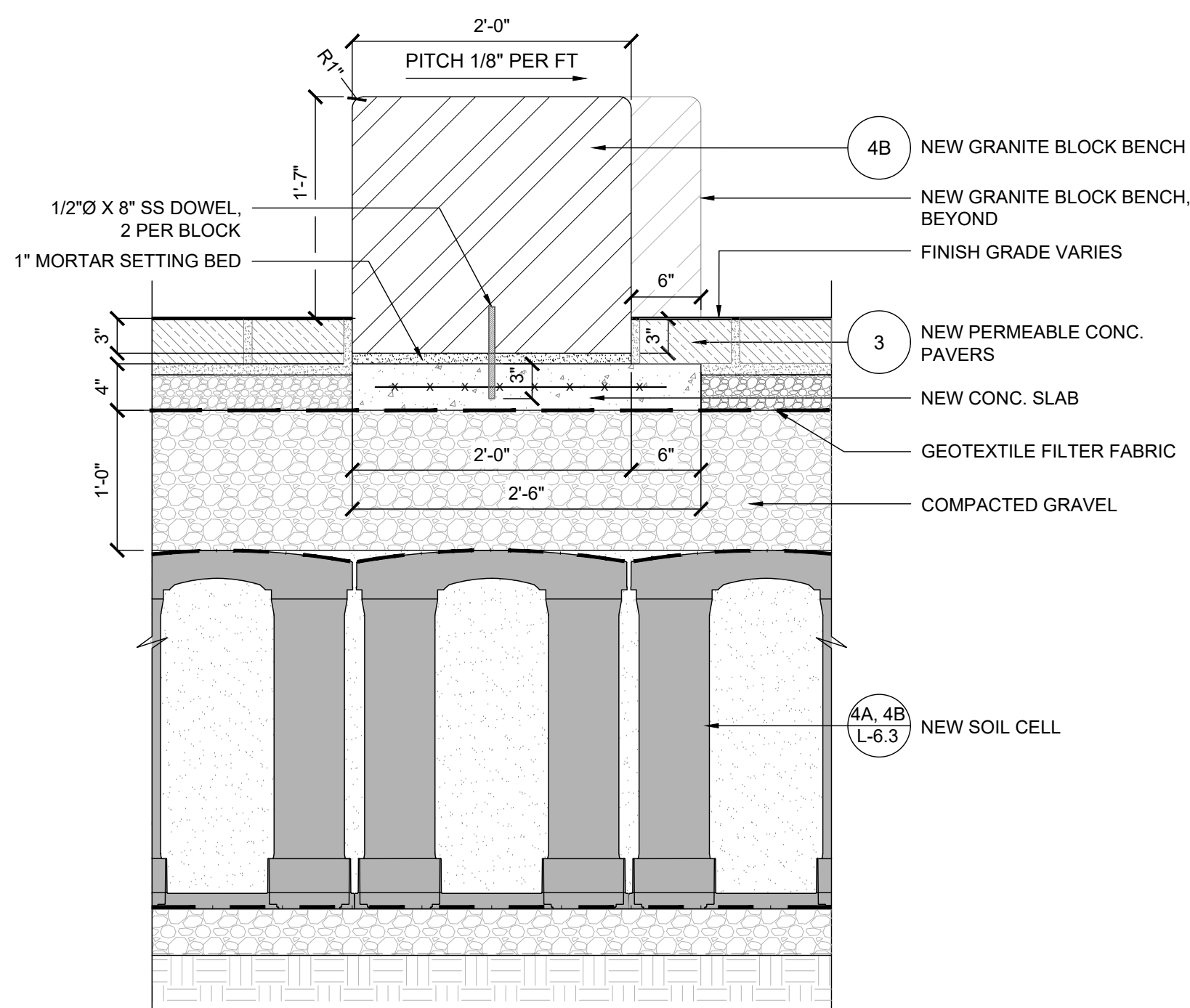
1 BITUMINOUS CONCRETE WALK PAVING - SECTION
SCALE: 1"=1'-0"



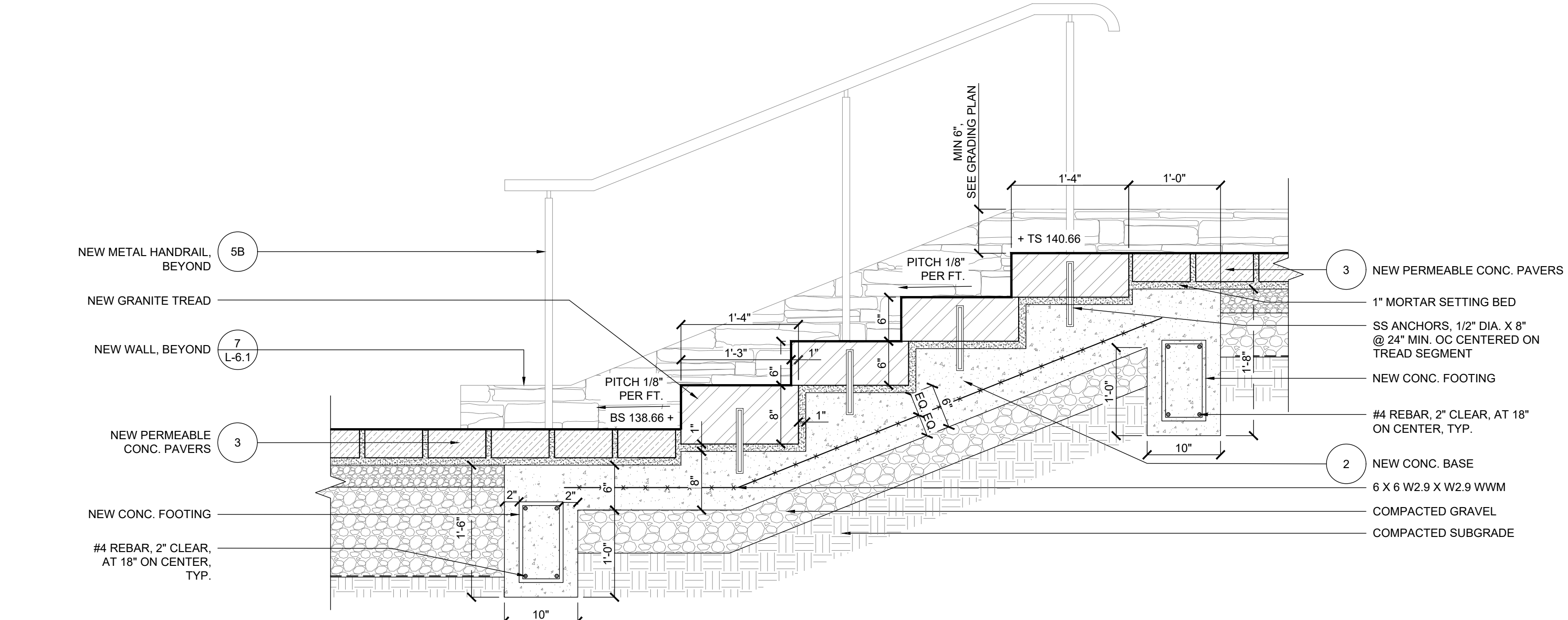
2 CONCRETE PAVING - SECTION
SCALE: 1"=1'-0"



