

PROJECT MANUAL

MEADE STADIUM FIELD TURF & LIGHTING IMPROVEMENTS

**University of Rhode Island
Kingston Campus**

December 2018

URI Job Number KC.A.MEAD.2018.001

Owner: State of Rhode Island Board of Education, University of Rhode Island, and
State of Rhode Island

In care of: University of Rhode Island
Office of Capital Projects
60 Tootell Road, Kingston, RI 02881
Paul DePace, P.E., Director
401-874-2725

Design Agent: Robert Schultz, P.E., Project Manager
Office of Capital Projects
60 Tootell Road, Kingston, RI 02881
401-874-2725

Consultant
Civil: Gordon R. Archibald, Inc.
200 Main Street, Pawtucket, RI 02860
(401) 726-4084
Todd Ravenelle, P.E., Senior Vice President

Consultant
Electrical: Creative Environment Corporation.
195 Frances Avenue, Building 2
Cranston, RI 02910
(401) 743-1004
Steve Huddle, Project Manager

PROJECT MANUAL

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END OF DOCUMENT

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END OF DOCUMENT**LIST OF DRAWINGS****January 2019****00 0115-1**

DOCUMENT 00 5200 – AGREEMENT FORM

PART 1 – GENERAL

- 1.1 The Agreement Form to be utilized on this project is AIA Document A101-2017 as amended, a copy of which follows this page.

END OF DOCUMENT



AIA[®] Document A101[™] – 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the date of issuance of the Owner's Purchase Order.

(Paragraph Deleted)

BETWEEN the Owner:

(Name, legal status, address, telephone and facsimile numbers, and website)

**State of Rhode Island One Capitol Hill, Second Floor
Providence, Rhode Island 02908-5855
401.578.8100 (telephone); 401.574.8387 (facsimile)**

**acting by and through,
The University of Rhode Island Purchasing Department
10 Tootell Road
Kingston, Rhode Island 02881
401.874.2171 (telephone); 401.874.2306 (facsimile)
<http://web.uri.edu/purchasing/>**

**and
Rhode Island Council on Postsecondary Education
560 Jefferson Boulevard, Suite 100
Warwick, Rhode Island 02886
401.456.6000 (telephone); 401.732.3541 (facsimile)**

on behalf of the User Agency:
(Name, legal status, address, telephone and facsimile numbers, and website)

**The University of Rhode Island
Office of Capital Projects
60 Tootell Road – Sherman Building
Kingston, Rhode Island 02881
401.874.2725 (telephone)**

and the Contractor:
(Name, legal status, address, telephone and facsimile numbers, and website)

for the following Project:
(Name, location and detailed description)

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101[™]-2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201[™]-2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

The Design Agent:

Init.

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User Notes:

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| (Name, legal status, address, telephone and facsimile numbers, and website)

The Owner and Contractor agree as follows.



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/

| (Paragraph Deleted)

| The Owner and Contractor agree as follows.

TABLE OF ARTICLES

- 1 THE CONTRACT DOCUMENTS
- 2 THE WORK OF THIS CONTRACT
- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
- 4 CONTRACT SUM
- 5 PAYMENTS
- 6 DISPUTE RESOLUTION
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- 8 MISCELLANEOUS PROVISIONS
- 9 ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General Conditions, Supplementary Conditions (if any), and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others. No part of the Work shall be performed by Subcontractors without the Owner's prior written consent.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall
be the later of: (i) the issuance of the Purchase Order by the Owner; and (ii) the
(Paragraph Deleted)

| date set forth in a notice to proceed issued by the User Agency.

| *(Paragraphs Deleted)*

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

(Check one of the following boxes and complete the necessary information.)

[] Not later than () calendar days from the date of commencement of the Work.

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[] By the following date:

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date
-----------------	-----------------------------

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor’s performance of the Contract. Subject to additions and deductions as provided in the Contract Documents, the Contract Sum shall be: \$_____.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price
------	-------

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement. *(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)*

Item	Price	Conditions for Acceptance
------	-------	---------------------------

§ 4.3 Allowances, if any, are specified in the Bid Proposal Form and are included in the Contract Sum.

(Paragraph Deleted)

(Table Deleted)

§ 4.4 Unit prices, if

any, are specified in the Bid Proposal Form and include all costs, including without limitation, labor, materials, services, regulatory compliance, overhead, and profit necessary for the completion of the Work. Unit prices shall be used for both additions to, and deletions from the Work.

(Table Deleted)

§ 4.5 Liquidated damages, if any:

(Insert terms and conditions for liquidated damages, if any.)

.1 In the event that there is one date for Substantial Completion of the Work, the Contractor shall pay the Owner the sum stipulated in this Section 4.5.1 as liquidated damages, and not as a penalty, for each calendar day of delay until the Work is substantially complete: \$_____.

.2 In the event that the Project is scheduled to be completed in phases, and there is more than one date for Substantial Completion of the Work, the Contractor shall pay the Owner an aggregate amount equal to the sums stipulated in this Section 4.5.2 as liquidated damages, and not as a penalty, for each calendar day of delay until the Work for each phase is substantially complete:

Phase Liquidated Damages Sum

.3 The Owner and the Contractor have reasonably determined the sums set forth in this Section 4.5 to be a fair estimate of the Owner' actual damages which are difficult to ascertain in the event of delay.

§ 4.6 Other:
(Paragraph Deleted)

The Owner shall not be liable to the Contractor or any Subcontractor for claims or damages of any nature caused by or arising out of any delays. The sole remedy against the Owner for delays shall be the allowance of additional time for completion of the Work.

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Design Agent by the Contractor and Certificates for Payment issued by the Design Agent and approved by the Owner in writing, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month.

§ 5.1.3 The Owner shall make payment of the certified amount, less retainage, to the Contractor not later than the 30th working day following written approval by the Owner.

(Paragraph Deleted)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor and approved by the Design Agent and the Owner in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Design Agent and the Owner may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2007, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- .3 That portion of Construction Change Directives that the Design Agent determines, in the Design Agent's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Design Agent has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2007;
- .3

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- For Work performed or defects discovered since the last payment application, any amount for which the Design Agent may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2007; and
- 4 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due: five (5%) percent.

(Paragraph Deleted)

§ 5.1.7.1.1
Deleted.

§ 5.1.7.2 **Deleted.**

(Paragraph Deleted)

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:

(Insert any other conditions for release of retainage upon Substantial Completion.)

The amount of five (5%) percent shall be retained by the Owner until the first anniversary of final completion of the Work.

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2007.

§ 5.1.9 Except with the Owner’s prior written approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.1.10 Within 10 working days of receipt of any progress payment from the Owner, the Contractor must pay its Subcontractors the full amount included for each such Subcontractor within the Contractor’s Application for Payment in accordance with the provisions of AIA A201 – 2007, General Conditions of the Contract for Construction.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, less the amount withheld pursuant to § 5.1.7.3, shall be made by the Owner to the Contractor when:

- .1 the Contractor has fully performed the Contract except for the Contractor’s responsibility to correct Work as provided in Article 12 of AIA Document A201–2007, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Design Agent and approved in writing by the Owner;
- .3 the Contractor has submitted its final release and final releases from all of its Subcontractors and suppliers in a form acceptable to the Owner; and
- 4 the Contractor has submitted to the Owner all close-out documents, including without limitation, all as-built plans, warranties, manuals, and other materials set forth in the Contract Documents.

§ 5.2.2 The Owner’s final payment to the Contractor shall be made no later than 30 working days after the issuance of the Design Agent’s final Certificate for Payment and written approval by the Owner.

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due in accordance with the provisions of “Prompt Payment by Department of Administration,” R.I. Gen. Laws §§ 42-11.1-1 et seq.

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§ 5.4 Owner's Rights

§ 5.4.1 The Owner shall have the right to deduct from any payments due to the Contractor the amount of any unpaid obligations owed to the State of Rhode Island by the Contractor, including without limitation, any and all unpaid taxes, the amount of any claim against the

Contractor arising out of this Agreement, or any amount on account of any other reason permitted by applicable law.

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

Claims shall be referred to the Initial Decision Maker for initial decision. The University of Rhode Island Vice President for Administration and Finance pursuant to the provisions of the "Delegation of Limited Procurement Authority," dated January 19, 2018 and the provisions of the "State Purchases Act," R.I. Gen. Laws § 37-2-1 et seq., will serve as the Initial Decision

Maker in accordance with the provisions of the State Purchases Act, State of Rhode Island Procurement Regulations, and this Section 6.1. An initial decision shall be required as a condition precedent to binding dispute resolution pursuant to Section 6.3 of any Claim arising prior to the date final payment is due.

§ 6.2 Mediation

For any Claim not resolved by the Initial Decision Maker procedures set forth in Section 6.1, and prior to the implementation of the binding dispute resolution procedures set forth in Section 6.3, the Contractor shall *have the*

option to pursue mediation, exercisable by written notice to the Owner within 30 calendar days of an Initial Decision. In the event of the exercise of such option by the Contractor, the Owner and the Contractor shall attempt to select a mediator, and in the event that the Owner and the Contractor cannot agree on a mediator, either party may apply in writing to the Presiding Justice of the Providence County Superior Court, with a copy to the other, with a request for the court to appoint a mediator, and the costs of the mediator shall be borne equally by both parties.

(Paragraph Deleted)

§ 6.3 Binding Dispute Resolution

For any Claim not resolved by the Initial Decision Maker procedures set forth in Section 6.1, or mediation at the option of the Contractor pursuant to Section 6.2, the method of binding dispute resolution shall be determined in accordance with the provisions of the "Public Works Arbitration Act," R.I. Gen. Laws §§ 37-16-1 et seq.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2007. The Contract may also be terminated by the Owner: (i) in the event of the unavailability of appropriated funds; (ii) in the absence of a determination of continued need; or (iii) as *otherwise provided in the State of Rhode Island Procurement Regulations General Conditions of Purchase or other applicable law.*

§ 7.1.1 Deleted.

§ 7.2 The Work may be suspended by the Owner as provided in: (i) the State of Rhode Island General Conditions of Purchase Regulation or other applicable law; or (ii) Article 14 of AIA Document A201–2007.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2007 or another Contract Document, the reference refers to: (i) the AIA Document A201 – 2007 or other Contract Document as modified by the Owner; and (ii) that provision in the AIA Document A201 – 2007 or other Contract Document as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 Representatives for the Owner

§ 8.2.1 The Owner's representative:

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User Notes:

(3B9ADA3B)

(Name, title, address, email address, and other information for the preferred methods of contact)

The University of Rhode Island, Purchasing Department
10 Tootell Road
Kingston, Rhode Island 02881
Paul M. DePace, PE
401.874.2725 (telephone)

§ 8.2.2 The User Agency's representative:
(Name, title, address, email address, and other information for the preferred methods of contact)

The University of Rhode Island
Office of Capital Projects
60 Tootell Road – Sherman Building
Kingston, Rhode Island 02881
Paul M. DePace, PE
401.874.2725 (telephone)

§ 8.2.3 The Design Agent's representative:
(Name, title, address, email address, and other information for the preferred methods of contact)

§ 8.3 The Contractor's representative:
(Name, title, address, email address, and other information for the preferred methods of contact)

§ 8.4 Neither the Owner's nor the Contractor's representative nor the Design Agent's representative shall be changed without 10 working days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in the Solicitation and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in the Solicitation and elsewhere in the Contract Documents.

§ 8.6 Deleted.

§ 8.7 Other provisions:

§ 8.7.1 The Contractor represents and warrants to the Owner, in addition to any other representations and warranties of the Contractor elsewhere in the Contract Documents:

.1 The Contractor and its Subcontractors are each financially solvent, able to pay their debts as they mature, and possess sufficient working capital to perform their obligations under the Contract Documents.

Init.

.2 The Contractor and its Subcontractors are each able to furnish the tools, materials, equipment, and labor required to complete the Project as required under the Contract Documents.

.3 The Contractor and each Subcontractor are authorized to do business in the State of Rhode Island and are properly licensed by all necessary governmental authorities having jurisdiction over them and over the Work and the Project.

.4 The execution of this Agreement and its performance is within its duly authorized powers.

.5 The Contractor has visited the site of the Project, familiarized itself with the local and special conditions under which the Work is to be performed, and correlated its observations with the requirements of the Contract Documents.

.6 The Contractor possesses the requisite level of experience and expertise in the business administration, construction, and superintendence of projects of the size, complexity, and nature of the Project, and it will perform the Work with the care, skill, and diligence of a contractor possessing such experience and expertise.

§ 8.7.2 The representations and warranties of the Contractor in this Section 8.7 and elsewhere in the Contract Documents will survive the execution and delivery of this Agreement, any termination of this Agreement, and the final completion of the Work.

§ 8.7.3 Any Change Orders or other Modifications must be approved in writing by the Owner.

§ 8.7.4 The Owner is the State of Rhode Island, acting by and through the University of Rhode Island Purchasing Department, and therefore, pursuant to the provisions of R.I. Gen. Laws § 34-28-31, mechanics liens may not be placed against the Project.

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, as modified by the Owner
- .2 **Deleted.**
- .3 AIA Document A201™–2007, General Conditions of the Contract for Construction, as modified by the Owner.
- .4 **Deleted.**
- .5 Drawings

(Table Deleted)

The Drawings are included in the Solicitation and are available on the Division of Purchases website at www.purchasing.ri.gov.

- .6 Specifications

(Table Deleted)

The Specifications are included in the Solicitation and are available on the Division of Purchases website at www.purchasing.ri.gov.

.7 Addenda, if
(Table Deleted)

any, issued pursuant to the Solicitation form a part of the Solicitation and are available on the Division of Purchases website at www.purchasing.ri.gov.

.8

Init.

Supplementary and other Conditions of the Contract, including without limitation, the State of Rhode Island General Conditions of Purchase Regulation.

.9 Other documents listed below:

(Paragraph Deleted)

.1 The Solicitation, issued by the Owner, including without limitation, the Invitation to Bid, the Instructions to Bidders, the Specifications and Drawings, any Addenda, and the Bid Checklist.

(Paragraph Deleted)

.2 The Bid Proposal, including without limitation, the Bid Form and the Bidder Certification Cover Form.

(Table Deleted)

.3 The Purchase Order issued by the Owner.

§ 9.2 This Agreement and the Contract Documents are subject to, and governed by, the laws of the State of Rhode Island, including all procurement statutes and regulations (available at www.purchasing.ri.gov), and applicable federal and local law, all of which are fully incorporated into this Agreement by this reference.

(Table Deleted)

(Paragraph Deleted)

§ 9.3 In the event of any conflict between or among the Contract Documents, or any Contract Documents and any provision of the State of Rhode Island Procurement Regulations and/or any other provision of the Rhode Island General Laws, the State of Rhode Island Procurement Regulations and the Rhode Island General Laws shall control.

ARTICLE 10 BENEFITS OF AGREEMENT

§ 10.1 The User Agency is a disclosed third-party beneficiary of this Agreement and shall have all of the rights and benefits hereunder to which such a party is entitled. Nothing contained in this Agreement shall create a contractual relationship with, or a cause of action in favor of, any other third party against the Owner or the User Agency.

§ 10.2 This Agreement shall be binding on the Contractor and its successors and assigns; provided, however, that the Contractor may not assign its rights nor delegate its responsibilities under this Agreement without the Owner's prior written consent.

This Agreement is entered into as of the day and year first written above; provided, however, that this Agreement shall not become a valid, binding, and enforceable contract unless and until the Owner shall have issued a Purchase Order.

**THE STATE OF RHODE ISLAND, acting by
and through THE UNIVERSITY OF RHODE
ISLAND PURCHASING DEPARTMENT and
RHODE ISLAND COUNCIL ON
POSTSECONDARY EDUCATION**

OWNER *(Signature)*

(Printed name and title)

CONTRACTOR *(Signature)*

(Printed name and title)



Init.

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DOCUMENT 00 6140 - WAIVER OF LIEN FORM

U. R. I. Document Waiver of Lien Form is included, following this page, as an integral part of the Contract documents. A copy with completed information must be submitted with the second and each succeeding Application for Payment.

WAIVER OF LIEN FORM - Material or Labor

Rev. 1/2/14
January 2019

WAIVER OF LIEN FORM
00 6140-1

UNIVERSITY OF RHODE ISLAND

Construction Project Title: _____

General Contractor: _____

Subcontractor/Supplier: _____

DUNS No.: _____

Application and Certificate for Payment No: _____
(prior to Application accompanying this form)

Schedule of Values Line Item No.: _____

DESCRIPTION OF WORK Heading: _____

Total payment Received, Including Current Payment: \$ _____

The undersigned Representative of the above Subcontractor/Supplier has been contracted by the above General Contractor to furnish materials, or labor, or both, as included in the approved Schedule of Values under the Line Item No.____, and DESCRIPTION OF WORK heading indicated above, for the Construction Project listed above.

The undersigned acknowledges receipt of payment, under this Line Item No., and DESCRIPTION OF WORK heading, and hereby waives and releases any and all lien, or claim or right to lien, on the Construction Project listed above, and premises, under the statutes of the State of Rhode Island, relating to Mechanics Liens, on account of materials, or labor, or both, furnished, or which may be furnished, by the undersigned to, or on account of, the above numbered Application and Certificate for Payment.

Signed on this _____ day of _____, 20__.

(signature)

(firm name)

END OF DOCUMENT

DOCUMENT 00 7000 – GENERAL CONDITIONS

PART 1 – GENERAL

- 1.1 The General Conditions to be utilized on this project is AIA Document A201-2007 as amended, a copy of which follows this page.