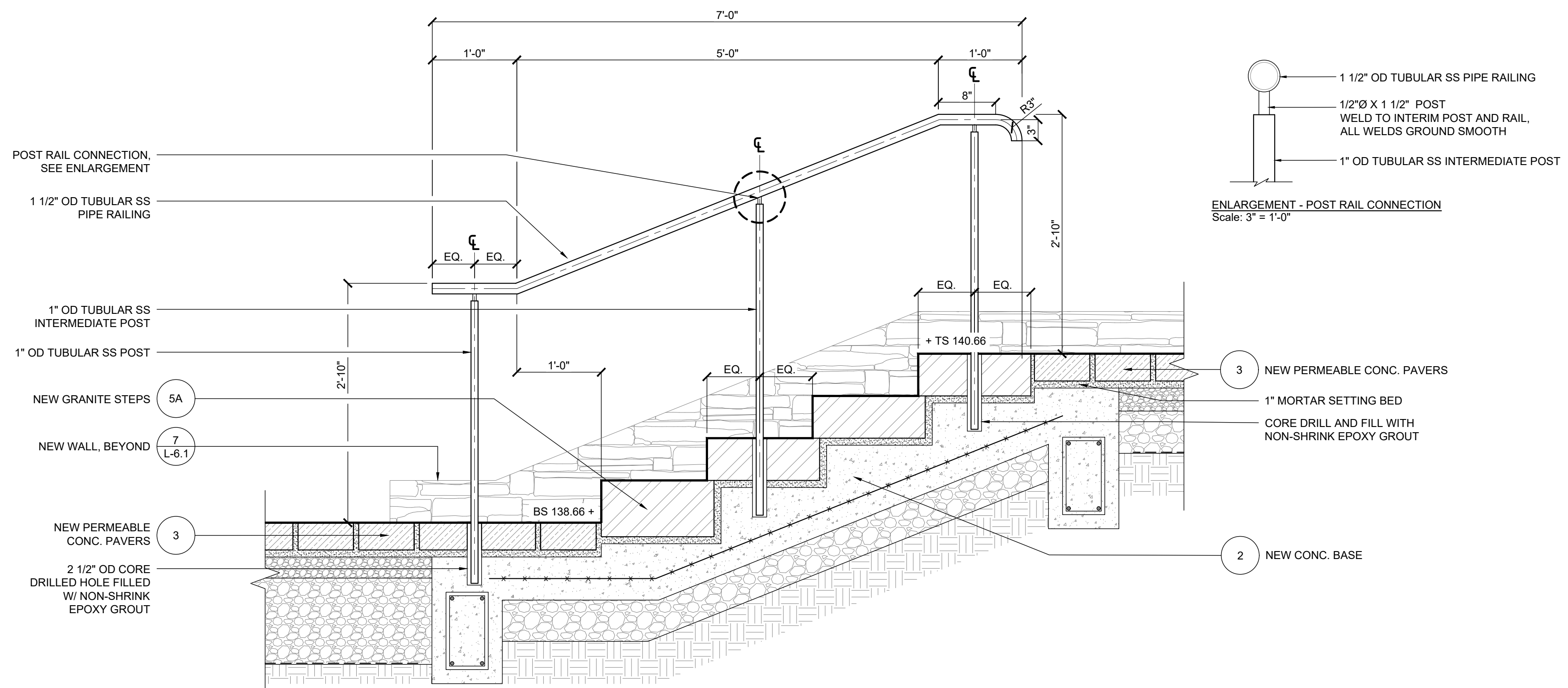
3 PERMEABLE CONC. PAVERS - SECTION
SCALE: 1"=1'-0"



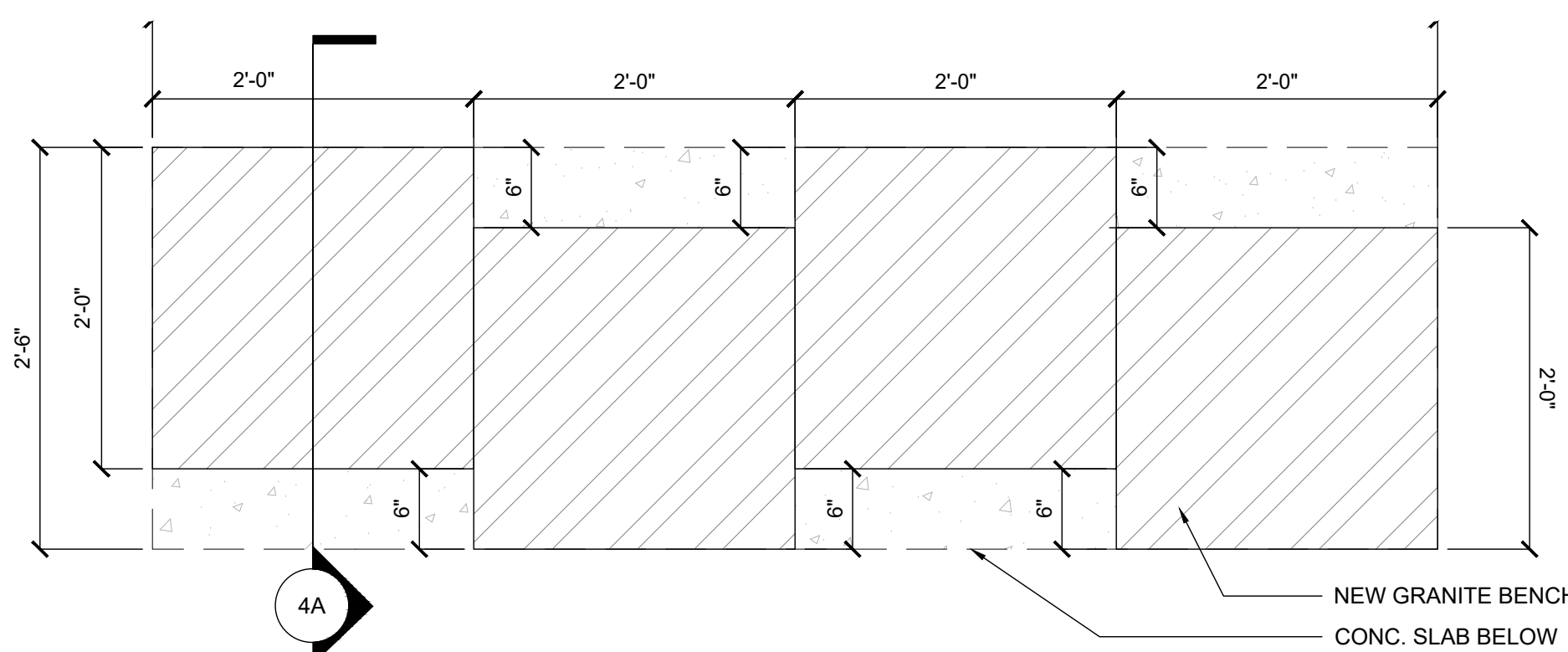
4A GRANITE BLOCK BENCH - SECTION
SCALE: 1"=1'-0"