END OF DOCUMENT



AIA[®] Document A201[™] – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

THE OWNER:

(Name, legal status and address)

State of Rhode Island
One Capitol Hill, Second Floor
Providence, Rhode Island 02908-5855
(401) 574-8100 (telephone)
(401) 574-8387 (facsimile)

(Paragraphs deleted)

acting by and through

(Paragraphs deleted)

The University of Rhode Island Purchasing Department

(Paragraphs deleted)

10 Tootell Road
Kingston, Rhode Island 02881
(401) 874-2171 (telephone)
(401) 874-2306 (facsimile)
<http://web.uri.edu/purchasing/>

(Paragraph deleted)

and

Rhode Island Council on Postsecondary Education
560 Jefferson Boulevard, Suite 100
Warwick, Rhode Island, 02886
(401) 456-6000 (telephone)
(401) 732-3541 (facsimile)
On behalf of the User Agency

THE USER AGENCY

(Paragraphs deleted)

(Name, address, telephone and facsimile numbers, and web address)

The University of Rhode Island

(Paragraphs deleted)

Office of Capital Projects

(Paragraphs deleted)

60 Tootell Road – Sherman Building
Kingston, Rhode Island 02881

(Paragraphs deleted)

(401) 874-2725 (telephone)

(Paragraphs deleted)

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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THE Design Agent:

(Paragraphs deleted)

(Name, legal status, address, telephone and facsimile numbers, and web address)

TABLE OF ARTICLES

1 GENERAL PROVISIONS

2 OWNER

3 CONTRACTOR

4 DESIGN AGENT

5 SUBCONTRACTORS

(Paragraphs deleted)

6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

(Paragraphs deleted)

7 CHANGES IN THE WORK

8 TIME

(Paragraphs deleted)

9 PAYMENTS AND COMPLETION

(Paragraphs deleted)

10 PROTECTION OF PERSONS AND PROPERTY

(Paragraph deleted)

11 INSURANCE AND BONDS

12 UNCOVERING AND CORRECTION OF WORK

(Paragraphs deleted)

13 MISCELLANEOUS PROVISIONS

(Paragraphs deleted)

14 TERMINATION OR SUSPENSION OF THE CONTRACT

(Paragraphs deleted)

15 CLAIMS AND DISPUTES

(Paragraphs deleted)

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (the Agreement) and consist of the Agreement (and the documents enumerated therein), Conditions of the Contract (General Conditions, Supplementary Conditions, if any, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Design Agent.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Design Agent or the Design Agent's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Design Agent or the Design Agent's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Design Agent shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Design Agent's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location, and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Design Agent and the Design Agent's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items and services necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; the Contractor shall perform all work reasonably inferable from the Contract Documents as being necessary to produce the indicated results.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

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§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.2.4 In the event of any conflicts or discrepancies among the Contract Documents, the provisions of the Contract Documents will be interpreted in the following order of priority:

- .1 Modifications (if any).
- .2 The Purchase Order.
- .3 The Agreement.
- .4 The Solicitation, including any Addenda, and the Specifications and Drawings
- .5 The Supplementary Conditions (if any).
- .6 The General Conditions.
- .7 The Bid Proposal.

§ 1.2.5 In the event of any conflicts or discrepancies between the Contract Documents and the State of Rhode Island Procurement Regulations or any provision of the Rhode Island General Laws, the State of Rhode Island Procurement Regulations and the Rhode Island General Laws will control.

§ 1.2.6 In the event of any inconsistency between the Drawings and Specifications, the better quality or greater quantity of Work shall be provided.

§ 1.2.7 The Owner will be the final decision maker for any and all interpretations.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Owner and the User Agency shall have a perpetual license to utilize the Drawings, Specifications, and other documents, including electronic or digital documents, prepared by the Design Agent and the Design Agent's consultants, for the execution of the Project and shall have and retain all rights to use them and reproduce them for the production and maintenance of the Work described therein. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Design Agent's or Design Agent's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Design Agent and the Design Agent's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express

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authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Design Agent does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 Deleted.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Deleted.

§ 2.2.2 The Contractor shall secure and pay for permits and fees, necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 If required for the Work in the discretion of the Owner, the Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of any information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Deleted.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a 10 working-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Design Agent's additional services made necessary by such default, neglect, or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Design Agent. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Design Agent, or by tests, inspections, or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Owner and the Design Agent any errors, inconsistencies, or omissions discovered by or made known to the Contractor or additional Drawings, Specifications, or instructions required to define the Work in greater detail to permit the proper progress of the Work as a request for information in such form as the Design Agent may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Design Agent and the Owner any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Design Agent or Owner may require.

§ 3.2.3.1 Omissions from the Drawings and Specifications of items obviously needed to perform the Work properly, such as attachments, bolts, hangers, and other fastening devices, shall not relieve the Contractor from the obligation to furnish and install such items.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Design Agent issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2, 3.2.3, or 3.2.3.1, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Design Agent for damages resulting from errors, inconsistencies, or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.2.4.1 The Contractor shall not make any changes without prior written authorization from the Design Agent and the Owner.

§ 3.2.5 The Owner is entitled to reimbursement from the Contractor for amounts paid to the Design Agent for evaluating and responding to the Contractor's requests for information that are not prepared in accordance with the Contract Documents or where the requested information is available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior Project correspondence or documentation.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Design Agent and shall not proceed with that portion of the Work without further written instructions from the Design Agent. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without

acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. Whenever the Contractor has an obligation to provide labor and materials under the Agreement, the Contractor, at a minimum, shall provide the labor for, and furnish and install and place in operation all items, including without limitation, all proper connections.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Design Agent in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Design Agent and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and the Design Agent that materials and equipment furnished under the Contract will be of first quality, prime manufacture, and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements, including substitutions not properly authorized, may be considered defective and, unless a longer period is required elsewhere in the Contract Documents, will be repaired and/or replaced, at the option of the Owner, for a period of one year following Final Completion of the Work. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Design Agent, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

§ 3.6.1 The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.6.2 The State of Rhode Island is exempt from payment of any federal or state excise, transportation, or sales tax. The Rhode Island Department of Administration Division of Purchases will furnish Exemption Certificates upon request.

§ 3.6.3 Pursuant to R.I. Gen. Laws § 44-1-6, the Owner shall withhold payment from the Contractor if the Contractor does not maintain a regular place of business in Rhode Island in the amount of three (3%) percent of the Contract Sum until 30 calendar days after Final Completion and compliance by the Contractor with the requirements of such section.

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections required by the Rhode Island State Building Code

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necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded. The Contractor shall be responsible for obtaining the Certificate of Occupancy from the appropriate governmental authorities.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 The Contractor shall promptly notify the Design Agent and the Owner if the Contractor becomes aware that the Contract Documents are not in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities. If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 **Concealed or Unknown Conditions.** If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Design Agent before conditions are disturbed and in no event later than 21 working days after first observance of the conditions. The Design Agent will promptly investigate such conditions and, if the Design Agent determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Design Agent determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Design Agent shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Design Agent's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Design Agent. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

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§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Design Agent the name and qualifications of a proposed superintendent. The Design Agent may reply within 14 working days to the Contractor in writing stating (1) whether the Owner or the Design Agent has reasonable objection to the proposed superintendent or (2) that the Design Agent requires additional time to review. Failure of the Design Agent to reply within the 14 working-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Design Agent has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, within 20 working days after the issuance of the Purchase Order, shall prepare and submit for the Owner's and Design Agent's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals, not less frequently than monthly, as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work. The Contractor shall certify on the initial schedule and all revised schedules that they comply with the Contract Documents.

§ 3.10.2 The Contractor shall prepare a submittal schedule, within 20 working days after the issuance of the Purchase Order, and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Owner's and the Design Agent's approval. The Owner's and the Design Agent's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Owner and the Design Agent reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Design Agent.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Design Agent and shall be delivered to the Design Agent for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Design Agent is subject to the limitations of Section 4.2.7. Informational submittals upon which the Design Agent is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Design Agent without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Design Agent Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Owner and the Design Agent or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Design Agent that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Design Agent.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Design Agent's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Design Agent in writing of such deviation at the time of submittal and (1) the Design Agent has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Design Agent's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Design Agent on previous submittals. In the absence of such written notice, the Design Agent's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Design Agent will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Design Agent. The Owner and the Design Agent shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Design Agent have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Design Agent will review, approve, or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.12.11 The Owner shall be entitled to reimbursement from the Contractor for amounts paid to the Design Agent for evaluation of resubmittals.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, and any restrictions imposed by the User Agency or the Owner, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Design Agent access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Design Agent harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Design Agent. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Design Agent and the Owner.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, the State of Rhode Island, and each executive, legislative, judicial, regulatory, and administrative body of the state, and any political subdivision thereof, including without limitation, any department, division, agency, commission, board, office, bureau, committee, authority, educational institution, school, water, and fire district, and other agency of Rhode Island state, municipal, and local government that exercises governmental functions, any other governmental authority, and any quasi-public corporation and/or body corporate and politic, including without limitation, the User Agency, their elected and appointed officials, members, employees, and agents, the Design Agent, the Design Agent's Consultants, Subconsultants, and Subcontractors, and agents and employees and any of them from and against any and all claims, demands, damages, liabilities, judgments, losses and expenses, including but not limited to attorneys' fees and costs of mediation, arbitration, and/or litigation, arising out of or resulting from performance of the Work, and/or the obligations of the under the Contract Documents, but only to the extent caused by the acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not any such claim, demand, damage, liability, judgment, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages,

compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

§ 3.18.3 Without limiting the generality of the foregoing, the defense and indemnity set forth in this Section 3.18 includes, without limitation, all liabilities, damages, losses, claims, demands, and actions on account of bodily injury, death, or property loss to a person or entity indemnified hereunder or any other persons or entities, whether based upon statutory (including, without limitation, workers compensation), contractual, tort, or other liability of any person or entity so indemnified.

§ 3.18.4 The remedies set forth herein shall not deprive any person indemnified hereunder of any other indemnity action, right, or remedy otherwise available to any such person or entity at common law or otherwise.

§ 3.18.5 The Contractor will include the indemnity set forth in this Section 3.18, without modification, in each Subcontract with any Subcontractor.

§ 3.18.6 Notwithstanding any other language in the Contract Documents to the contrary, the indemnity hereunder shall survive Final Completion of the Work and final payment under the Agreement and shall survive any termination of the Agreement.

ARTICLE 4 DESIGN AGENT

§ 4.1 GENERAL

§ 4.1.1 The Design Agent is the person lawfully licensed to practice his or her profession in the State of Rhode Island or an entity lawfully practicing its profession in the State of Rhode Island and identified in the Contract Documents as the Design Agent. The term "Design Agent" means the Design Agent or the Design Agent's authorized representative.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Design Agent as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Design Agent. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Design Agent is terminated, the Owner shall employ a successor Design Agent as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Design Agent.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Owner with assistance from the Design Agent will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction through the date the Design Agent issues the final Certificate for Payment and continuing until the expiration of the warranty period in Section 3.5. The Design Agent will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Design Agent will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Design Agent will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Design Agent will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.2.1 The Owner is entitled to reimbursement from the Contractor for amounts paid to the Design Agent for site visits made necessary by the fault of the Contractor or by defects and deficiencies in the Work.

§ 4.2.3 On the basis of the site visits, the Design Agent will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Design Agent will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Design Agent will not have control

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over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Design Agent about matters arising out of or relating to the Contract. Communications by and with the Design Agent's consultants shall be through the Design Agent. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Design Agent's evaluations of the Contractor's Applications for Payment, the Design Agent will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Design Agent has authority to reject Work that does not conform to the Contract Documents. Whenever the Design Agent considers it necessary or advisable, the Design Agent will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Design Agent nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Design Agent to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Design Agent will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Design Agent's action will be taken in accordance with the submittal schedule approved by the Design Agent or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Design Agent's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Design Agent's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Design Agent's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Design Agent, of any construction means, methods, techniques, sequences or procedures. The Design Agent's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Design Agent will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Design Agent will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Design Agent will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Design Agent agree, the Design Agent will provide one or more project representatives to assist in carrying out the Design Agent's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Design Agent will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Design Agent's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Design Agent will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Design Agent will endeavor to secure faithful performance by both Owner and

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Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Design Agent's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents and approved by the Owner.

§ 4.2.14 The Design Agent will review and respond to requests for information about the Contract Documents. The Design Agent's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Design Agent will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner and the Design Agent the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Owner may reply within 14 working days to the Contractor in writing stating (1) whether the Owner or the Design Agent has reasonable objection to any such proposed person or entity or (2) that the Owner or Design Agent requires additional time for review.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Design Agent has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Design Agent has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Design Agent has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Design Agent makes reasonable objection to such substitution.

§ 5.2.5 MANUFACTURERS AND FABRICATORS

§ 5.2.5.1 Not later than 10 working days after the date of commencement of the Work, the Contractor shall furnish in writing to the Owner and the Design Agent the names of the manufacturers or fabricators for certain products, equipment, and systems identified in the Specifications and, where applicable, the name of the installing Subcontractor. The Owner may reply within 14 working days to the Contractor in writing, stating: (i) whether the Owner or the Design Agent has reasonable objection to any such proposed person manufacturer or fabricator; or (ii) whether the Owner or Design Agent requires additional time to review.

§ 5.2.5.2 The Contractor shall not contract with a proposed manufacturer, fabricator, or Subcontractor to whom the Owner or Design Agent has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

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§ 5.2.5.3 If the Owner or Design Agent has an objection to a manufacturer, fabricator, or Subcontractor proposed by the Contractor, the Contractor shall propose another to whom the Owner or Design Agent has no objection.

§ 5.2.5.4 The Contractor shall not substitute a manufacturer, fabricator, or Subcontractor previously selected if the Owner or Design Agent makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Design Agent. Upon the request of the User Agency and/or the Owner, the Contractor shall provide the User Agency and/or the Owner with copies of each subcontract agreement. Each subcontract agreement shall preserve and protect the rights of the Owner and Design Agent under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

(Paragraph deleted)

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 working days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

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§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Design Agent apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement between the Owner and the Contractor; a Construction Change Directive requires agreement by the Owner and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Design Agent alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Contractor and signed by the Owner, Contractor and Design Agent stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.2.2 Subsequent to the approval of a Change Order as provided in § 7.1.2, whether such Change Order changes the Contract Sum or Contract Time or both, no additional claim related to such Change Order will be considered by the

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Owner. Any change, once incorporated into a Change Order, is all inclusive, and includes all factors that could have been considered at the time of the Change Order such as Project impact or schedule "ripple" effect.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Design Agent and signed by the Owner, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.7.

§ 7.3.4 Deleted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Design Agent of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Design Agent shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in Section 7.3.1. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Design Agent may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

- .1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
- .2 Costs of materials, supplies and equipment, including cost of delivery;
- .3 Rental costs of machinery and equipment, exclusive of hand tools; or
- .4 Costs of premiums for all bonds and insurance and permit fees related to the Work..

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Design Agent. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Design Agent will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Design Agent determines, in the Design Agent's professional judgment, to be reasonably justified. The Design Agent's interim determination of cost shall adjust the Contract Sum on the same

basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Design Agent concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Contractor will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.3.11 The combined overhead and profit included in the total cost to the Owner for a change in the Work shall be based on the following schedule:

- .1 For the Contractor, for work performed by the Contractor's own forces, an amount not to exceed ten (10%) percent of the cost.
- .2 For the Contractor, for work performed by the Contractor's Subcontractors, an amount not to exceed five (5%) of the amount due to the Subcontractors.
- .3 For each Subcontractor, for work performed by the Subcontractor's own forces, an amount not to exceed ten (10%) percent of the cost.
- .4 Where the Work represents both additions and deletions and results in a net increase, the allowable overhead and profit shall be in accordance with this Section 7.3.11, but in no event shall the amount exceed fifteen (15%) percent of the net increase in the cost of the Work.

§ 7.3.12 All proposals with an aggregate cost equal to or in excess of \$500.00 shall be accompanied by a detailed itemization of costs, including labor, materials (quantities and prices), and Subcontracts, in a form acceptable to the Owner. In no event will a change order request reflecting an aggregate cost equal to or in excess of \$500.00 be approved without such itemization.

§ 7.4 MINOR CHANGES IN THE WORK

The Design Agent with the prior written approval of the Owner has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be affected by written order signed by the Design Agent and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

The date of commencement of the Work is the date established in Section 3.1 of the Agreement..

(Paragraph deleted)

§ 8.1.3 The date of Substantial Completion is the date certified by the Design Agent in accordance with Section 9.8.

§ 8.1.4 Deleted.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

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§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Design Agent, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control, then the Contract Time shall be extended by Change Order for such reasonable time as the Owner may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Within 20 working days of the issuance of the Purchase Order, and promptly if revision is necessary from time to time as a result of a Change Order, the Contractor shall submit to the Owner, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Design Agent and the Owner may require. This schedule, if and when approved by the Design Agent and the Owner in writing, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least 10 working days before the date established for each progress payment, the Contractor shall submit to the Design Agent and the Owner for approval an itemized Application for Payment prepared in accordance with the schedule of values for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or the Design Agent may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 All Applications for Payment for Change Orders must be accompanied by a Notice of Change in Purchase Order issued by the Owner, and if directed by the Owner, by the User Agency.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.1.3 The form of Application for Payment shall be AIA Document G702, Application and Certification for Payment, supported by AIA Document G702A, Continuation Sheet.