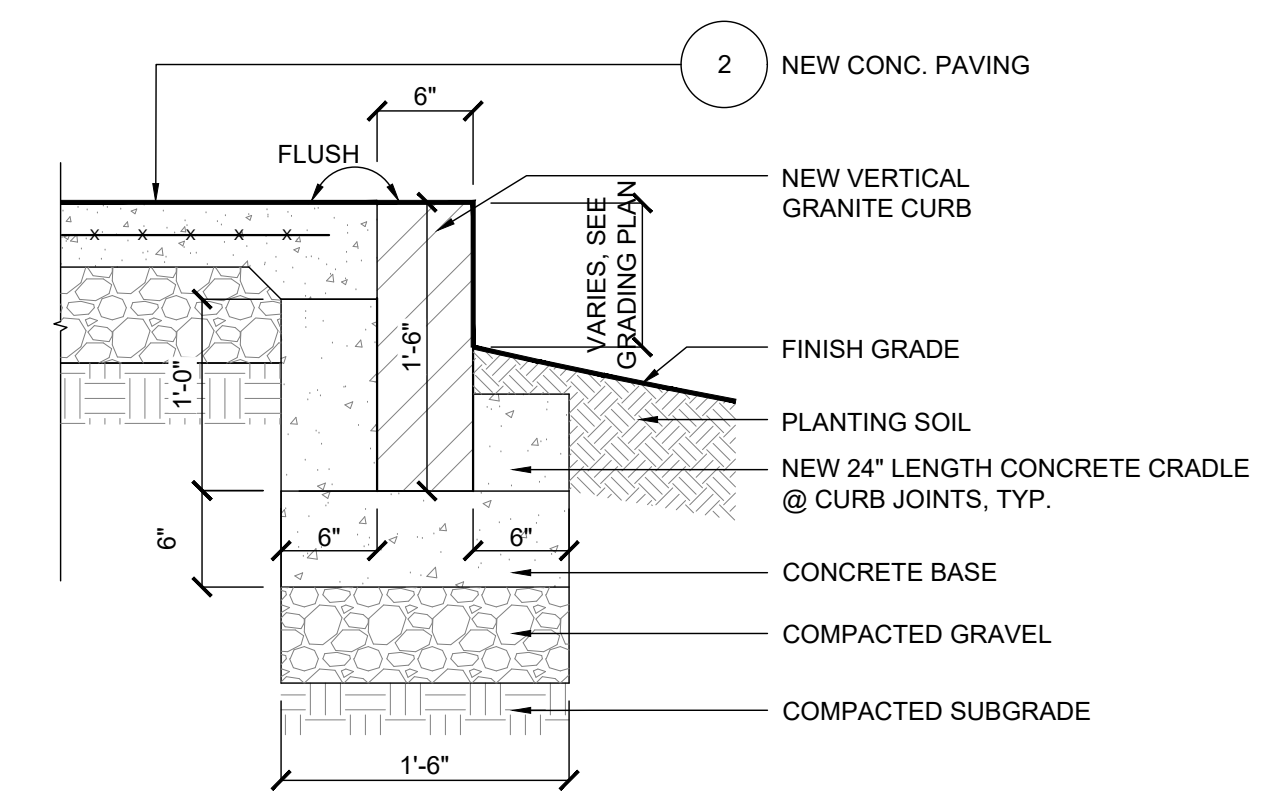
5A GRANITE STEPS - SECTION
SCALE: 1"=1'-0"



5B METAL HANDRAILS @ GRANITE STEPS - SECTION
SCALE: 1"=1'-0"



4B GRANITE BLOCK BENCH - PLAN
SCALE: 1"=1'-0"



6 VERTICAL GRANITE CURB - SECTION
SCALE: 1"=1'-0"



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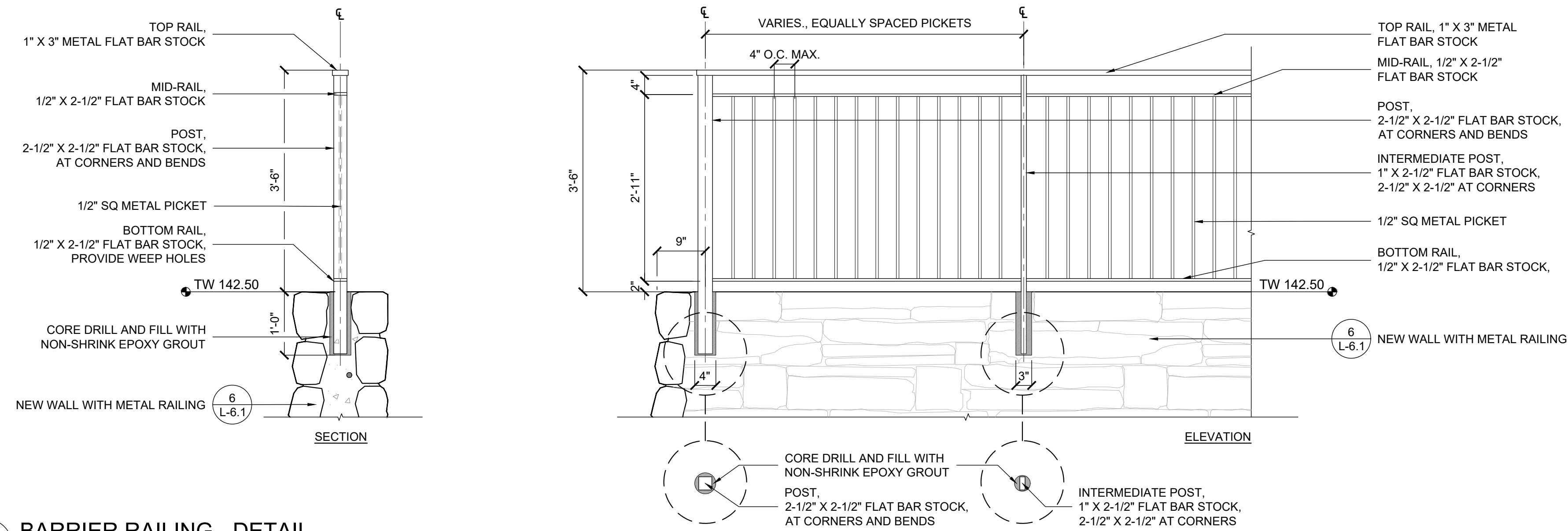
DATE 10.04.24

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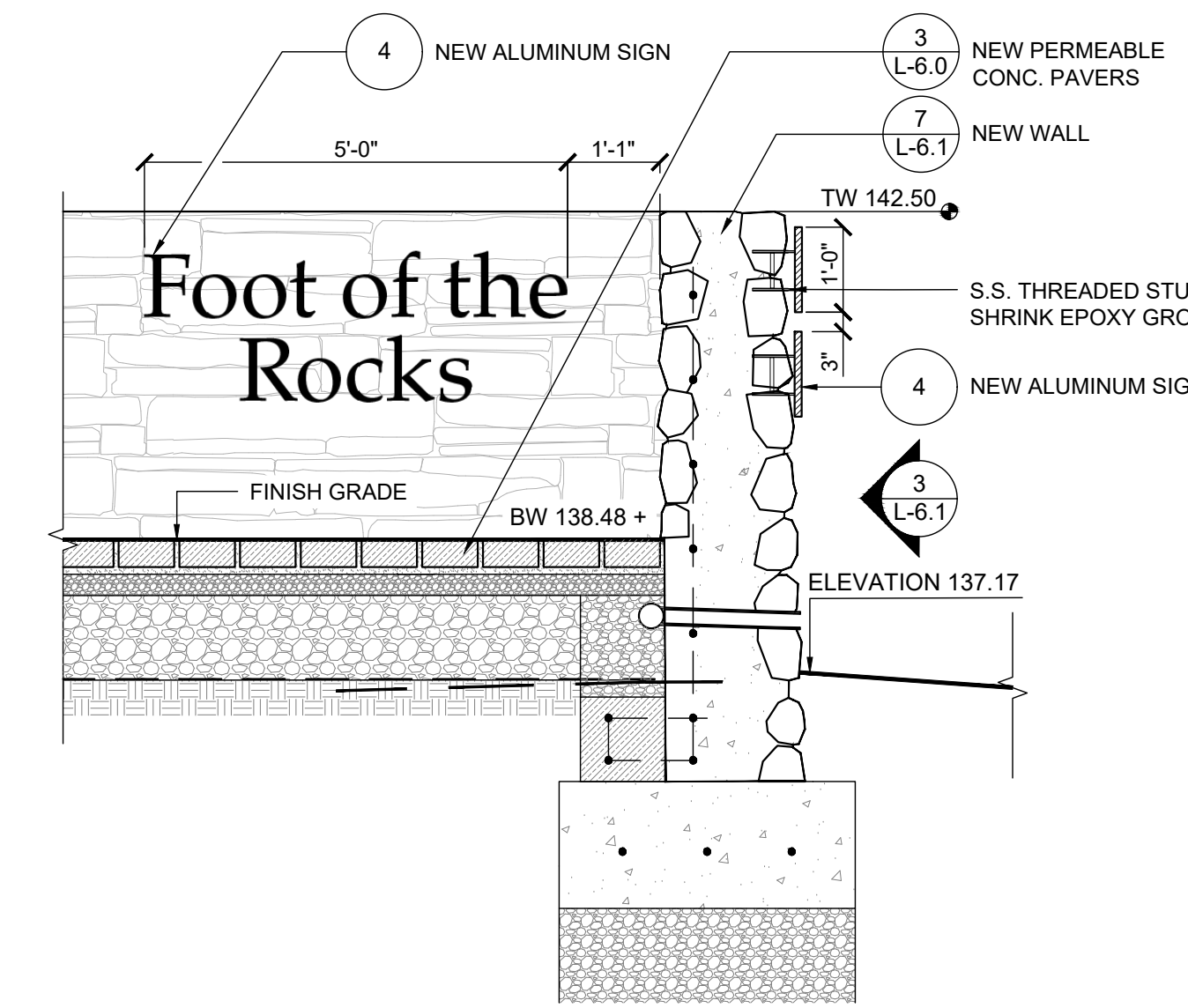
CKD RD

SCALE AS SHOWN SHEET NO.