§ 9.3.1.4 Until final payment, the Owner shall pay ninety-five (95%) percent of the amount due the Contractor on account of progress payments.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall be

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free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work. The Contractor shall immediately satisfy any lien, claim, or encumbrance against the site where the Project is located and indemnify the Owner from and against all resulting costs and expenses, including without limitation, attorneys' fees.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Design Agent will, within 7 working days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Design Agent determines is properly due, or notify the Contractor and Owner in writing of the Design Agent's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Design Agent to the Owner, based on the Design Agent's evaluation of the Work and the data comprising the Application for Payment, that, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Design Agent. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Design Agent has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.4.3 The Contractor must submit all product literature, material and color samples with each Application for Payment, or as otherwise required by the Owner.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Design Agent will withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Design Agent's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Design Agent is unable to certify payment in the amount of the Application, the Design Agent will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Design Agent cannot agree on a revised amount, the Design Agent will promptly issue a Certificate for Payment for the amount for which the Design Agent is able to make such representations to the Owner. The Design Agent may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Design Agent's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of:

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a separate contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
- .7 failure to carry out the Work in accordance with the Contract Documents; or
- .8 any other failure to comply with the obligations of the Contractor under the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Design Agent withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the

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Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Design Agent and the Design Agent will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Design Agent has issued a Certificate for Payment and the Owner has approved the Certificate for Payment in writing, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Design Agent.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than 10 working days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Design Agent will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Design Agent and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within 7 working days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. The Owner shall have the right to withhold payment(s) to the Contractor in the event that any Subcontractors or material and equipment suppliers have not been properly paid. Neither the Owner nor Design Agent shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT

If the Design Agent does not issue a Certificate for Payment, through no fault of the Contractor, within 7 working days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within 7 working days after the date established in the Contract Documents the amount certified by the Design Agent or awarded by binding dispute resolution, then the Contractor may, upon 7 additional working days' written notice to the Owner and Design Agent, make a claim for payment as provided under the provisions of applicable law.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Design Agent a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Design Agent will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Design Agent's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Design Agent. In such case, the Contractor shall then submit a request for another inspection by the Design Agent to determine Substantial Completion. The Design Agent will perform no more than 2 inspections to determine whether the Work or a designated portion thereof has attained Substantial Completion in accordance with the Contract Documents. The Owner is entitled to reimbursement from the Contractor for amounts paid to the Design Agent for any additional inspections.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Design Agent will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment less the amount of five (5%) percent to be retained by the Owner until the first anniversary of Final Completion of the Work. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Design Agent as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Design Agent.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Design Agent shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Design Agent will promptly make such inspection and, when the Design Agent finds the Work acceptable under the Contract Documents and the Contract fully performed, the Design Agent will promptly issue a final Certificate for Payment stating that to the best of the Design Agent's knowledge, information and belief, and on the basis of the Design Agent's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Design Agent's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled. The Design Agent will perform no more than 2 inspections to determine whether the Work or a designated portion thereof has attained Final Completion in accordance with the Contract Documents. The Owner is entitled to reimbursement from the Contractor for amounts paid to the Design Agent for any additional inspections.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Design Agent (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 working days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner, and (6) all other close-out documents required by the Owner, including without limitation, all as-built plans, warranties, manuals, and other materials set forth in the Contract Documents. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Design Agent so confirms, the Owner shall, upon application by the Contractor and certification by the Design Agent, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Design Agent prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from:

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 claims permitted under the State of Rhode Island General Conditions of Purchase Regulation.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

§ 9.11 The Contractor and the Contractor's surety shall be liable for and shall pay the Owner as liquidated damages the sums specified in the Solicitation and Bid Form, or if completed, the amount set forth in Section 3.4 of the Agreement.

§ 9.12 Warranties required by the Contract Documents shall commence on the date of Final Completion of the Work.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to:

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel and in consultation with the appropriate governmental authorities.

§ 10.2.4.1 When use or storage of explosives, or other hazardous materials, substances or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall give the User Agency and the Owner reasonable advance notice.

§ 10.2.4.2 If the Contract Documents require the Contractor to handle materials or substances that under certain circumstances may be designated as hazardous, the Contractor shall handle such materials in an appropriate manner.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Design Agent or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Design Agent.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Design Agent in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Design Agent the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Design Agent will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons

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or entities proposed by the Owner. If either the Contractor or Design Agent has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Design Agent have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 To the extent permitted by the provisions of R.I. Gen. Laws §§ 9-31-1 et seq., the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Design Agent, Design Agent's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as is specified in the Solicitation and as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations; and
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

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§ 11.1.1.2 The Contractor's liability insurance shall include all major coverages and be on a comprehensive general liability basis.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance as specified in the Solicitation and as otherwise acceptable to the Owner shall be filed with the Owner and the User Agency prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 working days' prior written notice has been given to the Owner and the User Agency. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the User Agency, and their elected and appointed officials, members, employees, and agents, the Design Agent and the Design Agent's consultants as additional insureds for claims caused in whole or in part by the Contractor's acts or omissions during the Contractor's operations; and (2) the Owner, the User Agency, and their elected and appointed officials, members, employees, and agents, as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.1.5 The Contractor shall be responsible for the prompt payment to the Owner of any deductible amounts under any insurance policies required under the Contract Documents for claims made pursuant to such policies.

§ 11.2 OWNER'S LIABILITY INSURANCE.

§ 11.2.1 The Contractor shall furnish the Owner and the User Agency, through the Design Agent, an insurance certificate providing Owner's Protective Liability extended to include the interests of the Design Agent, and to protect the Owner, User Agency, and Design Agent from any liability which might be incurred against any of them as a result of any operation of the Contractor or Subcontractors or their employees or anyone for whom either the Contractor or Subcontractors are responsible. Such insurance shall be written for the same limits as the Contractor's comprehensive general liability insurance and shall include the same coverage.

§ 11.2.2 If the Owner engages separate contractors to perform work for, or in or around, the Project, it shall require in its contracts with each separate contractor that Contractor and its officers, directors, partners, members, employees, and agents shall be: (i) named as additional insureds on a primary, noncontributory basis to any commercial general liability, pollution liability, and excess liability insurance policies; and (ii) provided a waiver of subrogation on all workers compensation and professional liability insurance policies.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 The Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the state of Rhode Island, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the User Agency, the Contractor, Subcontractors and Sub-subcontractors in the Project. If the Owner and/or

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the User Agency incur any damages by failure of the Contractor to maintain such insurance, then the Contractor shall bear all reasonable cost resulting from such failure.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Design Agent's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 Deleted.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 Deleted.

§ 11.3.3 Deleted.

§ 11.3.4 Deleted.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Contractor shall file with the Owner a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 working days' prior written notice has been given to the Owner and the User Agency.

§ 11.3.7 WAIVERS OF SUBROGATION

The Contractor waives all rights against the Owner and the User Agency and any of their subcontractors, sub-subcontractors, agents and employees, and (2) the Design Agent, Design Agent's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Design Agent, Design Agent's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

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§ 11.3.8 A loss insured under this property insurance shall be adjusted by the Contractor as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Contractor's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Contractor shall deposit in a separate account proceeds so received, which the Contractor shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Contractor as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within 5 working days after occurrence of loss to the Contractor's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Contractor shall furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in the Solicitation.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Design Agent's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Design Agent, be uncovered for the Design Agent's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Design Agent has not specifically requested to examine prior to its being covered, the Design Agent may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Design Agent or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Design Agent's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Final Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. If

the Contractor fails to correct nonconforming Work within a reasonable time after receipt of notice from the Owner or Design Agent, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.2.4 Upon request by the Owner and prior to the expiration of one year from the date of Final Completion, the Design Agent will conduct and the Contractor shall attend 2 meetings with the Owner to review the facility operations and performance.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the State of Rhode Island.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to any executive, legislative, judicial, regulatory, or administrative body of the state, or any political subdivision thereof, including without limitation, any department, division, agency, commission, board, office, bureau, authority, school, water, or fire district, or other agency of Rhode Island state or local government that exercises governmental functions, any other governmental authority, and any quasi-public corporation and/or body corporate and politic. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice, or when received, if manually delivered or transmitted by electronic mail or facsimile to the last such address known to the party giving notice.

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§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Design Agent or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Design Agent timely notice of when and where tests and inspections are to be made so that the Design Agent may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Design Agent, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Design Agent will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Design Agent of when and where tests and inspections are to be made so that the Design Agent may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Design Agent's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Design Agent.

§ 13.5.5 If the Design Agent is to observe tests, inspections or approvals required by the Contract Documents, the Design Agent will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

No interest shall be due or payable on account of any payment due or unpaid under the Contract Documents except in accordance with the provisions of "Prompt Payment by Department of Administration," R.I. Gen. Laws §§ 42-11.1-1 et seq.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 calendar days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons

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or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency that requires all Work to be stopped; or
- .3 Because the Design Agent has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1

§ 14.1.2 Deleted.

§ 14.1.3 If one of the reasons described in Section 14.1.1 exists, the Contractor may, upon 7 working days' written notice to the Owner and Design Agent, terminate the Contract and recover from the Owner payment for Work executed.

§ 14.1.4 If the Work is stopped for a period of 60 calendar days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon 7 additional days' written notice to the Owner and the Design Agent, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor:

- .1 refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- .3 disregards or fails to comply with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority;
- .4 otherwise is guilty of breach of a provision of the Contract Documents; or
- .5 cancels or the Contractor or the Owner receives notice of cancellation or nonrenewal of any insurance required under the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, 7 working days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Design Agent's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

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§ 14.3.2 The

(Paragraphs deleted)

Owner shall not be liable to the Contractor or any Subcontractor for claims or damages of any nature caused by or arising out of any delays. The sole remedy against the Owner for delays shall be the allowance of additional time for completion of the Work in accordance with the provisions of Section 8.3.1.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall:

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party. Such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly serviced if delivered in person, by mail, by courier, or by electronic transmission. Claims by either party must be initiated within 21 working days after occurrence of the event giving rise to such Claim or within 21 working days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Design Agent will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.5.3 Claims for increase in the Contract Time shall set forth in detail the circumstances that form the basis for the Claim, the date upon which each cause of delay began to affect the progress of the Work, the date upon which each cause of delay ceased to affect the progress of the Work and the number of days' increase in the Contract Time claimed as a consequence of each such cause of delay. The Contractor shall provide such supporting documentation as the Owner may require including, where appropriate, a revised construction schedule indicating all the activities affected by the circumstances forming the basis of the Claim.

§ 15.1.5.4 The Contractor shall not be entitled to a separate increase in the Contract Time for each one of the number of causes of delay which may have concurrent or interrelated effects on the progress of the Work, or for concurrent delays due to the fault of the Contractor.

§ 15.1.6

(Paragraphs deleted)

Deleted.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims shall be referred to the Initial Decision Maker for initial decision. The University of Rhode Island Vice President for Administration and Finance appointed pursuant to the provisions of the "Delegation of Limited Procurement Authority," dated January 19, 2018, will serve as the Initial Decision Maker in accordance with the provisions of the "Delegations of Limited Procurement Authority," State Purchases Act, State of Rhode Island Procurement Regulations, and this Section 15.2.1. An initial decision shall be required as a condition precedent to binding dispute resolution pursuant to Section 15.3.1 of any Claim arising prior to the date final payment is due.

§ 15.2.2 Deleted.

§ 15.2.3 Deleted.

§ 15.2.4 Deleted.

§ 15.2.5 Deleted.

§ 15.2.6 Deleted.

§ 15.2.6.1 Deleted.

§ 15.2.7 Deleted.

§ 15.2.8 Deleted.

§ 15.3 MEDIATION

§ 15.3.1 For any Claim not resolved by the Initial Decision Maker procedures set forth in Section 15.2.1, and prior to the implementation of the binding dispute resolution procedures set forth in Section 15.4.1, the Contractor or the Architect shall have the option to pursue mediation, exercisable by written notice to the Owner within 30 calendar days of an Initial Decision. In the event of the exercise of such option by the Contractor or the Architect, the Owner and the Contractor or the Architect shall attempt to select a mediator, and in the event that the Owner and the Contractor or the Architect cannot agree on a mediator, either party may apply in writing to the Presiding Justice of the Providence County Superior Court, with a copy to the other, with a request for the court to appoint a mediator, and the costs of the mediator shall be borne equally by both parties.

§ 15.3.2 Deleted.

§ 15.3.3 Deleted.

§ 15.4 BINDING DISPUTE RESOLUTION

§ 15.4.1 For any Claim not resolved by the Initial Decision Maker procedures set forth in Section 15.2.1, or mediation at the option of the Contractor pursuant to Section 15.3.1, the method of binding dispute resolution shall be determined in accordance with the provisions of the "Public Works Arbitration Act," R.I. Gen. Laws §§ 37-16-1 et seq.

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User Notes:

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(Paragraphs deleted)

§ 15.4.4 Deleted.

§ 15.4.4.1 Deleted.

§ 15.4.4.2 Deleted.

§ 15.4.4.3 Deleted.

§ 16 COMPLIANCE WITH APPLICABLE LAW

The Contractor and its Subcontractors shall comply with all applicable federal, state, and local laws.

DOCUMENT 00 7200 – URI STANDARD DOCUMENTS

PART 1 – GENERAL

- 1.1 The latest version of the following documents, available on the URI Capital Projects website, <http://web.uri.edu/capitalprojects/manual-for-construction-project-safety-procedures/>, will apply to all of the work of this project and are hereby incorporated by reference:

URI Sexual Harassment Policy
Manual for Construction Project Safety Procedures
Hot Work Procedure
Managing Fire Protection System Impairment
URI Water System Regulations/Policies

END OF DOCUMENT

SECTION 01 1000 - SUMMARY

PART 1 - GENERAL

1.01 PROJECT

- A. See Supplemental General Conditions for official Project Information.
- B. The Project consists of the construction of the following types of work:
 - 1. The scope of work consists of the construction of artificial turf field and stadium lighting for Meade Stadium. The work will include demolition, site clearing, excavation, placement of fill materials, drainage, retaining walls, wall repair and cleaning, fence and gates, electrical power, communication conduit, lighting, field equipment, and erosion and sediment controls.

1.02 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 5200 - Agreement.

1.03 DESCRIPTION OF WORK

- A. Scope of construction work is shown on drawings and/or as specified herein.
- B. Site modifications: The existing natural grass turf will be removed and replaced with artificial turf surface. Stadium lighting will be installed for the football field.

1.04 OWNER OCCUPANCY/SCHEDULE

- A. Owner will not occupy facilities. Work areas will be made available as mutually agreed to during project scheduling. See Attachment A at the end of this section for availability and restrictions on access to spaces.
- B. Work to begin within 7 days of receipt of Purchase Order.
- C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

1.05 CONTRACTOR USE OF SITE AND PREMISES

- A. Construction Operations: Limited to areas noted on Drawings. Coordinate with Attachment A following this section. Include all costs of this coordination, including all premium time wages that may be required to meet these requirements, in the Base bid.
- B. Arrange use of site and premises to allow:
 - 1. Adjacent projects to progress as planned for the Owner.
 - 2. Use of street and adjacent properties by the Public.
 - 3. Continued operation of the facility in accordance with Attachment A.

- C. Provide access to and from site as required by law and by Owner:
 - 1. Maintain appropriate egress for workforce and users of the facility.
 - 2. Do not obstruct roadways, sidewalks, or other public ways without permit. Provide necessary signage and barriers to direct pedestrians around work areas.
- D. Time Restrictions:
 - 1. Limit conduct of especially noisy work when events are in process. No night work is allowed.
- E. Utility Outages and Shutdown:
 - 1. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
 - 2. Prevent accidental disruption of utility services to other facilities.

1.06 ITEMS TO BE SALVAGED

- A. Existing irrigation control system is to be removed and provided to the University.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION – NOT USED

END OF MAIN SECTION – See Attachment A, B, and C following.

01 1010 SUMMARY – Attachment A

NOTE:

Unrestricted = Contractor to plan and schedule work and submit for review by Owner

Limited Restriction = Contractor to meet with Owner and coordinate access to these areas

Restricted = Contractor to perform work on dates provided in this document

GENERAL NOTES:

1. Parking for employees is restricted to areas designated by the University.
2. Equipment shall not be parked outside of the limit of disturbance.
3. Permanent stockpiles and storage of materials is not allowed outside of the football field fence limits. All temporary stockpiles and storage of materials is permitted within the limits of disturbance (LOD) indicated on the Plans during work hours.

END OF DOCUMENT



OFFICE OF CAPITAL PROJECTS

Sherman Building, 523 Plains Road, Kingston, RI 02881 USA p: 401.874.2725 f: 401.874.5599

Fire Sprinkler and Alarm System Impairment Notification Form

To: URI Office of Capital Projects

Date _____

Start of Planned Impairment: _____

End of Planned Impairment: _____

Building occupied during impairment: Yes: _____ No: _____

Any hot work to be performed: Yes: _____ No: _____

Description of Work to be performed: _____

URI Manager of Alarms, Mike Suriani, can also be directly contacted at 401-639-2268.

Contractor supervisory personnel shall remain in the building for the entire duration of the impairment.

Name: _____

Company: _____

Phone: _____

01 1030 SUMMARY - Attachment C
Abatement Plan

Not Applicable.

SECTION 011630

PRODUCT SUBSTITUTION PROCEDURE
ITEM 2 STADIUM LIGHTING
BID ALTERNATE 1 AND 2

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Item -2 - Stadium Lighting
2. Bid Alternate 1 - Dual Polymer Turf System: Field Turf Core & AstroTurf Trionic
3. Bid Alternate 2 - Non-floating rubber infill.

- B. Related Sections: Construction Drawings, Technical Specifications, Addenda, and general provisions of the Contract, including Contract General Conditions and Supplementary General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUBSTITUTION PROVISIONS

- A. General: The contract presents two bid alternatives and Item 2 – Stadium Stadium Lighting for products with specific brands or trade names or requirements. Alternative products for these Bid Alternates which are of equal quality and of the required characteristics for the purpose intended may be proposed for use provided the Contractor complies with provisions presented herein.

1. Substitutions must be submitted 14 days in advance of the bid date to the University for Approval.
2. If the proposed substitution is approved by the University, the use of the substitute product shall be issued by an addendum.

B. Substitution Provisions:

1. Documentation: Substitutions will not be considered if they are not submitted 14 days prior to the bid.
2. Design Revision: Substitutions will not be considered if acceptance will require substantial revision of the Contract Documents or will substantially change the intent of the design, in the opinion of the Engineer. The intent of the design shall include functional performance and aesthetic qualities.
3. Data: It shall be the responsibility of the Contractor to provide adequate data demonstrating the merits of the proposed substitution, including cost data and information regarding changes in related Work.
4. Determination by Engineer: Engineer and University's Representative will determine the acceptability of proposed substitutions, and University's Representative will notify bidders via addendum of acceptance or rejection. The determination by the Engineer regarding functional performance and aesthetic quality shall be final.
5. Substitution Limitation: Only one request for substitution will be considered for each product.