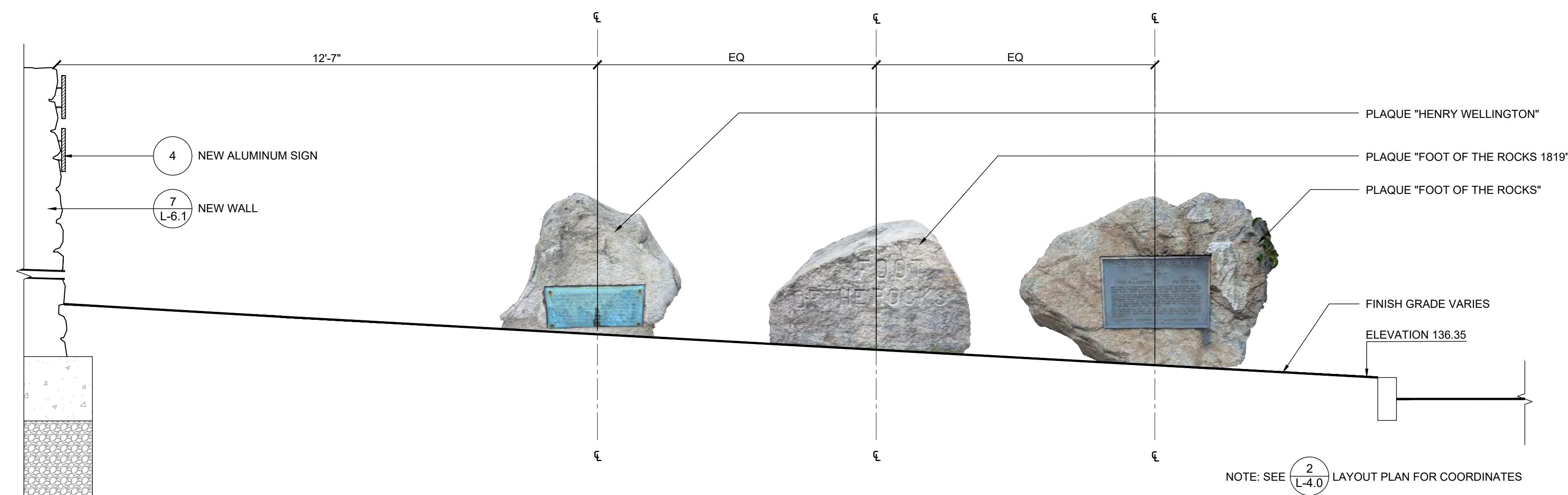
L-6.0



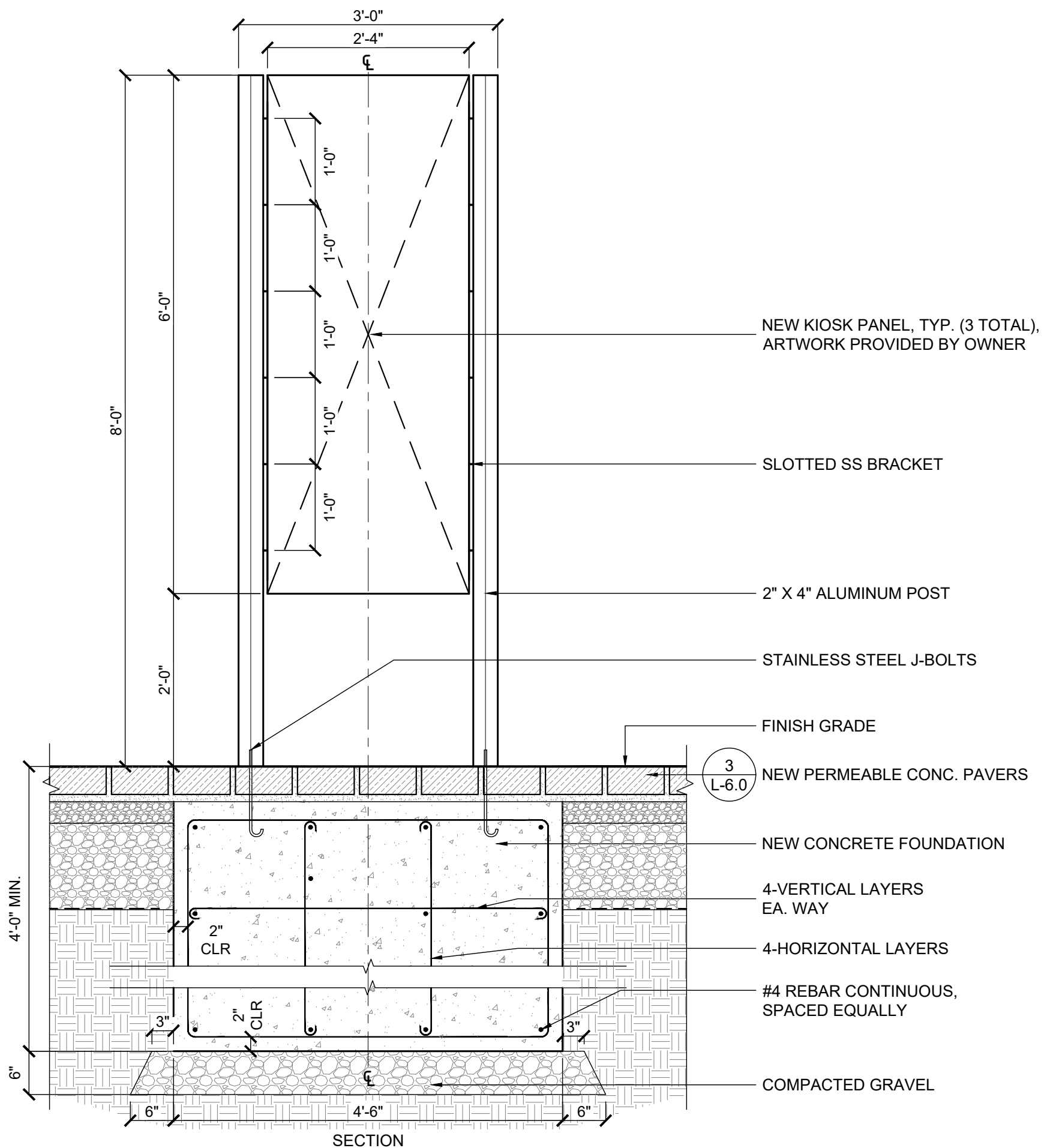
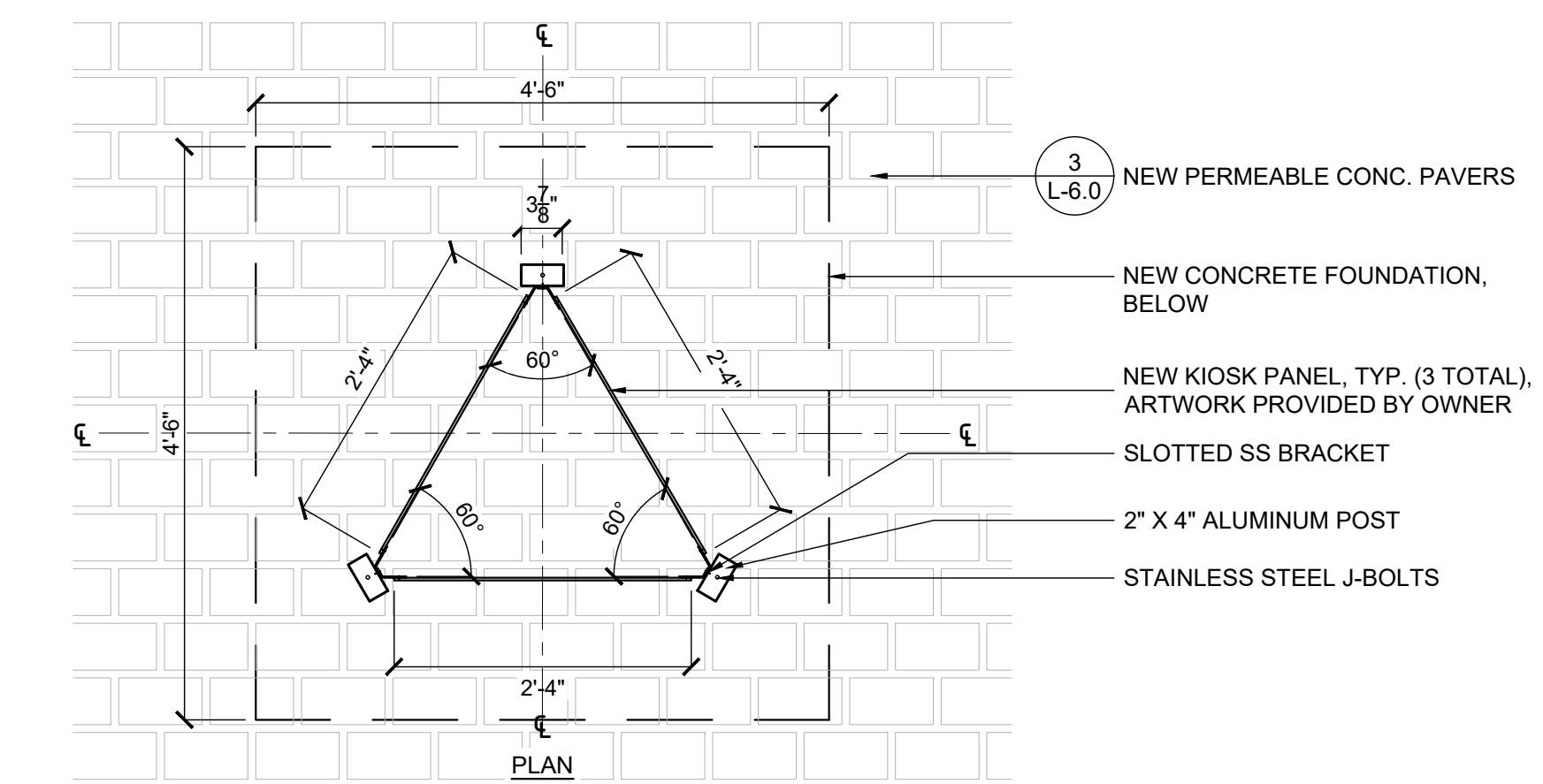
1 BARRIER RAILING - DETAIL
SCALE: 3/4"=1'-0"