C. Request for Substitution Procedures:

1. Contractor shall prepare a request for substitution and submit the request to Engineer through University's Representative for review and recommendation for acceptance. Acceptance and approval of substitutions shall be by University's Representative.

2. Substitution requests shall include complete product data, including drawings and descriptions of products, fabrication details and installation procedures. Include samples where applicable or requested.
3. Substitution requests shall include appropriate product data for the specified product(s) of the specified manufacturer, suitable for use in comparison of characteristics of products.
 - a. Include a written, point-by-point comparison of characteristics of the proposed substitute product with those of the specified product.
 - b. Include a detailed description, in written or graphic form as appropriate, indicating all changes or modifications needed to other elements of the Work and to construction to be performed by the University and by others under separate contracts with University that will be necessary if the proposed substitution is accepted.
4. Substitution requests shall include a statement indicating the substitution's effect on the Construction Schedule. Indicate the effect of the proposed substitution on overall Contract Time and, as applicable, on completion of portions of the Work for use by University or for work under separate contracts by University.
5. Substitution requests shall include signed certification that the Contractor has reviewed the proposed substitution and has determined that the substitution represents an equivalent or superior condition in every respect to product requirements and value indicated or specified in the Contract Documents, and that the substitution is suited for and can perform the purpose or application of the specified product indicated or specified in the Contract Documents.
6. If, in the opinion of the Engineer, the substitution request is incomplete or has insufficient data to enable a full and thorough review of the intended substitution, the substitution may be summarily refused and determined to be unacceptable.

END OF SECTION

SECTION 01 2000 - PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Allowances.
- B. Testing and inspection allowances.
- C. Schedule of values.
- D. Applications for payment.
- E. Warranty inspection retainage.
- F. Sales tax exemption.
- G. Change procedures.
- H. Defect assessment.
- I. Unit prices.
- J. Alternates.

1.02 ALLOWANCES

- A. See General Conditions Article 3.8 for Allowance provisions.
- B. Design Agent Responsibility:
 - 1. Consult with Contractor for consideration and selection of products, suppliers, and Installers.
 - 2. Select products in consultation with Owner and transmit decision to Contractor.
 - 3. Prepare Change Order to adjust final cost.
- C. Contractor Responsibility:
 - 1. Assist Design Agent or its Consultants in selection of products, suppliers and installers.
 - 2. Obtain proposals from suppliers and installers, and offer recommendations.
 - 3. On notification on selection by Design Agent, execute purchase agreement with designated supplier and installer.
 - 4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
 - 5. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.
- D. Schedule of Allowances: See Attachment A.

1.03 TESTING AND INSPECTION ALLOWANCE

- A. All costs of regularly scheduled testing are included in the Base Bid. See Attachment A for allowance to cover costs of additional testing to be provided when directed by the Owner.
- B. See Section 01 4000 and its attachment for testing requirements.

1.04 SCHEDULE OF VALUES

- A. Submit Schedule of Values in duplicate, one copyrighted original and one copy.
- B. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the major specification Section. Identify site mobilization, bonds, insurance and closeout.
- C. Include in each line item, the amount of Allowances specified in this Section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.
- D. Include separately for each line item, a direct proportional amount of Contractor's overhead and profit.
- E. Revise schedule to list approved Change Orders, with each Application for Payment.

1.05 APPLICATIONS FOR PAYMENT

- A. Submit each application on an original AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet, accompanied by three copies.
 - 1. Prepare a draft version "pencil copy" of each application and distribute via email 5 days prior to due date for review by Design Agent and Owner's representative.
 - 2. After making agreed revisions, individually sign and notarize and emboss with notary's official seal, the original and each of the three copies. Deliver to Owner's representative for further processing and distribution.
 - 3. Applications not including original copyrighted AIA G702, and G703 Forms, will be rejected, and returned for re-submittal.
 - 4. Applications not properly signed and notarized will be rejected, and returned for re-submittal.
 - 5. Applications submitted without the following items described in this section and its attachments will be returned for resubmittal.
- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- C. Provide one hard copy and one copy in disc form of the updated construction schedule with each Application for Payment submission, prepared per Section 01 3300.

1. Provide a statement signed by the Contractor's firm principal certifying that there are no unidentified outstanding claims for delay.
- D. Include with each monthly Application for Payment, following the first application, Certified Monthly Payroll Records with proper compliance cover sheet for the previous month's pay period. Identify MBE/DBE subcontractors and hours worked in a format acceptable to URI. See Attachment A this section for current State and Federal requirements.
- E. Submit with transmittal letter as specified for Submittals in Section 01 3300.
- F. Beginning with the second Application for Payment, Contractor's right to payment must be substantiated by documenting, on a copy of the URI Waiver of Lien Form included in Document 00 6140 - Waiver of Lien Form in this Project Manual, that payment monies due, less retainage not exceeding ten percent, have been paid in full to subcontractor and suppliers for work, materials, or rental of equipment billed for under specific line item numbers in the immediately preceding application.
- G. Substantiating Data: When the Owner or Design Agent requires additional substantiating information from the review of the "pencil copy", submit data justifying dollar amounts in question.
- H. In addition to the items above, include the following with the Application for Payment :
 1. Record Documents as specified in Section 01 7800, for review by the Owner which will be returned to the Contractor.
 2. Affidavits attesting to off-site stored products with insurance certificates as requested.
 3. Digital Photographs as specified in Section 01 3300. Include on same disc with construction schedule.
- I. Payment Period: Submit at monthly intervals unless stipulated otherwise in the Supplemental General Conditions.

1.06 WARRANTY INSPECTION RETAINAGE

- A. A percentage of job cost as defined in Attachment A will be retained from Final Payment for a duration of ten months. If, after ten months, all systems including mechanical and electrical, are determined by the Owner to be properly functioning, the Warranty Inspection Retainage will be released.
- B. If, after ten months, there are found to be modifications, adjustments, or corrections necessary to be made to address any system or product malfunction, in order to fulfill specified performance or requirements of such systems or products, release of the warranty inspection retainage will be delayed until such malfunctions are rectified.
- C. If, after twelve months from the date of Final Completion, all systems have not been fully addressed, the Owner may utilize the Warranty Inspection Retainage to hire others to execute necessary modifications, adjustments, or corrections.

1.07 SALES TAX EXEMPTION

- A. Owner is exempt from sales tax on products permanently incorporated in Work of the Project.
 - 1. Obtain sales tax exemption certificate number from Owner.
 - 2. Place exemption certificate number on invoice for materials incorporated in the Work of the Project.
 - 3. Furnish copies of invoices to Owner.
 - 4. Upon completion of Work, file a notarized statement with Owner that all purchases made under exemption certificate were entitled to be exempt.
 - 5. Pay legally assessed penalties for improper use of exemption certificate number.

1.08 CHANGE PROCEDURES

- A. Submittals: Submit name of the individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.
- B. The Design Agent will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time by issuing supplemental instructions on AIA Form G710.
- C. The Design Agent may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required, and the period of time during which the requested price will be considered valid. Contractor will prepare and submit an estimate within 15 days.
- D. The Contractor may propose changes by submitting a request for change to the Design Agent, describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation, and a statement describing the effect on Work by separate or other Contractors. Document any requested substitutions in accordance with Section 01 6000.
- E. Stipulated Sum Change Order: Based on Proposal Request, and Contractor's fixed price quotation, or Contractor's request for a Change Order as approved by Design Agent.
- F. Unit Price Change Order: For contract unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute the Work under a Construction Change Directive. Changes in the Contract Sum or Contract Time will be computed as specified for a Time and Material Change Order.
- G. Construction Change Directive: Design Agent may issue a directive, on AIA Form G713 Construction Change Directive signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in the Contract Sum or Contract Time. Promptly execute the change.

- H. Time and Material Change Order: Submit an itemized account and supporting data after completion of the change, including timeslips signed by Owner's representative, within the time limits indicated in the Conditions of the Contract. The Design Agent will determine the change allowable in the Contract Sum and Contract Time as provided in the Contract Documents. Only Owner-representative-signed timeslips will be considered.
- I. Maintain detailed records of work done on a Time and Material basis. Submit timeslips daily for verification and sign-off by Owner's representative on-site. Provide full information required for an evaluation of the proposed changes, and to substantiate costs for the changes in the Work.
- J. Document each quotation for a change in cost or time with sufficient data to allow an evaluation of the quotation. Provide detailed breakdown of costs and estimates for labor and materials including a detailed breakdown for subcontractor's or vendor's Work. Include copies of written quotations from subcontractors or vendors.
- K. Change Order Forms: AIA G701 Change Order.
- L. Execution of Change Orders: The Design Agent will issue Change Orders for signatures of the parties as provided in the Conditions of the Contract.
- M. Correlation Of Contractor Submittals:
 - 1. Promptly revise the Schedule of Values and the Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum. Promptly revise progress schedules to reflect any change in the Contract Time, revise sub-schedules to adjust times for any other items of work affected by the change, and resubmit.
 - 2. Promptly enter changes in the Project Record Documents.

1.09 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to specified requirements.
- B. If, in the opinion of the Design Agent, it is not practical to remove and replace the Work, the Design Agent will direct an appropriate remedy or adjust payment.
- C. The defective Work may remain, but the unit sum will be adjusted to a new sum at the discretion of the Design Agent.
- D. The defective Work will be partially repaired to the instructions of the Design Agent, and the unit sum will be adjusted to a new sum at the discretion of the Design Agent.
- E. The individual Specification Sections may modify these options or may identify a specific formula or percentage sum reduction.

- F. The authority of the Design Agent to assess the defect and identify a payment adjustment, is final.
- G. Non-Payment for Rejected Products: Payment will not be made for rejected products for any of the following:
 - 1. Products wasted or disposed of in a manner that is not acceptable.
 - 2. Products determined as unacceptable before or after placement.
 - 3. Products not completely unloaded from the transporting vehicle.
 - 4. Products placed beyond the lines and levels of the required Work.
 - 5. Products remaining on hand after completion of the Work.
 - 6. Loading, hauling, and disposing of rejected products.

1.10 UNIT PRICES

- A. See Attachment A.

1.11 ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at the Owner's option. Accepted Alternates will be identified in the Purchase Order.
- B. Coordinate related work and modify surrounding work as required.
- C. Schedule of Alternates: See Attachment A.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

01 2010 PRICE AND PAYMENT PROCEDURES - Attachment A

A. Testing Allowance

An allowance is listed in the Bid Form. This allowance allows the Contractor, with the approval of the Owner, to retain the services of a qualified Materials Testing Company to conduct various soil testing including, but not limited to, sieve analysis, soil compaction, modified proctors, concrete sampling and strength. The scope of the soil testing program will be developed by the Design Agent/Engineer. The Contractor will transmit the scope of the testing program to the Materials Testing Company together with a request for a firm quotation for the work. When the Contractor receives the quotation from the Materials Testing Company and he finds it fair and reasonable, he shall provide to the Owner. The Owner will review the Contractor's submission and if satisfaction, the Contractor shall notify the Materials Testing Company to proceed forthwith.

B. Utility Allowance

A utility allowance is listed on the Bid Form. This allowance allows the Contractor, with the approval of the Owner (and owner of the utility, if different from the Owner), to conduct certain repairs and/or modifications to subsurface utilities. The scope of any such utility work will be developed by the Design Agent/Engineer.

C. Rock Excavation Allowance

A rock excavation allowance is listed on the Bid Form. This allowance allows the Contractor, with the approval of the Owner, for payment of rock material under the unit bid price. The scope of any such rock excavation will be reviewed and approved by the Design Agent/Engineer.

D. Unsuitable Material Allowance

An unsuitable material allowance is listed on the Bid Form. This allowance allows the Contractor, with the approval of the Owner, to remove unsuitable material encounter at depths greater than anticipated. The scope of any such removal of unsuitable material will be reviewed and approved by the Design Agent/Engineer.

E. Soil Boring Allowance

A soil boring allowance is listed on the Bid Form. This allowance allows the Contractor, with the approval of the Owner, to perform additional borings for the design of the stadium light foundations. The location of the one boring provided in the Contract Document could not be taken at the foundation location due to equipment accessibility. The scope of any additional borings will be reviewed and approved by the Design Agent/Engineer.

F. Unit Prices

A unit price is solicited under Section 3 of the BID FORM for Rock Excavation – as specified in Section 31 2317 Rock Excavation. The unit price shall be measured per Cubic Yard (CY) for the fixed quantity defined in the BID FORM. The total amount calculated in Section 3. UNIT PRICES of the BID FORM shall be included in the price provided in Section 1. BASE BID. The unit bid price and quantity allow the Contractor, with the approval of the Owner to remove rock and ledge as defined in the specification for Rock Excavation at the specified UNIT BID PRICE.

G. Alternates

There are two alternates provided in the Bid Documents. These are as follows.

- Bid Alternate 1 is to provide a dual polymer turf system manufactured by FieldTurf Core or AstroTurf Trionic or approved equal, reference Section 011630 Product Substitutions Procedure. The price stated shall be for the added cost of providing the premium turf product.
- Bid Alternate 2 is to provide a non-floating rubber infill manufactured by FieldTurf or approved equal, reference Section 011630 Product Substitutions Procedure. The price state shall be for the added cost of providing the premium infill product.

H. Payroll Reporting

1. Forms for the submission of Certified Payroll Records may be found from the Rhode Island [Prevailing Wage Website](#) in either PDF or Excel formats. These forms must be used on monthly submittals.
2. Identify Apprenticeship hours required under RIGL 37-13-3.1 for all contracts over \$1 million in value.
3. A Minority Utilization Report for minority subcontractors must be included. Use the form provided as Attachment B.

I. Warranty Inspection Retainage

1. One-half of one percent of the cost of the Work will be retained from Final Payment for this purpose.

END OF ATTACHMENT

MBE Compliance Office Attachment B – 01 2020
1 Capitol Hill, 2nd Floor
Providence, RI 02908
401-574-8670, 401-574-8387 (fax)

www.mbe.ri.gov (website)

Pursuant to RIGL 37-14.1 as well as the regulations promulgated thereto, the MBE Compliance Office requires that you complete the following table. Please note that these figures will be verified with the MBEs identified. If there are outstanding issues, such as retainage or a dispute, please indicate and attach supporting documentation for same. Also note that copies of invoice and cancelled checks for payment to all MBE subcontractors and suppliers are required.

Contractor/Vendor Name:

Project Name & Location:

Original Prime Contract Amount: \$ _____

Current Prime Contract Amount: _____

MBE/WBE Subcontractor	Original Contract Amount	Change Orders	Revised Contract Value	% Completed To Date	Amount Paid To Date	Amount Due	Retainage %	Retainage Amount	Explanation

I declare, under penalty of perjury, that the information provided in this verification form and supporting documents is true and correct.

Signature

Date

Printed Name

Notary Certificate:

Sworn before me this ____ day of _____, 2012.

Notary Signature

Commission Expires

SECTION 01 3000 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Site administration
- B. Coordination and project conditions.
- C. Preconstruction meeting.
- D. Site mobilization meeting.
- E. Progress meetings.
- F. Pre-installation meetings.

1.02 SITE ADMINISTRATION

- A. Maintain a daily attendance log to include the names of all project employees and guests to the site. Each guest signing the log should indicate a brief description of the reason for the visit, the guest's employer or organization. The log sheet, or sheets, must clearly indicate the Project Name, and the name of the Prime contractor. Each line in the log should allow for the name of that employee, the employee's job title (use terminology used by prevailing wage job title), and the name of that employee's employer. This log shall be kept on a uniform form prescribed by the Director of Labor and Training. Such log shall be available for inspection on the site at all times by the Purchaser, Owner, and/or the Director of the Department of Labor and Training and his or her designee. Provide copies when requested. The log shall comply with requirements of RIGL 37-12-12(c.).

1.03 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate the scheduling, submittals, and the Work of the various Sections of the Project Manual to ensure an efficient and orderly sequence of the installation of interdependent construction elements.
- B. Verify that the utility requirements and characteristics of the operating equipment are compatible with the building utilities. Coordinate the Work of the various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate the space requirements, supports and installation of the mechanical and electrical Work, which are indicated diagrammatically on the Drawings. Follow the routing shown for the pipes, ducts, and conduit, as closely as practicable; place runs parallel with the lines of the building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

- D. Coordinate the completion and clean up of the Work of the separate Sections in preparation for Substantial Completion and for portions of the Work designated for the Owner's partial occupancy.
- E. After the Owner's occupancy of the premises, coordinate access to the site for correction of defective Work and the Work not in accordance with the Contract Documents to minimize disruption of the Owner's activities.

1.04 PRECONSTRUCTION MEETING

- A. The Design Agent will schedule a meeting after a Purchase Order is issued to the Contractor.
- B. Attendance Required: Owner's Representative, Design Agent, and Contractor.
- C. Agenda:
 - 1. Distribution of the Contract Documents.
 - 2. Submission of a list of Subcontractors, a list of products, schedule of values, and a progress schedule.
 - 3. Designation of the personnel representing the parties in the Contract and the Design Agent.
 - 4. The procedures and processing of the field decisions, submittals, substitutions, applications for payments, proposal requests, Change Orders, and Contract closeout procedures.
 - 5. Scheduling.
- D. Contractor shall record the minutes and distribute copies within two days after the meeting to the participants, with copies to the Design Agent, Owner, other participants, and those consultants affected by the decisions made.

1.05 SITE MOBILIZATION MEETING

- A. The Design Agent will schedule a meeting at the Project site prior to the Contractor's occupancy and may occur at the same time as the Preconstruction meeting noted above.
- B. Attendance Required: The Owner, Design Agent, Contractor, the Contractor's Superintendent, and major Subcontractors.
- C. Agenda:
 - 1. Use of the premises by the Owner and the Contractor.
 - 2. The Owner's requirements and partial occupancy.
 - 3. Construction facilities and controls provided by the Owner.
 - 4. Temporary utilities provided by the Owner.
 - 5. Security and housekeeping procedures.
 - 6. Schedules.
 - 7. Application for payment procedures.
 - 8. Procedures for testing.

9. Procedures for maintaining the record documents.
10. Requirements for the start-up of equipment.
11. Inspection and acceptance of the equipment put into service during the construction period.

- D. Contractor shall record the minutes and distribute the copies within two days after the meeting to the participants, with copies to the Design Agent, Owner, other participants, and those consultants affected by the decisions made.

1.06 PROGRESS MEETINGS

- A. Schedule and administer the meetings throughout the progress of the Work at weekly intervals while work is in process.
- B. Make arrangements for the meetings, prepare the agenda with copies for the participants, and preside at the meetings.
- C. Attendance Required: The job superintendent, major subcontractors and suppliers, the Owner, Design Agent, and Consultants as appropriate to agenda topics for each meeting.
- D. Agenda:
 1. Review the minutes of previous meetings.
 2. Review of the Work progress.
 3. Field observations, problems, and decisions.
 4. Identification of the problems which impede the planned progress.
 5. Review of the submittals schedule and status of the submittals.
 6. Review of delivery schedules.
 7. Maintenance of the progress schedule.
 8. Corrective measures to regain the projected schedules.
 9. Planned progress during the succeeding work period.
 10. Coordination of the projected progress.
 11. Maintenance of the quality and work standards.
 12. Effect of the proposed changes on the progress schedule and coordination.
 13. Other business relating to the Work.
- E. Contractor shall record the minutes and distribute the copies within two days after the meeting to the participants, with copies to the Design Agent, Consultants, Owner, participants, and others affected by the decisions made.

1.07 PREINSTALLATION MEETINGS

- A. When required in the individual specification Sections, convene a pre-installation meeting at the site prior to commencing the Work of the Section.
- B. Require attendance of the parties directly affecting, or affected by, the Work of the specific Section.

- C. Notify the Design Agent four days in advance of the meeting date.
- D. Prepare an agenda and preside at the meeting:
 - 1. Review the conditions of installation, preparation and installation procedures.
 - 2. Review coordination with the related work.
- E. Record the minutes and distribute the copies within two days after the meeting to the participants, with copies to the Design Agent, Owner, participants, and those Consultants affected by the decisions made.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

01 3010 ADMINISTRATIVE REQUIREMENTS - Attachment A

A. Pre-installation Meetings

1. Site Demolition - Removal of top soil, fencing and gates.
2. Placement of septic gravel on bottom of drainage system.
3. Installation of light foundations
4. Installation of retaining walls
5. Cleaning and Repair of existing retaining walls.
6. Placement of field turf.

END OF ATTACHMENT

SECTION 01 3300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Proposed products list.
- D. Product data.
- E. Shop drawings.
- F. Design Data.
- G. Samples.
- H. Test reports.
- I. Certificates.
- J. Manufacturer's instructions.
- K. Manufacturer's field reports.
- L. Digital Photographs.
- M. Erection drawings.
- N. Construction photographs.

1.02 SUBMITTAL PROCEDURES

- A. Master List Submittal:
 - 1. Submit a master list of the required submittals with a proposed date for each item to be submitted. See Attachment A for initial minimum list on which to base master.
 - 2. Show the date submittal was sent, days since submittal was sent, status of submittal, date submittal was received in return, and any date associated with resubmittals.
 - 3. Up date master list with each submission and response.
 - 4. Issue copy of master list at least monthly to the Design Agent.

- B. Transmit each submittal with a dated Design Agent-accepted transmittal form.
- C. Transmit printed copies and electronic PDF copy of each submittal to the Design Agent for review and comment as outlined in each section below.
- D. Sequentially number the transmittal form. Mark revised submittals with an original number and a sequential alphabetic suffix.
- E. Identify the Project, Contractor, subcontractor and supplier; the pertinent drawing and detail number, and the specification Section number, appropriate to the submittal.
- F. Apply a Contractor's electronic stamp certifying that the review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of the information is in accordance with the requirements of the Work and the Contract Documents.
- G. Schedule submittals to expedite the Project, and deliver to the Design Agent's FTP site. Coordinate the submission of related items.
- H. For each submittal, allow 15 days for review.
- I. Identify all variations from the Contract Documents and any Product or system limitations which may be detrimental to a successful performance of the completed Work.
- J. Allow space on the submittals for the Contractor's, Design Agent's, and Consultant's electronic review stamps.
- K. When revised for resubmission, identify the changes made since the previous submission.
- L. Distribute copies of the reviewed submittals as appropriate. Reproduce as necessary to inform subcontractors without internet download capabilities. Instruct the parties to promptly report any inability to comply with the Contract requirements.
- M. Produce additional copies as required for the Record Document purposes as described in Section 01 7800.

1.03 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit initial progress schedule in duplicate within 20 days after Date of Commencement for Design Agent to review. After a review, submit detailed schedules within 15 days modified to accommodate the revisions recommended by the Design Agent and Owner.

- B. Distribute copies of the reviewed schedules to the Project site file, subcontractors, suppliers, and other concerned parties. Instruct the recipients to promptly report, in writing, the problems anticipated by the projections indicated in the schedules
- C. Submit updated schedules with each Application for Payment, identifying changes since previous version as follows:
 - 1. Indicate the progress of each activity to the date of submittal, and the projected completion date of each activity.
 - 2. Identify the activities modified since the previous submittal, major changes in the scope, and other identifiable changes.
 - 3. Provide a narrative report to define the problem areas, the anticipated delays, and impact on the Schedule. Report the corrective action taken, or proposed, and its effect including the effect of changes on the schedules of separate contractors.
- D. Submit a computer-generated horizontal bar chart with separate line for each major portion of the Work or operation, identifying the first work day of each week.
- E. Show a complete sequence of construction by activity, identifying the Work of separate stages and other logically grouped activities. Indicate the early and late start, the early and late finish, float dates, and duration.
- F. Indicate an estimated percentage of completion for each item of the Work at each submission.
- G. Provide a separate schedule of submittal dates for shop drawings, product data, and samples, including Owner-furnished Products and Products identified under Allowances, if any, and the dates reviewed submittals will be required from the Design Agent. Indicate the decision dates for selection of the finishes.
- H. Indicate the delivery dates for Owner furnished Products, and for Products identified under Allowances.

1.04 PROPOSED PRODUCTS LIST

- A. Within 20 days after the Date of Commencement, submit a list of major products proposed for use, with the name of the manufacturer, the trade name, and the model number of each product.
- B. For the products specified only by reference standards, give the manufacturer, trade name, model or catalog designation, and reference standards.
- C. With each product listed, indicate the submittal requirements specified to be adhered to, and an indication of relevant "long-lead-time" information , when appropriate.

1.05 PRODUCT DATA

- A. Product Data: Submit to the Design Agent for review for the limited purpose of checking for conformance with the information given and the design concept expressed in the Contract Documents. Provide copies and distribute in accordance with the SUBMITTAL PROCEDURES article and for the record documents purposes described in Section 01 7800.
- B. Submit one (1) printed copy and one (1) electronic PDF copy for review. The Design Agent will retain the reviewed printed copy for record and return the reviewed electronic PDF copy to the Contractor for distribution.
- C. Mark each copy to identify the applicable products, models, options, and other data. Supplement the manufacturers' standard data to provide the information specific to this Project.
- D. Indicate the product utility and electrical characteristics, the utility connection requirements, and the location of utility outlets for service for functional equipment and appliances.
- E. After a review distribute in accordance with the Submittal Procedures article above and provide copies for record documents described in Section 01 7800.

1.06 SHOP DRAWINGS

- A. Shop Drawings: Submit to the Design Agent for review for the limited purpose of checking for conformance with the information given and the design concept expressed in the Contract Documents. Produce copies and distribute in accordance with the SUBMITTAL PROCEDURES article and for the record documents purposes described in Section 01 7800.
- B. Submit two (2) printed copies and one (1) electronic PDF copy for review. The Design Agent and /or Consultants will retain the reviewed printed copies for record and return the reviewed electronic PDF copy to the Contractor for distribution.
- C. Indicate the special utility and electrical characteristics, the utility connection requirements, and the location of utility outlets for service for functional equipments and appliances.

1.07 SAMPLES

- A. Samples: Submit to the Design Agent for review for the limited purpose of checking for conformance with the information given and the design concept expressed in the Contract Documents. Produce duplicates and distribute in accordance with the

SUBMITTAL PROCEDURES article and for the record documents purposes described in Section 01 7800.

- B. Samples for Selection as Specified in Product Sections:
 - 1. Submit to the Design Agent for aesthetic, color, or finish selection.
 - 2. Submit samples of the finishes in the colors selected for the Design Agent's records.
 - 3. After review, produce duplicates and distribute in accordance with the SUBMITTAL PROCEDURES article and for the record documents purposes described in Section 01 7800.
- C. Submit samples to illustrate the functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate the sample submittals for interfacing Work.
- F. Include identification on each sample, with the full Project information.
- G. Submit at least the number of samples specified in the individual specification Sections; the Design Agent will retain two samples.
- H. Reviewed samples, which may be used in the Work, are indicated in the individual specification Sections.
- I. Samples will not be used for testing purposes unless they are specifically stated to be in the specification Section.

1.08 TEST REPORTS

- A. Submit (1) printed and (1) electronic PDF lab reports in accordance with Section 01 4000.
- B. Submit test reports for information for the limited purpose of assessing conformance with the information given and the design concept expressed in the Contract Documents.

1.09 DESIGN DATA

- A. Submit (1) printed and (1) electronic PDF data for the Design Agent's knowledge as contract administrator for the Owner.
- B. Submit information for the limited purpose of assessing conformance with the information given and the design concept expressed in the Contract Documents.

1.10 CERTIFICATES

- A. When specified in the individual specification Sections, submit (1) printed and (1) electronic PDF certification by the manufacturer, installation/application subcontractor, or the Contractor to the Design Agent in the quantities specified for the Product Data.
- B. Indicate that the material or product conforms to or exceeds the specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- A. Certificates may be recent or previous test results on the material or product, but must be acceptable to the Design Agent and its Consultants.

1.10 MANUFACTURER'S INSTRUCTIONS

- A. When specified in the individual specification Sections, submit (1) printed and (1) electronic PDF copy of instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to the Design Agent for delivery to the Owner in the quantities specified for Product Data.
- B. Indicate the special procedures, and the perimeter conditions requiring special attention, and the special environmental criteria required for application or installation.

1.11 MANUFACTURER'S FIELD REPORTS

- A. Submit (1) printed and (1) electronic PDF of reports for the Design Agent's benefit as contract administrator for the Owner.
- B. Submit the report within 30 days of observation to the Design Agent for the limited purpose of assessing conformance with the information given and the design concept expressed in the Contract Documents.

1.12 DIGITAL PHOTOGRAPHS

- A. Submit minimum 12 digital photographs of construction progress each month on the same CD as the project schedule submittal. Include both jpg. and reduced-size PDF versions for email use.
- B. Include an additional minimum of 12 photographs documenting underground utilities when installed in relationship to visible site features.
- C. Include photographs of important in-wall or ceiling utilities before close-in at appropriate stages of construction.
- D. See Section 01 7800 for close-out copy requirements of these files.

1.13 ERECTION DRAWINGS

- A. When specified in the individual Specification sections, the trade contractors shall submit (1) printed and (1) electronic PDF copy of erection drawings for review prior to proceeding with fabrication and/or construction.
- B. Erection drawings shall be prepared in accordance with the latest edition of the respective trades' codes of standard practice.
- C. All erection drawings shall be fully developed by the trade contractors or by agents of the contractors. CAD files, photocopies, or other reproductions of the contract drawings in whole or in part shall not be used by the trade contractors or their agents for the preparation and development of erections drawings without the expressed written consent of the Design Agent.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

01 3310 SUBMITTAL PROCEDURES - Attachment A

A. Submittal List

1. Reference Section 00 7001 General Conditions, ARTICLE 3 – CONTRACTOR, § 3.10 - § 3.12.
2. Bituminous pavement – Hot Mix Asphalt
3. Erosion and sediment control devices (silt sacks, compost filter sock, etc.)
4. Retaining wall materials, colors, and certified design computations
5. Drainage pipe and manhole structures
6. Concrete for cast-in place work
7. Field accessories (goal posts, netting, turf groomer, etc.)
8. Subbase materials (crushed stone, choker stone, gravel borrow, topsoil, septic gravel)
9. Loam and seed materials
10. Light and electrical equipment
11. Light foundations
12. Turf and field layout
13. Water pipe and materials

END OF ATTACHMENT

SECTION 01 4000 – QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Quality control and control of installation.
- B. Verification of Credentials and Licenses.
- C. Tolerances
- D. References.
- E. Testing and inspection services.
- F. Manufacturers' field services.
- G. Mock-up Requirements.

1.02 QUALITY CONTROL AND CONTROL OF INSTALLATION

- A. Monitor a quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of the specified quality.
- B. Comply with all manufacturers' instructions and recommendations, including each step in sequence.
- C. When the manufacturers' instructions conflict with the Contract Documents, request a clarification from the Design Agent before proceeding.
- D. Comply with the specified standards as a minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform the Work by persons qualified to produce the required and specified quality.
- F. Verify that field measurements are as indicated on the Shop Drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.03 VERIFICATION OF CREDENTIALS AND LICENSES

- A. The Owner has implemented a project management oversight process and is applying it to current construction projects at URI.
- B. An element of this oversight process is the verification that persons employed on the project site have appropriate and current credentials and licenses in their possession, at the project site, for the work they are performing.
- C. Be forewarned that state resident inspectors will be checking for verification of credentials and licenses of both union and non-union persons, in their onsite inspections.
- D. State resident inspectors will also be reviewing Contractor's Certified Monthly Payroll Records for conformance with RI State Prevailing Wage Rate requirements.
- E. Those persons without the appropriate credentials and licenses will be subject to dismissal from the project site.

1.04 TOLERANCES

- A. Monitor the fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with the manufacturers' tolerances. When the manufacturers' tolerances conflict with the Contract Documents, request a clarification from the Design Agent before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

1.05 REFERENCES

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by the date of issue current on the date of the Contract Documents, except where a specific date is established by code.
- C. Obtain copies of the standards where required by the product specification Sections.
- D. When the specified reference standards conflict with the Contract Documents, request a clarification from the Design Agent before proceeding.
- E. Neither the contractual relationships, duties, or responsibilities of the parties in the Contract, nor those of the Design Agent, shall be altered from the Contract Documents by mention or inference otherwise in reference documents.

1.06 TESTING AND INSPECTION SERVICES

- A. The Contractor will submit the name of an independent firm to the Design Agent for approval by the Owner, to perform the testing and inspection services. The Contractor shall pay for all the services required in the Base Bid as described in Attachment A. Contractor shall coordinate any Owner-authorized testing also described in Attachment A, to be paid for from Testing Allowance.
- B. The independent firm will perform the tests, inspections and other services specified in the individual specification Sections and as required by the Design Agent or its Consultants.
1. Laboratory: Authorized to operate in the location in which the Project is located.
 2. Laboratory Staff: Maintain a full time registered Engineer on staff to review the services.
 3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either the National Bureau of Standards or to the accepted values of natural physical constants.
- C. Testing, inspections and source quality control may occur on or off the project site. Perform off-site testing as required by the Design Agent or the Owner.
- D. Reports will be submitted by the independent firm to the Design Agent, the Consultant for that trade, and the Contractor, in duplicate, indicating the observations and results of tests and indicating the compliance or non-compliance with Contract Documents.
- E. Cooperate with the independent firm; furnish samples of the materials, design mix, equipment, tools, storage, safe access, and the assistance by incidental labor as requested.
1. Notify the Design Agent and Engineer and the independent firm 24 hours prior to the expected time for operations requiring services.
 2. Make arrangements with the independent firm and pay for additional samples and tests required for the Contractor's use.
- F. Testing and employment of the testing agency or laboratory shall not relieve the Contractor of an obligation to perform the Work in accordance with the requirements of the Contract Documents.
- G. Re-testing or re-inspection required because of a non-conformance to the specified requirements shall be performed by the same independent firm on instructions by the Design Agent or its Consultant. Payment for the re-testing or re-inspection will be charged to the Contractor by deducting the testing charges from the Contract Sum.
- H. Agency Responsibilities:
1. Test samples of mixes submitted by the Contractor.
 2. Provide qualified personnel at the site. Cooperate with the Design Agent or its Consultant and the Contractor in performance of services.
 3. Perform specified sampling and testing of the products in accordance with the specified standards.
 4. Ascertain compliance of the materials and mixes with the requirements of the Contract

Documents.

5. Promptly notify the Design Agent, Consultant and the Contractor of observed irregularities or non-conformance of the Work or products.
 6. Perform additional tests required by the Design Agent or its Consultants.
 7. Attend the preconstruction meetings and the progress meetings.
- I. Agency Reports: After each test, promptly submit two copies of the report to the Design Agent, appropriate Consultant, and to the Contractor. When requested by the Design Agent, provide an interpretation of the test results. Include the following:
1. Date issued.
 2. Project title and number.
 3. Name of inspector.
 4. Date and time of sampling or inspection.
 5. Identification of product and specifications section.
 6. Location in the Project.
 7. Type of inspection or test.
 8. Date of test.
 9. Results of tests.
 10. Conformance with Contract Documents.
- J. Limits On Testing Authority:
1. Agency or laboratory may not release, revoke, alter, or enlarge on the requirements of the Contract Documents.
 2. Agency or laboratory may not approve or accept any portion of the Work.
 4. Agency or laboratory may not assume any duties of the Contractor.
 5. Agency or laboratory has no authority to stop the Work.
- 1.08 MANUFACTURERS' FIELD SERVICES
- A. When specified in the individual specification Sections, require the material or Product suppliers, or manufacturers, to provide qualified staff personnel to observe the site conditions, the conditions of the surfaces and installation, the quality of workmanship, the start-up of equipment, or test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Submit the qualifications of the observer to the Design Agent 30 days in advance of the required observations. Observer is subject to approval of the Design Agent.
- C. Report the observations and the site decisions or instructions given to the applicators or installers that are supplemental or contrary to the manufacturers' written instructions.
- D. Refer to Section 01 3300 - SUBMITTAL PROCEDURES, MANUFACTURERS' FIELD REPORTS article.