2 ENTRANCE WALL WITH SIGN - SECTION
SCALE: 1/2"=1'-0"



3 RELOCATED BOULDERS - SECTION
SCALE: 1/2"=1'-0"

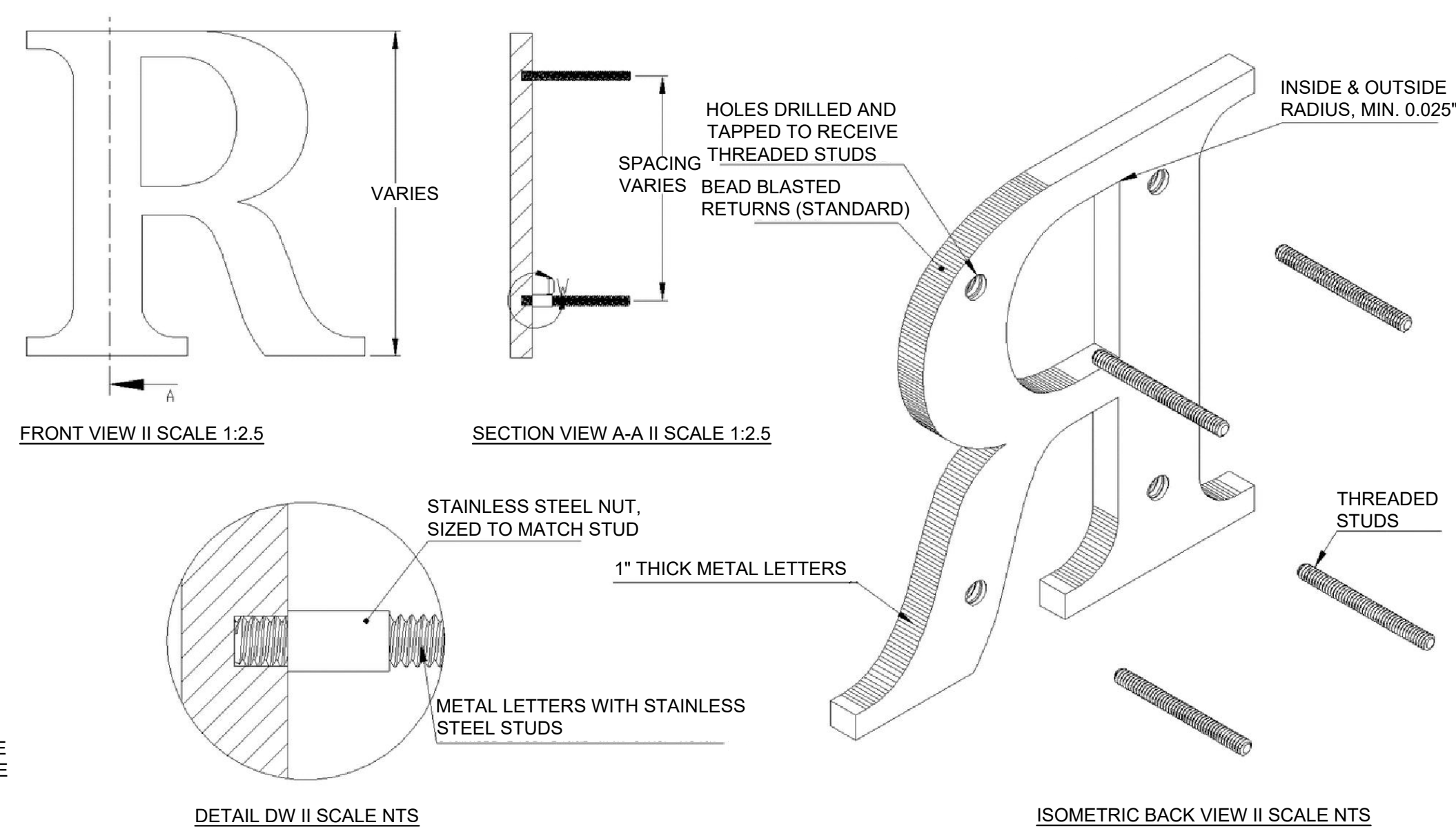


5 INTERPRETIVE KIOSK - PLAN & SECTION
SCALE: 3/4"=1'-0"

SIZE	MIN STUDS / LTR
UP TO 3"	3 STUDS
OVER 3" - 15"	4 STUDS
OVER 15"	6 STUDS
PUNCTUATION	2 STUDS

- NOTES:
- TYPICAL STUD LENGTH 2" BEYOND BACK OF LETTER AND 6" CITY SEAL.
 - LETTERS UNDER 15" HIGH - 10/24 STUDS, 15" HIGH - 1/4 - 20 STUDS.
 - 1" THICK METAL LETTERS
 - 5/16" THICK CITY SEAL

- NOTES:
- OWNERS REPRESENTATIVE TO PROVIDE ART WORK FOR LETTERING.
 - PROVIDE HOLES IN POSTS TO ATTACH INTERPRETIVE SIGN ONLY WHERE INTERPRETIVE SIGN IS INDICATED IN THE DRAWINGS. ALL POSTS WHERE INTERPRETATIVE SIGN IS NOT INDICATED ON THE PLANS SHALL BE COMPLETE WITH NO BOLT HOLES.