1.09 MOCK-UP REQUIREMENTS

- A. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- B. Accepted mock-ups shall be a comparison standard for the remaining Work.
- C. Where mock-up has been accepted by Design Agent and is no longer needed, remove mock-up and clear area when directed to do so.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not used.

END OF SECTION

01 4010 QUALITY REQUIREMENTS – Attachment A

A. Base Bid Testing Requirements List

1. None

B. Additional Owner-Authorized Testing Requirements List

1. Testing requirements which may be authorized include soils, compaction, concrete and bituminous pavement.

C. Other

1. None

END OF ATTACHMENT

SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Temporary Utilities:
 - 1. Temporary electricity.
 - 2. Temporary lighting for construction purposes.
 - 3. Temporary heating.
 - 4. Temporary cooling.
 - 5. Temporary ventilation.
 - 6. Telephone service.
 - 7. Temporary water service.
 - 8. Temporary sanitary facilities.

- B. Construction Facilities:
 - 1. Field offices and sheds.
 - 2. Hoisting.
 - 3. Parking/Traffic.
 - 4. Progress cleaning and waste removal.
 - 5. Project identification.
 - 6. Traffic regulation.

- C. Temporary Controls:
 - 1. Barriers.
 - 2. Enclosures and fencing.
 - 3. Security.
 - 4. Fire detection.
 - 5. Water control.
 - 6. Dust control.
 - 7. Erosion and sediment control.
 - 8. Noise control.
 - 9. Pest control.
 - 10. Pollution control.
 - 11. Rodent control.

- D. Removal of utilities, facilities, and controls with reseeded and repair of grounds.

- E. See Attachment A for any modifications.

1.02 TEMPORARY ELECTRICITY

- A. The Owner will pay the cost of energy used. Exercise measures to conserve energy. Utilize the Owner's existing power service.
- B. Complement the existing power service capacity and characteristics as required for construction operations.

- C. Provide power outlets, with branch wiring and distribution boxes located at each floor or as required for construction operations. Provide flexible power cords as required for portable construction tools and equipment. All flexible power cords shall be suspended with hangers to eliminate trip hazards.
- D. Provide main service disconnect and over-current protection at a convenient location, or a feeder switch at the source distribution equipment or meter.
- E. Permanent convenience receptacles may not be utilized during construction.
- F. Provide distribution equipment, wiring, and outlets to provide single-phase branch circuits for power. Provide 20-ampere duplex outlets, single-phase circuits for power tools.

1.03 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain incandescent lighting for construction operations to achieve a minimum lighting level of 2 watt/sq ft (21 watt/sq m).
- B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- C. Maintain lighting and provide routine repairs.
- D. Permanent building lighting may be utilized during construction where not removed.

1.04 TEMPORARY HEATING

- A. Existing facilities will be occupied and heated by the University when temperatures require. Take care to avoid leaving doors open in exterior walls that could compromise heating operations. For new construction, the cost of energy will be borne by the Contractor. Provide temporary heating as necessary for construction operations.
- B. Supplement with temporary heat devices if needed to maintain the specified conditions for construction operations even in existing buildings.
- C. Maintain a minimum ambient temperature of 50 degrees F in the areas where construction is in progress, unless indicated otherwise in the product Sections.
- D. In areas of work with mechanical hot-air heating, clean units and replace filters after Substantial Completion.
- E. Do not use new equipment for heating after replacement during construction.

1.05 TEMPORARY COOLING

- A. Existing cooling facilities are typically not available.
- B. Provide and pay for cooling devices and cooling as needed to maintain the specified conditions for construction operations.

- C. Maintain a maximum ambient temperature of 80 degrees F in the areas where construction is in progress, unless indicated otherwise in the specifications.

1.06 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to achieve a curing of materials, to dissipate humidity, and to prevent the accumulation of dust, fumes, vapors, or gases.
- B. If existing ventilation fans are used during construction, clean fans in areas of work after Substantial Completion.

1.07 TELEPHONE SERVICE

- A. Provide, maintain, and pay for cell phone service to the field supervisor at the time of project mobilization and until project Final Completion.

1.08 TEMPORARY WATER SERVICE

- A. The Owner will pay the cost of temporary water. Exercise measures to conserve energy. Utilize the Owner's existing water system, extend and supplement with temporary devices as needed to maintain the specified conditions for construction operations.
- B. Extend branch piping with outlets located so that water is available by hoses with threaded connections. Provide temporary pipe insulation if needed to prevent freezing.

1.09 TEMPORARY SANITARY FACILITIES

- A. Contractor shall provide and maintain temporary toilet facilities for use by all construction personnel. Trades people will not be permitted to use existing facilities within the building.

1.10 FIELD OFFICES AND SHEDS

- A. Do not use existing facilities for storage. Job meetings will be held on campus at a location to be chosen by the University.
- B. Storage Areas and Sheds: Size to the storage requirements for the products of the individual Sections, allowing for access and orderly provision for the maintenance and for the inspection of Products to the requirements of Section 01 6000. Containers will be permitted within the project limit line. Coordinate with URI for storage areas.
- C. Preparation: Fill and grade the sites for the temporary structures to provide drainage away from the buildings.
- D. Removal: At the completion of the Work remove the buildings, foundations, utility services, and debris. Restore the areas.

1.11 HOISTING

- A. Contractor is responsible for all hoisting required to facilitate, serve, stock, clean, and complete the Work. Include all costs for Operating Engineers, fuel, delivery and removal, mobilization, staging, protection of grades and surfaces, and equipment.

1.12 PARKING/TRAFFIC

- A. Workers must park in lots assigned by the University with daily permits. See Site Utilization Plan.
- B. Use of designated existing on-site streets and driveways for construction traffic is permitted. Tracked vehicles are not allowed on paved areas.
- C. Do not allow heavy vehicles or construction equipment in parking areas.
- D. Do not allow vehicle parking on existing sidewalks.
- E. Provide and maintain access to fire hydrants and control valves free of obstructions.
- F. Remove mud from construction vehicle wheels before entering streets. Cleanup dirt, rocks, and debris left on street from construction vehicles.
- G. Use designated existing on-site roads for construction traffic.
- H. Maintenance:
 - 1. Maintain the traffic and parking areas in a sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
 - 2. Maintain existing and permanent paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain the paving and drainage in original, or specified, condition.
- I. Removal, Repair:
 - 1. Remove temporary materials and at Substantial Completion.
 - 2. Remove underground work and compacted materials to a depth of 2 feet; fill and grade the site as specified.
 - 3. Repair existing and permanent facilities damaged by use, to the original or specified condition.

1.13 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain the site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other remote spaces, prior to enclosing the space.

- C. Broom and vacuum clean the interior areas prior to the start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and rubbish from the site daily, as necessary to prevent an on-site accumulation of waste material, debris, and rubbish, and dispose off-site.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.14 PROJECT IDENTIFICATION

- A. Project Identification Sign: One painted sign, 32 sq ft area, bottom 6 feet above the ground.
 - 1. Content:
 - a. Project title, and name of the Owner as indicated on the Contract Documents.
 - b. Names and titles of the authorities.
 - c. Names and titles of the Design Agent and Consultants.
 - d. Name of the Design Agent Contractor.
 - 2. Graphic Design, Colors, and Style of Lettering: 3 colors, as designated by the Design Agent during construction.
- B. Project Informational Signs:
 - 1. Painted informational signs of same colors and lettering as the Project Identification sign, or standard products; size lettering to provide legibility at 100-foot distance.
 - 2. Provide sign at each field office, storage shed, and directional signs to direct traffic into and within site. Relocate as the Work progress requires.
 - 3. No other signs are allowed without the Owner's permission except those required by law.
- C. Design all signs and their structures to withstand a 60-miles/hr-wind velocity.
- D. Sign Painter: Experienced as a professional sign painter for a minimum of three years.
- E. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for the duration of construction.
- F. Show content, layout, lettering, color, foundation, structure, sizes, and grades of members.
- G. Installation:
 - 1. Install the project identification sign within 15 days after the date of receipt of the Purchase Order from State of Rhode Island Department of Administration, Division of Purchases.
 - 2. Erect at the designated location.
 - 3. Erect the supports and framing on a secure foundation, rigidly braced and framed to resist wind loadings.
 - 4. Install the sign surface plumb and level, with butt joints. Anchor securely.
 - 5. Paint exposed surfaces of the sign, supports, and framing.
- H. Maintenance: Maintain the signs and supports clean, repair deterioration and damage.

- I. Removal: Remove the signs, framing, supports, and foundations at the completion of the Project and restore the area.

1.15 TRAFFIC REGULATION

- A. Signs, Signals, and Devices:
 - 1. Post Mounted and Wall Mounted Traffic Control and Informational Signs: As approved by local jurisdictions.
 - 2. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.
 - 3. Flag person Equipment: As required by local jurisdictions.
 - 4. Police Details: Provide all police details as required by local jurisdictions, including payment directly to officers.
- B. Flag Persons: Provide trained and equipped flag persons to regulate the traffic when construction operations or traffic encroach on the public traffic lanes.
- C. Flares and Lights: Use flares and lights during the hours of low visibility to delineate the traffic lanes and to guide traffic.
- D. Haul Routes:
 - 1. Consult with the authority having jurisdiction, establish the public thoroughfares to be used for haul routes and site access.
- E. Traffic Signs and Signals:
 - 1. At approaches to the site and on site, install at crossroads, detours, parking areas, and elsewhere as needed to direct the construction and affected public traffic.
 - 2. Install and operate automatic traffic control signals to direct and maintain the orderly flow of traffic in areas under the Contractor's control, and areas affected by the Contractor's operations.
 - 3. Relocate as the Work progresses, to maintain effective traffic control.
- F. Removal:
 - 1. Remove equipment and devices when no longer required.
 - 2. Repair damage caused by installation.
 - 3. Remove post settings to a depth of 2 feet .

1.16 BARRIERS

- A. Provide barriers to allow for the Owner's use of the site and to protect existing facilities and adjacent properties from damage from the construction operations, or demolition.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way, or for public access to the building.
- C. Provide protection for plants designated to remain. Replace damaged plants.
- D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.17 ENCLOSURES AND FENCING

- A. Construction: Provide 6-ft. high commercial grade chain link fence around on-site equipment or areas of site disturbance for the period required to protect work and the public. Equip with vehicular and pedestrian gates with locks. Provide one set of keys to all gates and door locks to the Owner.
- A. Perform adjustment to the proposed layout as may be directed by the Owner.
- B. Interior Enclosures:
 - 1. Provide temporary partitions and ceilings as indicated to separate the work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to the existing materials and equipment.
 - 2. Construction: Framing and reinforced polyethylene, plywood, or gypsum board sheet materials with closed joints and sealed edges at intersections with existing surfaces, as agreed with the Owner:
 - a. Maximum flame spread rating of 75 in accordance with ASTM E84.

1.18 SECURITY

- A. Security Program:
 - 1. Protect the Work, the existing premises, or the Owner's operations from theft, vandalism, and unauthorized entry.
 - 2. Initiate the program in coordination with the Owner's existing security system at mobilization.
 - 3. Maintain the program throughout the construction period until Owner occupancy of each designated area.
- B. Entry Control: Coordinate the access of the Owner's personnel to the site in coordination with the Owner's security forces.

1.19 FIRE DETECTION

- A. Before beginning any construction operation that can potentially trigger the existing fire alarm detection system, notify the Owner through use of the form provided in Section 01 1020.
- B. Failure to so notify the Owner will subject the Contractor to a monetary fine for each occurrence, should the fire detection system be activated inadvertently by a construction activity.
- C. Comply with FM Global insurance underwriting standards and insurer recommendations for Hot Work, sprinkler impairment, and site maintenance.

1.20 WATER CONTROL

- A. Grade the site to drain. Maintain excavations free of water. Provide, operate, and maintain the pumping equipment.
- B. Protect the site from puddling or running water. Provide water barriers as required to protect the site from soil erosion.

1.21 DUST CONTROL

- A. Execute the Work by methods to minimize raising dust from construction operations.
- B. Provide positive means to prevent air-borne dust from dispersing into the atmosphere.

1.22 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
- B. Minimize the amount of bare soil exposed at one time.
- C. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
- D. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
- E. Periodically inspect the earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

1.23 NOISE CONTROL

- A. Provide methods, means, and facilities to minimize noise produced by the construction operations.

1.24 PEST CONTROL

- A. Provide methods, means, and facilities to prevent pests and insects from damaging the Work, or entering the facility.

1.25 POLLUTION CONTROL

- A. Provide methods, means, and facilities to prevent the contamination of soil, water, and the atmosphere from discharge of noxious, toxic substances, and pollutants produced by the construction operations.

1.26 RODENT CONTROL

- A. Provide methods, means, and facilities to prevent rodents from accessing or invading the premises.

1.27 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, and materials, prior to Substantial Completion.
- B. Remove the underground installations to a minimum depth of 2 feet. Grade the site as indicated.
- C. Clean and repair the damage caused by installation or use of temporary work.
- D. Restore the existing and new facilities used during construction to their original condition.
- E. Restore any temporary exterior laydown or storage areas to the original condition. After each use, regrade and reseed as required to meet this requirement.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

01 5010 TEMPORARY FACILITIES AND CONTROLS - Attachment A

1.01 SECTION INCLUDES

A. The following changes are made to the contract:

1. Temporary electricity is not required.
2. Temporary lighting for construction purposes is not required.
3. Temporary heating is not required.
4. Temporary cooling is not required.
5. Temporary ventilation is not required.
6. Telephone service is not required.
7. Facsimile service is not required.
8. Temporary water service is not required.

END OF ATTACHMENT

SECTION 01 6000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Products.
- B. Product delivery requirements.
- C. Product storage and handling requirements.
- D. Product options.
- E. Product substitution procedures.

1.02 PRODUCTS

- A. Products: Means new material, machinery, components, fixtures, or systems forming the Work; but does not include the machinery or equipment used for the preparation, fabrication, conveying, or erection of the Work. Products may include the existing materials or components required or specified for reuse.
- B. Furnish products of qualified manufacturers suitable for the intended use. Furnish products of each type by a single manufacturer unless specified otherwise.
- C. Do not use materials and equipment removed from the existing premises, except as specifically permitted by the Contract Documents.
- D. Furnish interchangeable components of the same manufacturer for the components being replaced.

1.03 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products in accordance with the manufacturer's instructions.
- B. Promptly inspect shipments to ensure that the products comply with the requirements, the quantities are correct, and the products are undamaged.
- C. Provide equipment and personnel to handle the products by methods to prevent soiling, disfigurement, or damage.

1.04 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect the products in accordance with the manufacturers' instructions.

- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to the product.
- D. For exterior storage of fabricated products, place on sloped supports above the ground.
- E. Provide bonded off-site storage and protection when the site does not permit on-site storage or protection.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent the condensation and degradation of products.
- G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store the products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of the products to permit access for inspection. Periodically inspect to verify that the products are undamaged and are maintained in acceptable condition.

1.05 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of one of the manufacturers named and meeting the specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named in accordance with the following article.

1.06 PRODUCT SUBSTITUTION PROCEDURES

- A. Instructions to Bidders specify the time restrictions for submitting requests for Substitutions during the bidding period to requirements specified in this section.
- B. Substitutions may be considered after the bid only in the following circumstances:
 - 1. when a product becomes no longer in production following the date of receipt of the Purchase Order for this Contract. Submit certification both that specified product was carried in Bid, and is no longer obtainable. Provide cost change documentation.
 - 2. there is a significant cost savings offered to the Owner. Provide price comparison of both bid and offered substitution products as well as all collateral costs of the change.

3. Code changes or site conditions require a different item from that bid. Submit as for 2 above.
- C. Document each request with complete data substantiating the compliance of a proposed Substitution with the Contract Documents.
- D. A request constitutes a representation that the Bidder:
1. Has investigated the proposed Product and determined that it meets or exceeds the quality level of the specified product.
 2. Will provide the same warranty for the Substitution as for the specified Product.
 3. Will coordinate the installation and make changes to other Work which may be required for the Work to be complete with no additional cost to the Owner, including redesign.
 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 5. Will reimburse the Owner and the Design Agent for review or redesign services, including those associated with re-approval by the authorities having jurisdiction.
- E. Substitutions will not be considered when they are indicated or implied on the Shop Drawing or Product Data submittals, without a separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure, If Permitted Following Contract Award:
1. Submit three copies of a request for Substitution for consideration, no later than 20 working days following date of receipt of the Purchase Order for this Contract. Limit each request to one proposed Substitution.
 2. Submit the Shop Drawings, Product Data, and the certified test results attesting to the proposed product equivalence. The burden of proof is on the proposer.
 3. The Design Agent will notify the Contractor in writing of a decision to accept or reject the request. Costs for review time on unsuccessful requests will be included in the next change order.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

01 6010 PRODUCT REQUIREMENTS - Attachment A

A. No variations in this section for this Project.

END OF ATTACHMENT

SECTION 01 7000 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Examination.
- B. Preparation.
- C. Field Engineering.
- D. Protection of adjacent construction.
- E. Cutting and patching.
- F. Special procedures.
- G. Starting and adjusting of systems.
- H. Demonstration and Instructions.
- I. Testing, adjusting and balancing.
- J. Protecting Installed Construction.

1.02 EXAMINATION

- A. Acceptance of Conditions:
 - 1. Verify that existing applicable site conditions, substrates, or substrate surfaces are acceptable or meet specific requirements of individual specifications Sections, for subsequent Work to proceed.
 - 2. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.
 - 3. Examine and verify specific conditions described in individual specifications Sections.
 - 4. Verify that utility services are available, of correct characteristics, and in correct locations.
 - 5. Beginning of new Work, that relies upon the quality and proper execution of Work of a preceding trade, means acceptance of that preceding Work as appropriate for the proper execution of subsequent Work.
 - 6. Acceptance of preceding Work that can be shown later to have adversely affected proper performance of new Work may result in removal and repeat performance of all Work involved at no cost to the Owner.

1.03 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply substrate primer, sealer, or conditioner, required or recommended by manufacturer, prior to applying any new material or substance in contact or bond.
- D. Prior to the application, installation, or erection of any products and product components, perform any other preparatory operations, or surface or substrate modifications, as may be specified or directed by product manufacturers.

1.04 FIELD ENGINEERING

- A. Employ a Land Surveyor registered in the State of Rhode Island and acceptable to Design Agent and the Owner if required by subgrade work.
- B. Locate and protect survey control and reference points. Promptly notify Design Agent of any discrepancies discovered.
- C. Control Datum for survey is to be agreed to with the Design Agent.
- D. Verify setbacks and easements, if any; confirm drawing dimensions and elevations.
- E. Provide field-engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.
- F. Submit a copy of site drawings and certificate signed by the Land Surveyor that the elevations and locations of the Work are in conformance with the Contract Documents.
- G. Maintain a complete and accurate log of control and survey work as it progresses.
- H. If required by the Owner, on completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.
- I. Protect survey control points prior to starting site work; preserve permanent reference point during construction.
- J. Promptly report to Design Agent the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- K. Replace dislocated survey control point based on original survey control. Make no changes without prior written notice to Design Agent.

1.05 PROTECTION OF ADJACENT CONSTRUCTION

- A. Protect existing adjacent properties and provide special protection where specified in individual Specification Sections.
- B. Provide protective coverings at wall, projections, jambs, sills, and soffits of existing openings.
- C. Protect existing finished floors, stairs, and other existing surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- D. Cover and protect furnishings, materials and equipment within the spaces receiving new work. Move items as necessary to install new work and return them to original locations at the close of construction in that area.
- E. Repair adjacent properties damaged by construction operations to original condition to the satisfaction of the Owner.
- F. Prohibit unnecessary traffic from existing landscaped areas.
- G. Restore grassed landscaped areas damaged by construction operations to full healthy growth, by installing loam and sod to the requirements, and under the supervision of, the University's Associate Director of Lands and Grounds.

1.06 CUTTING AND PATCHING

- A. Employ skilled and experienced installers to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements which affect:
 - 1. Structural integrity of element.
 - 2. Integrity of weather-exposed or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Visual qualities of sight-exposed elements.
 - 5. Existing construction, or Work of separate contractor.
- C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
 - 1. Fit the several parts together, to integrate with other Work.
 - 2. Uncover Work to install or correct ill-timed Work.
 - 3. Remove and replace defective and non-conforming Work.
 - 4. Remove samples of installed Work for testing.
 - 5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

- D. Execute Work by methods that will avoid damage to other Work, and provide proper surfaces to receive patching and finishing.
- E. Cut masonry, concrete, and other rigid materials using masonry saw or core drill.
- F. Remove ceiling tiles as necessary to access areas of work. Store and replace carefully to avoid damage. Replace all ceiling tiles damaged during the work with new tiles to match. Repair ACT grid damaged during the work in accordance with this section.
- G. Restore Work with new Products in accordance with requirements of Contract Documents.
- H. Fit Work tight to pipes, sleeves, ducts, conduits, and other penetrations through surfaces.
- I. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- J. At penetration of fire rated partitions, ceiling, or floor construction, completely seal voids with fire rated or fire resistant material in accordance with Specifications, to full thickness of the penetrated element.
- K. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
- L. Identify any hazardous substance or conditions exposed during the Work to the Owner and Design Agent for decision or remedy.
- M. See General Conditions for additional requirements.

1.07 SPECIAL PROCEDURES

- A. Materials: As specified in product Sections; match existing with new products, or salvaged products as appropriate, for patching and extending work.
- B. Employ skilled and experienced installer to perform alteration work.
- C. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.
- D. Remove unsuitable material not marked for salvage, such as rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.
- E. Remove debris and abandoned items from area and from concealed spaces.

- F. Prepare surface and remove surface finishes to provide installation of new Work and finishes.
- G. Close openings in exterior surfaces to protect existing Work from weather and extremes of temperature and humidity.
- H. Remove, cut, and patch Work in a manner to minimize damage and to provide means of restoring products and finishes to original or specified condition.
- I. Refinish existing visible surfaces to remain in renovated rooms and spaces to specified condition for each material, with a neat transition to adjacent finishes.
- J. Where new Work abuts or aligns with existing, provide a smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.
- K. When finished surfaces are cut so that a smooth transition with new Work is not possible, terminate existing surface along a straight line at a natural line of division and submit recommendation to Design Agent for review.
- L. Where a change of plane of 1/4 inch or more occurs, submit recommendation for providing a smooth transition to Design Agent for review.
- M. Trim existing doors as necessary to clear new floor finish. Refinish trim as required.
- N. Patch or replace portions of existing surfaces which are damaged, or showing other imperfections.
- O. Finish surfaces as specified in individual product Sections, or as indicated on the Drawings.

1.08 STARTING AND ADJUSTING OF SYSTEMS

- A. Coordinate schedule for starting and adjusting of various equipment and systems.
- B. Notify Design Agent and Owner seven days prior to starting and adjusting of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions which may cause damage.
- D. Verify that tests, meter readings and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify wiring and support components for equipment are complete and tested.

- F. Execute starting and adjusting under supervision of responsible Contractor's personnel or manufacturer's representative, in accordance with manufacturer's instructions.
- G. Adjust operating Products and equipment to ensure smooth and unhindered operation.
- H. When specified in individual specifications Section, require manufacturer to provide authorized representative to be present at the site to inspect, check, and approve equipment or system installation prior to starting, and to supervise placing of equipment or system in operation.
- I. Submit a written report in accordance with Section 01400 that equipment or system has been properly installed and is functioning correctly.

1.09 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of Substantial Completion.
- B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manuals with Owner's personnel in detail to explain all aspects of operation and maintenance.
- D. Demonstrate start-up, operation, control, adjustment, trouble shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled or agreed upon times, at equipment or system location.
- E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

1.10 TESTING, ADJUSTING, AND BALANCING

- A. Submit, for the Owner's approval, the name of an independent firm to perform testing of fire systems. The independent firm's services will be paid for by the Contractor.
- B. The independent firm will perform services specified in individual specifications Sections.
- C. Reports will be submitted by the independent firm to the Design Agent and the Owner indicating observations and test results, indicating compliance or non-compliance with specified requirements and with the requirements of the Contract Documents.

1.11 PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- E. Repair or replace installed Work damaged by construction operations, as directed by the Design Agent.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

01 7010 EXECUTION REQUIREMENTS - Attachment A

A. Daily Attendance Form

1. Maintain Daily Attendance Form acceptable to the Department of Labor and Training for all projects with a contract value over \$1 Million. Submit as requested.

END OF ATTACHMENT

SECTION 01 7320**WASTE MANAGEMENT****PART 1 GENERAL****1.01 WASTE MANAGEMENT REQUIREMENTS**

- A. Owner requires that this project generate the least amount of trash and waste possible.
- B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- D. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:
 - 1. Aluminum and plastic beverage containers.
 - 2. Corrugated cardboard.
 - 3. Wood pallets.
 - 4. Clean dimensional wood: May be used as blocking or furring.
 - 5. Land clearing debris, including brush, branches, logs, and stumps.
 - 6. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
 - 7. Glass.
 - 8. Gypsum drywall and plaster.
 - 9. Plastic buckets.
 - 10. Paper, including wrapping, newsprint, and office.
- E. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, incineration, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports. Submit in accordance with Section 01 3300.
- F. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.
- G. Methods of trash/waste disposal that are not acceptable are:
 - 1. Burning on the project site.
 - 2. Burying on the project site.
 - 3. Dumping or burying on other property, public or private.
 - 4. Other illegal dumping or burying.
- H. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. Section 01 5000 - Temporary Facilities and Controls: Additional requirements related to trash/waste collection and removal facilities and services.
- C. Section 01 6000 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.
- D. Section 01 7000 - Execution Requirements: Trash/waste prevention procedures related to

demolition, cutting and patching, installation, protection, and cleaning.

1.03 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.
- J. Reuse: To reuse a construction waste material in some manner on the project site.
- K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.04 SUBMITTALS

- A. See Section 01 3300 for submittal procedures.
- B. Waste Management Plan: Include the following information:
 - 1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
 - 2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
 - 3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
 - 4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.

5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
 6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.
- C. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
 2. Submit Report on a form acceptable to Owner.
 3. Landfill Disposal: Include the following information:
 - a. Identification of material.
 - b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
 - c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 4. Incinerator Disposal: Include the following information:
 - a. Identification of material.
 - b. Amount, in tons or cubic yards, of trash/waste material from the project delivered to incinerators.
 - c. State the identity of incinerators, total amount of fees paid to incinerator, and total disposal cost.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 5. Recycled and Salvaged Materials: Include the following information for each:
 - a. Identification of material, including those retrieved by installer for use on other projects.
 - b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.
 - c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
 6. Material Reused on Project: Include the following information for each:
 - a. Identification of material and how it was used in the project.
 - b. Amount, in tons or cubic yards.
 - c. Include weight tickets as evidence of quantity.
 7. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 2 PRODUCTS (not used)

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

- A. See Section 01 1000 for list of items to be salvaged from the existing building for relocation in project or for Owner.

- B. See Section 01 3000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.
- C. See Section 01 5000 for additional requirements related to trash/waste collection and removal facilities and services.
- D. See Section 01 6000 for waste prevention requirements related to delivery, storage, and handling.
- E. See Section 01 7000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, Owner's Recycling and Solid Waste Coordinator, and Design Agent.
- C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- D. Meetings: Discuss trash/waste management goals and issues at project meetings.
 - 1. Pre-bid meeting.
 - 2. Pre-construction meeting.
 - 3. Regular job-site meetings.
- E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
 - 1. Provide containers as required.
 - 2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
 - 3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
- F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.
- H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
- I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

01 7330 WASTE MANAGEMENT - Attachment A

A. No variations in this section for this Project.

END OF ATTACHMENT

SECTION 01 7800 - CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Closeout procedures.
- B. Quality assurance.
- C. Maintenance service.
- D. Operations and maintenance manuals.
- E. Materials and finishes manuals.
- F. Equipment and systems manuals.
- G. Spare parts and maintenance materials.
- H. Product warranties and product bonds.
- I. Project Record documents.

1.02 CLOSEOUT PROCEDURES

- A. Submit a written certification that the Contract Documents have been reviewed, the Work has been inspected, and that the Work is complete in accordance with the Contract Documents and is ready for the Owner's review.
- B. Provide submittals to Design Agent that are required by governing or other authorities, including abatement invoices correctly prepared as proscribed in the abatement plan. Failure to include correctly prepared abatement invoices will delay issuing of final payment.
- C. Provide submittals to Design Agent that are required by the governing or other authorities, including the following closeout documents:
 - 1. AIA Document G706 - Contractor's Affidavit of Payment of Debts and Claims
 - 2. AIA Document G706A - Contractor's Affidavit of Release of Liens
 - 3. AIA Document G707 - Consent of Surety to Final payment
- D. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

- E. The Owner will occupy all portions of the building after Substantial Completion as specified in Section 01 1000.

1.03 QUALITY ASSURANCE

- A. Employ personnel assembling submittals experienced in the maintenance and the operation of the described products and systems.

1.04 MAINTENANCE SERVICE

- A. Submit a contract for furnishing service and maintenance of the components indicated in the specification Sections for one year from date of Substantial Completion, or during the warranty period, whichever period of time is the longest.
- B. Provide for an examination of the system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- C. Include a systematic cleaning, examination, adjustment, and lubrication of the components. Repair or replace the parts whenever required. Use the parts produced by the manufacturer of the original component.
- D. Do not assign or transfer the maintenance service to an agent or Subcontractor without the prior written consent of the Owner.

1.05 OWNER'S MANUALS

- A. Submit the data for Operations and Maintenance, Materials and Finishes, and Equipment and Systems Manuals bound in 8-1/2 x 11 inch text pages, in minimum 2 inch size three D side ring commercial quality binders with durable cleanable plastic covers.
- B. Prepare binder covers with the printed title of the manual, title of the project, and the subject matter of binder. Label each spine with the following: Building, project or facility name, OCP project number, submission date.
- C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Drawings: Provide with reinforced punched binder tab. Bind in with the text; fold the larger drawings to the size of the text pages.
- E. Submit two copies of a preliminary draft of the proposed formats and outline of the contents before the start of work. The Design Agent and its consultants will review drafts and return one copy with comments.

- F. Submit one copy of the completed volumes 15 days prior to final inspection for final review. This copy will be reviewed and returned after final inspection, with the Design Agent's comments. Revise the content of the document sets as required prior to final submission.
- G. Submit three sets of revised final volumes plus electronic copy in final form within ten days after final inspection.

1.06 OPERATIONS AND MAINTENANCE MANUALS

- A. Contents: Prepare the Table of Contents for each volume, with each product or system description identified, in three parts as follows:
 - 1. **Part 1:** Directory, listing the names, addresses, and telephone numbers of the Design Agent, its Consultants, Contractor, Subcontractors, and major equipment suppliers.
 - 2. **Part 2:** Operation and maintenance instructions, arranged by system and subdivided by the specification Section. For each category, identify the names, addresses, and telephone numbers of the Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for [special] finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - 3. **Part 3:** Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Originals of warranties and bonds.
 - 4. **Part 4:** Scan entire manual and provide 3 copies on disc in electronic PDF format.

1.07 MATERIALS AND FINISHES MANUALS

- A. Building Products, Applied Materials, and Finishes: Include product data, with the catalog number, size, composition, and the color and texture designations. Include information for re-ordering custom manufactured products.
- B. Instruction for Care and Maintenance: include manufacturer's instructions for cleaning agents and methods, precautions against detrimental agents and methods, and a recommended schedule for cleaning and maintenance.
- C. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Include recommendations for inspections, maintenance, and repair.
- D. Additional Requirements: As specified in the individual product specification Sections.

- E. Include a listing in the Table of Contents for design data, with a tabbed flysheet and a space for the insertion of data.

1.08 EQUIPMENT AND SYSTEMS MANUALS

- A. For equipment, or component parts of equipment put into service during construction and operated by the Owner, submit documents within 10 days after acceptance.
- B. Each Item of Equipment and Each System: Include a description of the unit or system, and the component parts. Identify the function, normal operating characteristics, and limiting conditions. Include performance curves, with priming data and tests, and complete nomenclature and model number of replaceable parts.
- C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- D. Include color-coded wiring diagrams as installed.
- E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter, and special operating instructions.
- F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- G. Include a servicing and lubricating schedule, and a list of lubricants required.
- H. Include the manufacturer's printed operation and maintenance instructions.
- I. Include sequence of operation by the controls manufacturer.
- J. Include the original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- K. Include control diagrams by the controls manufacturer as installed.
- L. Include the Contractor's coordination drawings, with color-coded piping diagrams as installed.
- M. Include charts of valve tag numbers, with the location and function of each valve, keyed to the flow and control diagrams.
- N. Include a list of the original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- O. Include test and balancing reports as specified in Section 01400.

- P. Additional Requirements: As specified in the individual product specification Sections.

1.09 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Furnish spare parts, maintenance, and extra products (attic stock) in the quantities specified in the individual specification Sections.
- B. Deliver to the Project site and place in a location as directed by the Owner; obtain a receipt prior to final payment.

1.10 PRODUCT WARRANTIES AND PRODUCT BONDS

- A. Obtain warranties and bonds executed in duplicate by the responsible subcontractors, suppliers, and manufacturers, within 10 days after the completion of the applicable item of work.
- B. Execute and assemble the transferable warranty documents and bonds from the subcontractors, suppliers, and manufacturers.
- C. Verify that the documents are in the proper form, contain full information, and are notarized.
- D. Co-execute the submittals when required.
- E. Include in the Operations and Maintenance Manuals within the appropriate material specification section.
- F. Submit prior to the final Application for Payment. For items of Work for which acceptance is delayed beyond the Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty or bond period.

1.11 PROJECT RECORD DOCUMENTS

- A. Maintain on the site one set of the following record documents; record actual revisions of the Work for all trades:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed Shop Drawings, Product Data, and Samples.
 - 6. Manufacturer's instructions for assembly, installation, and adjusting.
- B. Ensure the entries are complete and accurate, enabling future reference by the Owner.
- C. Store the record documents separate from the documents used for construction.