4 ALUMINUM SIGN - DETAIL
SCALE: 1"=1'-0"



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SCALE AS SHOWN SHEET NO.

L-6.2



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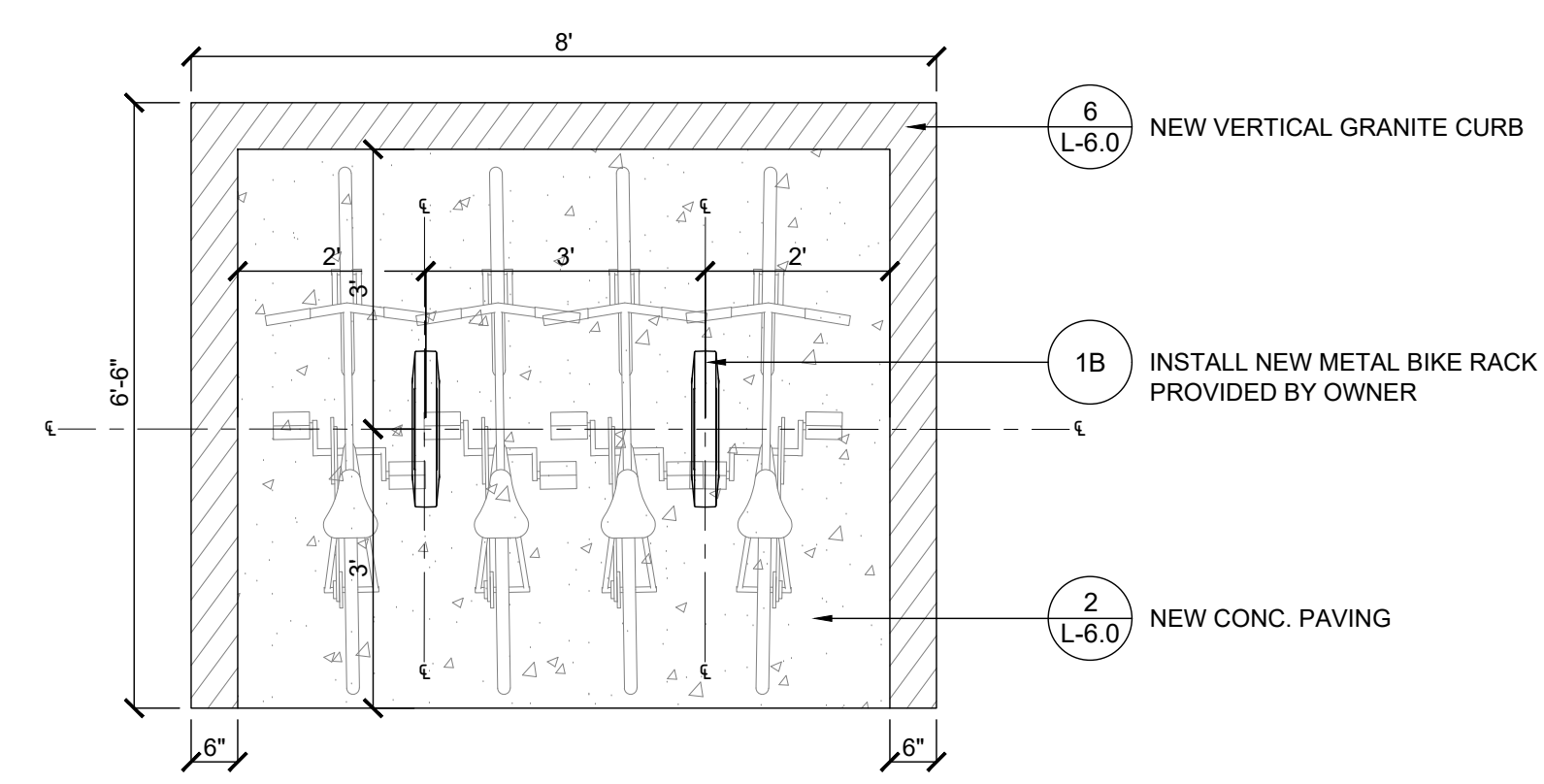
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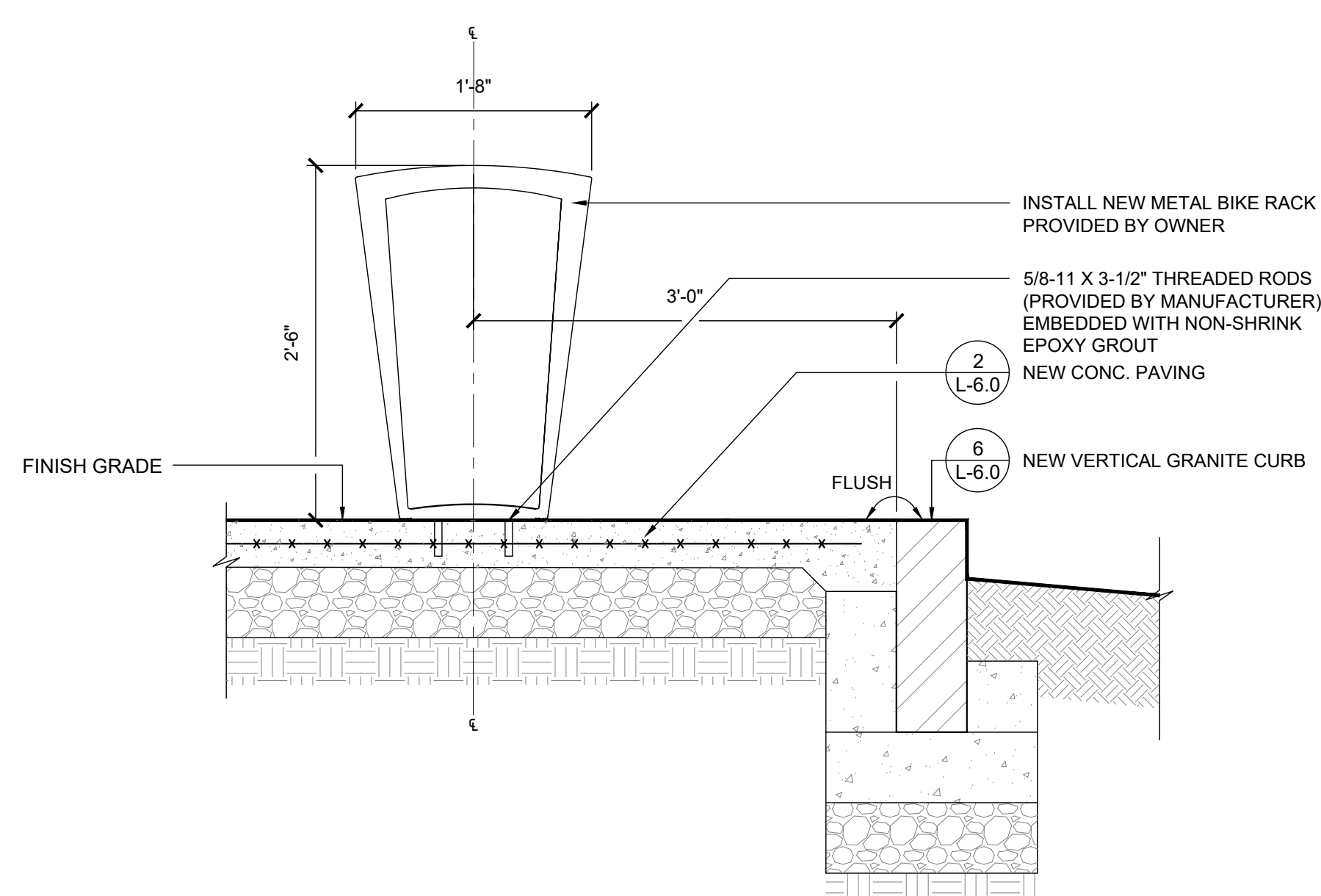
CONTRACT NO.	
DATE	10.04.24
DRAWN	SD, PZ
CKD	RD
SCALE	AS SHOWN

L-6.3

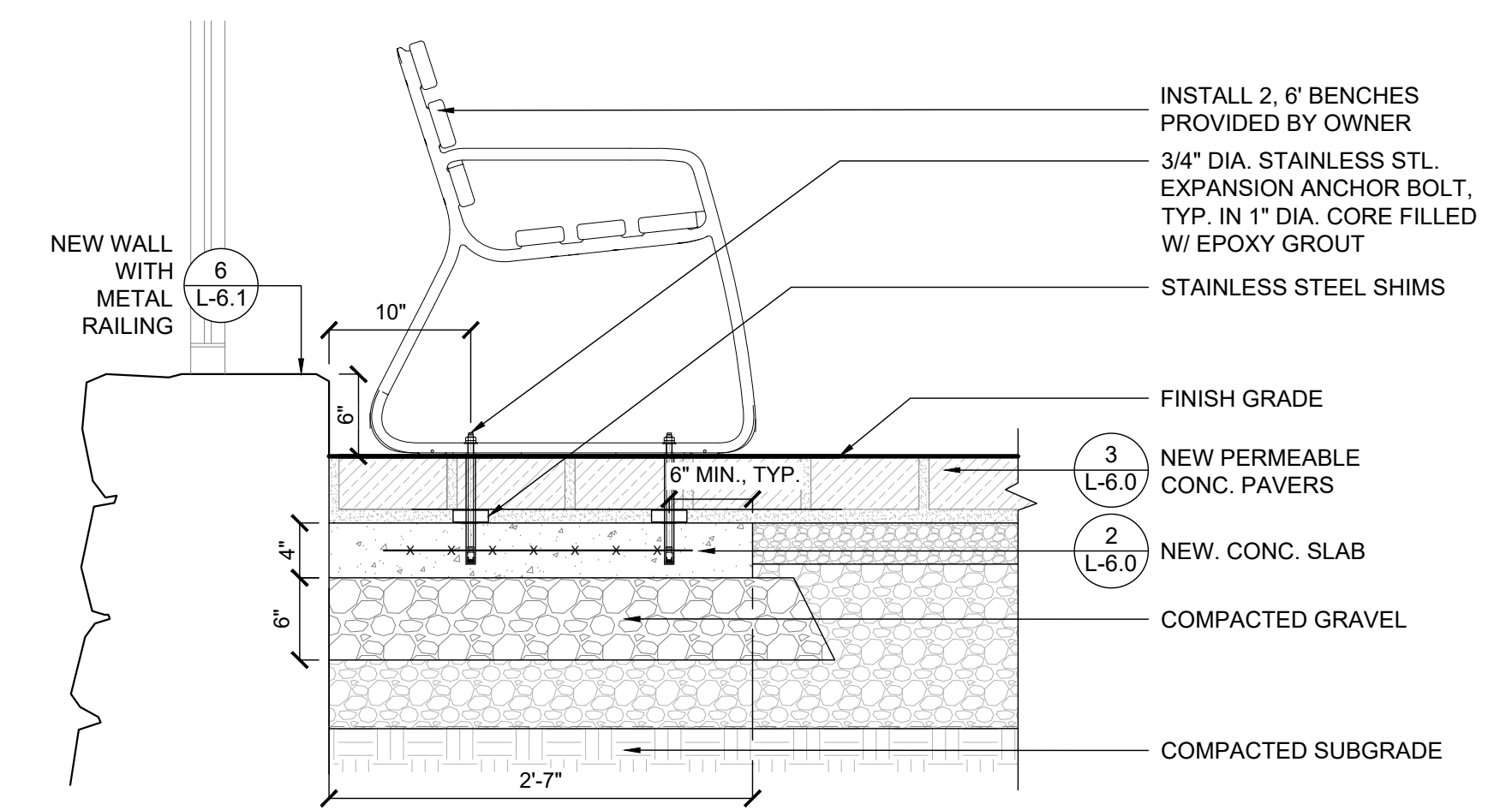
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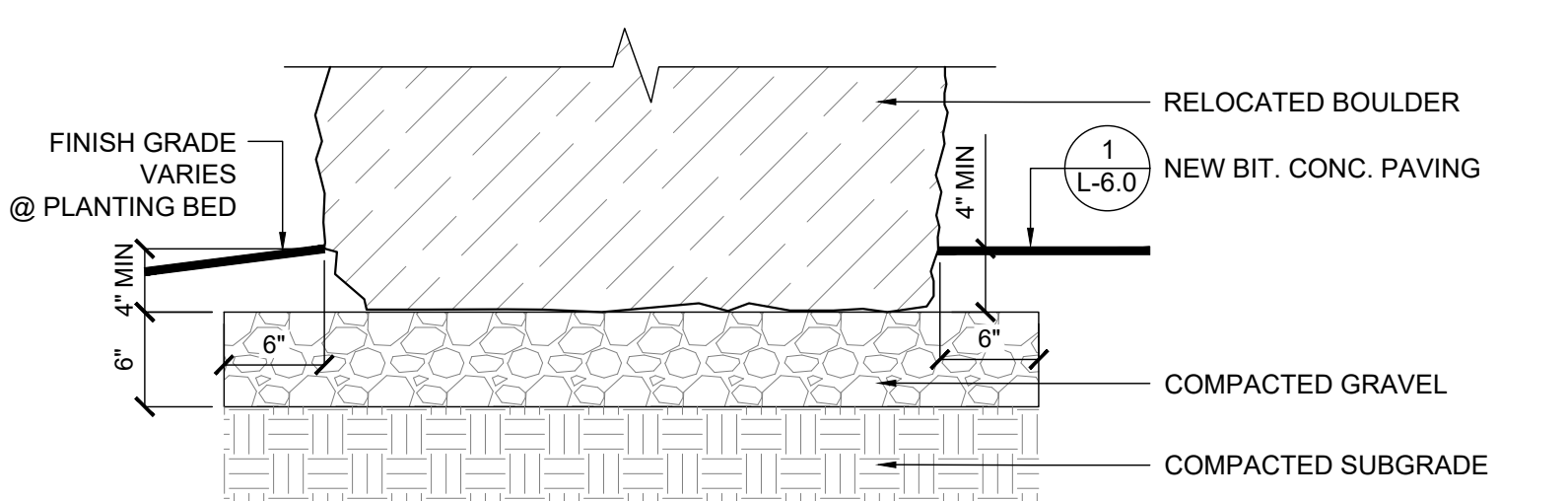
1A BIKE RACK ON CONC. PAD - PLAN
SCALE: 1"=1'-0"



1B BIKE RACK ON CONC. PAD - SECTION
SCALE: 1"=1'-0"

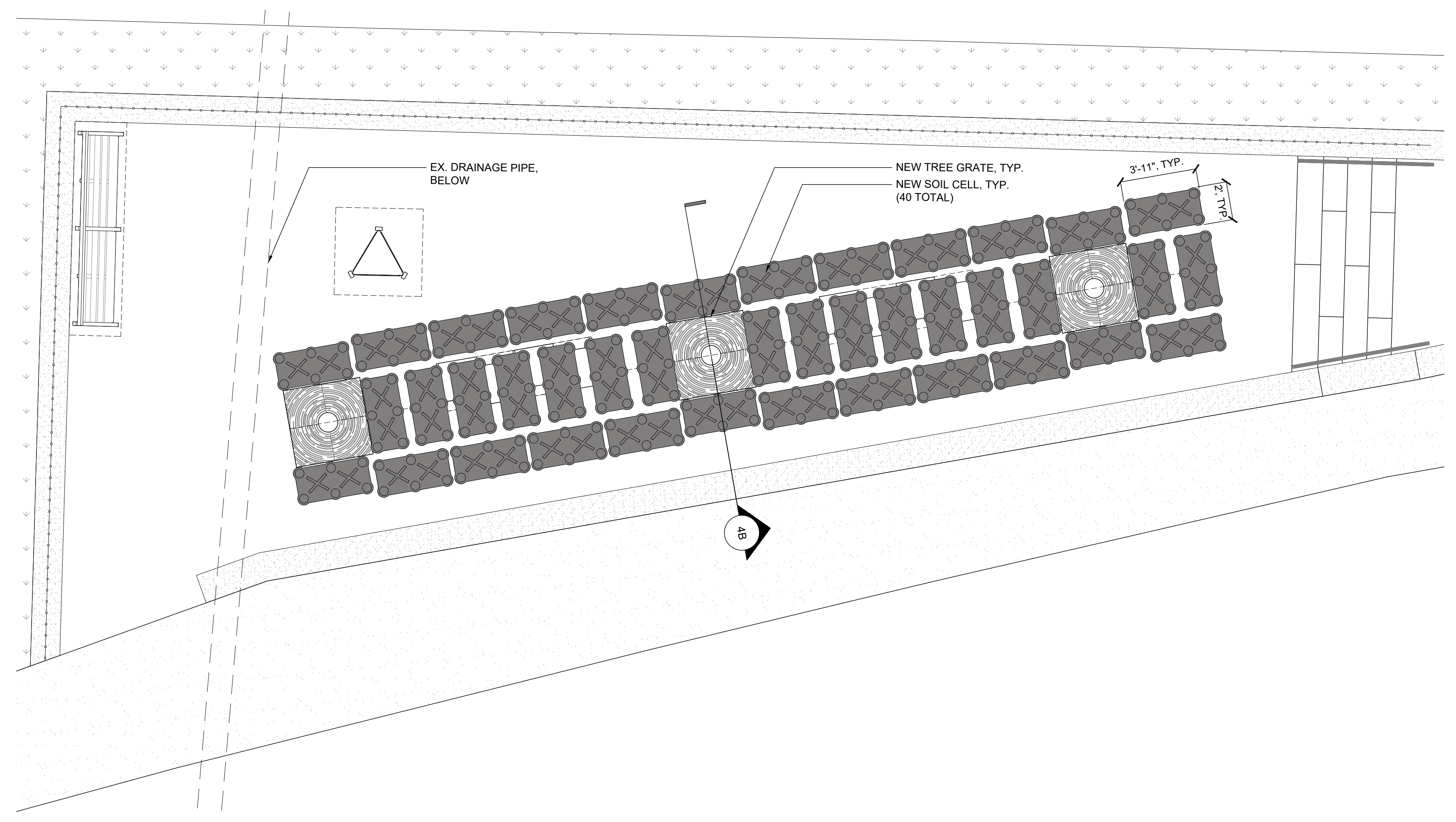


2 BENCH ON PERMEABLE PAVERS - SECTION
SCALE: 1"=1'-0"

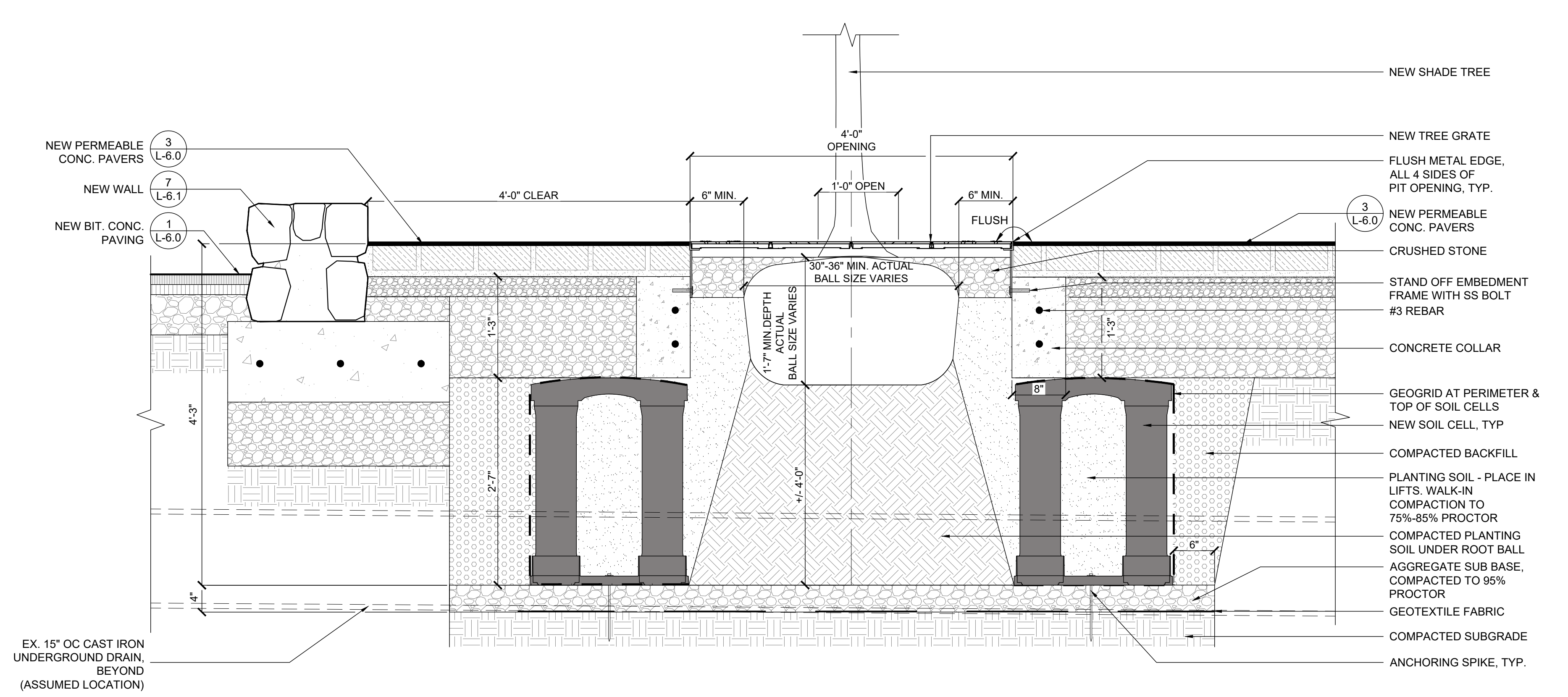


3 RELOCATED BOULDERS - SECTION
SCALE: 1"=1'-0"

NOTE: SET BOULDERS IN A MANNER THAT THE INSCRIPTIONS & PLAQUES ARE CLEARLY VISIBLE TO PASSERSBY.



4A TREE GRATE WITH SOIL CELLS - PLAN
SCALE: 1/4"=1'-0"



4B TREE GRATE WITH SOIL CELLS - SECTION
SCALE: 1"=1'-0"

EX. 15" OC CAST IRON UNDERGROUND DRAIN, BEYOND (ASSUMED LOCATION)