- D. Record information concurrent with the construction progress, not less than weekly.
- E. Specifications: Legibly mark and record at each product Section description of the actual products installed, including the following:
1. Manufacturer's name and product model and number.
 2. Product substitutions or alternates utilized.
 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record the actual construction including:
1. Measured horizontal and vertical locations of the underground utilities and appurtenances, referenced to permanent surface improvements. Include the locations and description of any existing utility lines and other existing installations of any kind or description encountered during construction. Note all changes in size, material, location, and elevation of all new or abandoned underground utility lines and pertinent work, including site grading. Document topography and drainage changes. Show the location of all valves, manholes, etc. and include dimensions to permanent features such as building corners. Note direction of each new valve opening. Show clearances between new utilities and existing crossed lines. Locate all bends, thrust blocks, and other restraints.
 2. The placement, size, and type of any fire extinguishers.
 3. Measured locations of internal utilities and appurtenances concealed in the construction.
 4. Field changes of dimension and detail.
 5. Details not on the original Contract drawings.
- G. Legibly marked Specifications, and legibly marked Record Drawings and Shop Drawings shall constitute the Project Record Documents in paper form.
- H. At completion of the Work of the Contract, the Contractor shall retain competent drafting personnel to transfer the information from the Project Record Documents in paper form to editable electronic formats to create "As-Built" Documents on base files provided by the Design Agent. The record construction drawings shall be produced in both AutoCAD format plus a record PDF copy of each drawing. AutoCAD files shall include all XREF, font, image, shape, and plot files. PDF files shall be saved full sheet size. The record Project Manual shall be in Microsoft Word form plus a record PDF of the entire manual. The electronic media containing this information will constitute the Project Record Documents in digital form, sometimes referred to as the "As-Built" Documents. Acceptable media are write-protected CD-R format discs or flash drives. Submit one full size printed set of drawings and specifications on 20 lb. white bond made from the As-Built files in addition to the electronic media.
- I. Associated materials including but not limited to the following are also required to be submitted at project close-out: shop drawings and cut sheets, RFIs, correspondence and meeting minutes, LEED scorecards, construction progress photographs, DEM permits including generator permits, certificates including Final Certificate of Occupancy, boiler and elevator certificates, easement rights, National Grid Rebate Applications, test and inspection documentation including fire pump test data, asbestos abatement plans and manifests. These materials may be

submitted in either paper or PDF digital format, organized by specification number, and clearly labeled. If paper copies are submitted, each box must be clearly labeled as to specific contents.

- J. If the project required geotechnical, archeological, or other miscellaneous studies or other reports, these shall also be submitted as Record Document in either paper or digital format.
- K. Labeling: In all cases, paper or digital submissions must contain the following information: Building, project or facility name, OCP Project number, submission date, and specific content index.
- L. No review or receipt of Project Record Documents by the Design Agent or the Owner shall be interpreted as a waiver of any deviation from the Contract Documents or Shop Drawings, or in any way relieve the Contractor from responsibility to perform the Work in accordance with the Contract Documents and the Shop Drawings.
- M. Update the on-site Project Record Documents on a regular basis. Monthly payments will not be processed if Project Record Documents are not maintained up to date.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

01 7810 CLOSEOUT REQUIREMENTS - Attachment A

A. No variations in this section for this Project.

END OF ATTACHMENT

SECTION 024113
SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Demolition of designated site structures, retaining walls, fences, and foundations.
 - 2. Demolition and removal of pavements, curbs, drainage structures, drainage pipe, utilities, and landscaping.
 - 3. Disconnecting and capping or removal of identified utilities.
 - 4. Filling voids in subgrade created as a result of removals or demolition.
 - 5. Disposal of demolished materials.

- B. Related Documents: The Contract Documents, as defined in Section 01 1000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

- C. Related Sections:
 - 1. Section 311000- Site Clearing: Clearing outside periphery of structures.
 - 2. Section 312000 - Earth Moving: Fill material.

1.2 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Conform to applicable local code for demolition of structures, safety of adjacent buildings and structures, dust control and runoff control.
 - 2. Obtain required permits and licenses from authorities having jurisdiction. Pay associated fees including disposal charges.
 - 3. Notify affected utility companies before starting work and comply with utility company requirements.
 - 4. Do not close or obstruct roadways, sidewalks or fire hydrants without permits.
 - 5. Barricade and mark hazards as necessary.
 - 6. Conform to applicable regulatory procedures when discovering hazardous or contaminated materials. Notify Owner immediately upon discovery of hazardous or contaminated materials. Do not commence removals, remediation, or abatement without authorization from Owner.

1.3 PROJECT CONDITIONS

- A. Existing Conditions:
 - 1. University assumes no responsibility for condition of structures to be demolished.
 - 2. Unless otherwise indicated in the Contract Documents or specified by the Owner, remove items of salvageable value to Contractor from project site and structure. Storage or sale of removed items on project site not permitted.
 - 3. Burning or fires of any nature not permitted.

1.4 FILL MATERIALS

- A. Refer to in Section 312000.

PART 2 - EXECUTION

2.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Site Verification of Conditions: Verify that field measurements, surfaces, substrates, and conditions are as required, and ready to receive Work.
 - 1. Locate existing utilities as specified in Section 312000
- C. Report in writing to Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to Owner.

2.2 PREPARATION

- A. Provide, erect, and maintain erosion control devices, dust control measures, temporary barriers, and security devices at locations indicated on Drawings and as specified in the Contract Documents.
- B. Protect appurtenances and structures which are not indicated to be demolished. Repair damage caused by demolition operations at no additional cost to the Owner.
- C. Prevent movement or settlement of adjacent structures. Provide bracing and shoring as required.
- D. Mark location of utilities. Protect and maintain, in safe and operable condition, utilities to remain. Provide temporary services during interruptions to existing utilities acceptable to governing authorities and the University.

2.3 CONSTRUCTION

- A. Demolition Requirements:
 - 1. Conduct demolition to minimize interference with adjacent structures or pavements.
 - 2. Stop operations immediately if adjacent structures appear to be in danger. Notify Owner immediately. Do not resume operations until directed by Owner.
 - 3. Conduct operations with minimum interference to public or private access. Maintain access and egress at all times.
 - 4. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon, or limit access to their property.
 - 5. Sprinkle soil and demolition work area with water to minimize dust. Provide hoses and water connections for this purpose.
 - 6. Comply with governing regulations pertaining to environmental protection.
 - 7. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.
- B. Demolition:
 - 1. Disconnect and remove designated utilities within demolition areas.
 - 2. Proceed with demolition in systematic manner, from top of structure to ground.

3. Locate demolition equipment and remove materials using procedures to prevent excessive loading to walls, floors, or framing.
 4. Demolish concrete and masonry in small sections.
- C. Filling Voids:
1. Completely fill below grade areas and voids existing or resulting from demolition or removal of structures (pits, wells, cisterns, etc.) using approved select fill materials consisting of stone, gravel, and sand free from debris, trash, frozen materials, roots, and other organic matter.
 2. Remove standing water, frost, frozen, or unsuitable material, trash, and debris from areas to be filled before fill placement.
 3. Place fill materials in horizontal layers and compact each layer at optimum moisture content of fill material to proposed density as specified in Section. 312000
 4. Grade surface to match adjacent grades and to provide flow of surface drainage after fill placement and compaction.
- D. Disposal of Demolished Materials:
1. Collect, recycle, reuse and dispose of demolished materials in a legal manner.

END OF SECTION

SECTION 031000

CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
 - 2. Openings for other work.
 - 3. Form accessories.
 - 4. Form stripping.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 032000 - Concrete Reinforcement: Coordination between formwork and reinforcement.
 - 2. Section 033000 - Cast-in-Place Concrete: Supply of concrete accessories for placement by this section.

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 301 - Structural Concrete for Buildings.
 - 2. ACI 318 - Building Code Requirements for Reinforced Concrete.
 - 3. ACI 347 - Recommended Practice For Concrete Formwork.
- B. United States Department of Commerce Product Standard (PS):
 - 1. PS 1 - Construction and Industrial Plywood.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Provide data on void form materials and installation requirements. Submit data on form-coating materials.
 - 2. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 347.
- B. Where necessary, design formwork under direct supervision of a Professional Engineer experienced in design of formwork and licensed in State where Project is located.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Environmental Impact:
 - 1. Formwork: Reuse forms to greatest extent possible without damaging structural integrity of concrete and without damaging aesthetics of exposed concrete.

PART 2 - PRODUCTS

2.1 WOOD FORMS

- A. Forms for Exposed Finish Concrete: Plywood panels, 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.
 - 1. Plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Lumber: Construction grade; with grade stamp clearly visible.

2.2 PREFABRICATED FORMS

- A. Preformed Steel Forms: Minimum 16 gage, well matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- B. Void Forms (Carton Forms): Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set. Thickness indicated on drawings.
- C. Tubular Column Type: Metal or fiberglass-reinforced plastic. Provide units with sufficient wall thickness to resist wet concrete loads without deformation.
- D. Forms for Textured Finish Concrete: Units of face design, size, arrangement, and configuration to match Architect's control sample. Provide solid backing and form supports to ensure stability of textured form liners.

2.3 ACCESSORIES

- A. Form Ties: Factory-fabricated, removable or snap-off type, metal, of fixed or adjustable length as applicable, with cone ends. Designed to prevent form deflection and to prevent spalling concrete upon removal. Back break dimension, 1-1/2 inch from exposed concrete surface. Provide ties that, when removed, will leave holes not larger than 1 inch diameter in concrete surface.
- B. Form Release Agent: 100 percent biodegradable colorless agent which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of subsequent coatings intended for use on concrete surfaces. Zero VOC.
 - 1. Envirolux by Conspec, Kansas City, KS, (800) 348-7351 or (913) 287-1700.
 - 2. SMD-10 Soy Form Release by Strategic Market Development (800) 959-1071 or (815) 935-0863.
 - 3. Bio-Form by Leahy-Wolf, Franklin Park, IL, (888) 873-5327 or (847) 455-5710.

- 4. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- C. Corners: Chamfered, wood strip 3/4 x 3/4 inch size; maximum possible lengths.
- D. Dovetail Anchor Slot: Galvanized steel, 22 gage thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- E. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- F. Waterstops (Rubber/PVC): Rubber or Polyvinyl chloride, minimum 1,750 tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, width as indicated on Drawings, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, and conditions are as required, and ready to receive Work.
 - 1. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.
- B. Report in writing to Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 EARTH FORMS

- A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.3 FORMWORK INSTALLATION

- A. Install formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 347R.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Furnish in largest available sizes to minimize number of joints and to conform to joint system indicated on Drawings.
- E. Obtain Contracting Officer approval before framing openings in structural members which are not indicated on Drawings.

- F. Provide chamfer strips on external corners of concrete members, to produce uniform, smooth lines and tight edge joints.
- G. Install void forms in accordance with manufacturer's published instructions. Protect forms from moisture or crushing.

3.4 FORM RELEASE AGENT APPLICATION

- A. Apply form release agent on formwork in accordance with manufacturer's published instructions.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are effected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items which will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- D. Install accessories in accordance with manufacturer's published instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.6 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.7 CONSTRUCTION

- A. Site Tolerances:
 - 1. Construct formwork to maintain tolerances required by ACI 301 and ACI 347.
 - 2. Camber slabs and beams 1/4 inch per 10 feet in accordance with ACI 301.

3.8 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection and testing.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

3.9 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END OF SECTION

SECTION 033000

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes all labor, materials and appliances, and perform all operations in connection with the installation of Concrete Work, and all related work incidental to the completion thereof, as shown on the drawings, complete, in strict accordance with the drawings and as specified herein. Section Includes:
1. Cast-in-place (CIP) concrete in walls, foundations, foundation walls, and equipment pads.
 2. Expansion and contraction, control joints in CIP concrete.
 3. Concrete curing and protection.
 4. Non-shrink grout including installation and forming.
 5. Testing related services.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents and References in Section 1.2.
- C. Related Sections: Related work specified elsewhere includes but may not be limited to
1. Section 031000: Concrete Forming and Accessories
 2. Section 032000: Concrete Reinforcement

1.2 REFERENCES

- A. General:
1. The publications listed below form a part of this specification to the extent referenced.
 2. Where a date is given for reference standards, the edition of that date shall be used. Where no date is given for reference standards, the latest edition available on the date of Notice Inviting Bids shall be used
- B. American Association of State Highway and Transportation Officials (AASHTO)
1. AASHTO M182, "Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats."
- C. Unless otherwise shown or specified, the work shall conform to the following standards and recommendations of the American Concrete Institute (ACI), latest editions adopted:
1. ACI 117, "Standard Specification for Tolerances for Concrete Construction and Materials."
 2. ACI 121R, "Quality Assurance Systems for Concrete Construction."
 3. ACI211.1, "Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
 4. ACI 212.2R, "Guide for Use of Admixtures in Concrete."
 5. ACI 214, "Recommended Practice for Evaluation of Strength Test Results of Concrete."
 6. ACI 301, "Specification for Structure /Concrete."
 7. ACI 302.1R, "Guide for Concrete Floor and Slab Construction."
 8. ACI 304R, "Guide for Measuring, Mixing, Transporting, and Placing Concrete."
 9. ACI 304.2-R, "Placing Concrete by Pumping Methods."
 10. ACI 305, "Hot Weather Concreting."

11. ACI 306, "Cold Weather Concreting."
 12. ACI 306.1 "Standard Specification for Cold Weather Concreting."
 13. ACI 308, "Standard Practice for Curing Concrete."
 14. ACI 309R, "Guide for Consolidation for Concrete."
 15. ACI 315, "Details and Detailing of Concrete Reinforcement."
 16. ACI 318, "Building Code Requirements for Structural Concrete."
 17. ACI 347, "Guide to Formwork for Concrete."
 18. ACI 347.2R "Guide for Shoring/Reshoring of Concrete Multistory Buildings."
 19. ACI 503.2, "Standard Specification for Bonding Plastic Concrete to Hardened Concrete with a Multi-Component Epoxy Adhesive."
 20. ACI SP-15, "Field Reference Manual" which includes "ACI 301 "Specifications for Structural Concrete for Buildings" and reference standards specified therein.
- D. American Welding Society (AWS)
1. AWS D1.4, "Structural Welding Code Reinforcing."
- E. American Society for Testing and Materials (ASTM).
1. ASTM A615, "Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement."
 2. ASTM C31, "Standard Practice for Making and Curing Concrete Test Specimens in the Field."
 3. ASTM C33, "Standard Specification for Concrete Aggregates."
 4. ASTM C39, "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens."
 5. ASTM C42, "Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete."
 6. ASTM C94, "Standard Specification for Ready-Mixed Concrete."
 7. ASTM C109, "Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)"
 8. ASTM C114, "Standard Test Method for Chemical Analysis of Hydraulic Cement."
 9. ASTM C138, "Standard Test Method for Unit Weight, Yield, and Air Content of Concrete (Gravimetric) of Concrete."
 10. ASTM C143, "Standard Test Method for Slump of Hydraulic Cement-Cement Concrete."
 11. ASTM C150, "Standard Specification for Portland Cement."
 12. ASTM C156, "Standard Test Method for Water Retention by Concrete Curing Materials."
 13. ASTM C171, "Standard Specification for Sheet Materials for Curing Concrete."
 14. ASTM C173, "Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method."
 15. ASTM C231, "Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method."
 16. ASTM C260, "Standard Specification for Air Entraining Admixtures for Concrete."
 17. ASTM C309, "Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete."
 18. ASTM C311, "Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete."
 19. ASTM C387, "Standard Specification for Packaged, Dry, Combined Materials for Mortars and Concrete."
 20. ASTM C457, "Standard Test Method for Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete."
 21. ASTM C494, "Standard Specification for Chemical Admixtures for Concrete."
 22. ASTM C618, "Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete."
 23. ASTM C920, "Standard Specification for Elastomeric Joint Sealants."
 24. ASTM C685, "Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing."

25. ASTM C989, "Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars."
26. ASTM C1260, "Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)."
27. ASTM C1567, "Standard Test Method for Potential Alkali Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)."
28. ASTM E154, "Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Slabs, On Walls, or as Ground Cover."
29. ASTM E1155, "Standard Test Method for Determining F Floor Flatness and FL Floor Levelness Numbers"
30. ASTM D2240, "Standard Test Method for Rubber Property-Durometer Hardness."

- F. Concrete Reinforcing Steel Institute (CRSI),
1. CRSI "Manual of Standard Practice."

1.3 SUBMITTALS

A. Section 013300 - Submittal Procedures: Procedures for submittals.

1. Review of submittals will cover general design only. In no case shall submittal review relieve the Contractor of the responsibility for strength of concrete, general or detailed dimension, quality or quantity of materials, or any other conditions, functions, performance or guarantees required.
2. Product Data:
 - a. Manufacturers' literature containing product and installation specifications and details.
 - b. Where Manufacturer's specifications, recommendations, and/or directions are required in this specification, deliver to the Owner two (2) copies of such printed specifications, recommendations, and/or directions for approval before any work is commenced.
 - c. Sources of fine and coarse aggregate. Once approved, the source of fine and coarse aggregate shall not be changed without written approval of the Engineer.
 - d. List of manufacturers and brand names for cement, mineral and liquid admixtures, bond breakers, curing compounds, joint sealants, and materials other than aggregates and reinforcing steel. Include product data sheets, instructions, and specifications for use.
3. Shop Drawings:
 - a. All shop drawings and calculations must bear the seal and signature of an engineer registered in the jurisdiction where project is being constructed.
 - b. Cast-in-place concrete shown on structural drawings, prepared under the supervision of a registered Professional Engineer, including:
 - 1) Rebar placing drawings (ACI 315, "Detailing Manual SP-66-(04)" or CRSI "Manual of Standard PracticeMSP-2-81"): Show bar sizes, bending, placing, spacing, locations, and quantities of reinforcing and wire fabric and supporting and spacing accessories. Provide steel order lists including bending and cutting details for all reinforcement shown on the structural design drawings.
 - 2) Form construction details, including jointing, special formed joints or reveals, location and pattern of form tie placement, and other items that affect exposed concrete visually.
 - 3) Calculations for any formwork, shoring and/or reshoring.
4. Batch Plant Equipment and Procedures
 - a. Supplier of concrete and ready-mix grout. Only one source will be approved for the Contractor, including all subcontractors. All concrete and ready-mixed grout supplied to the project shall originate from the approved single facility.
 - b. The following information shall be submitted:
 - 1) Name of supplier.
 - 2) Plant location.
 - 3) Plant volume and output capacity.

- 4) Capacity of transit equipment.
 - 5) Estimated travel time from plant to jobsite.
 - c. If the Contractor elects to use an on-site concrete batching plant, the following information shall be submitted:
 - 1) Drawings and data including proposed location of the batch plant on the site.
 - 2) List of and performance data for material handling equipment.
 - 3) Procedures for processing, handling, transporting, sorting, and proportioning the materials for concrete.
 - d. All other data necessary to show the supplier's capability to produce concrete of the quality and quantity required.
 5. Concrete Procedures
 - a. The following information shall be submitted:
 - 1) Placement drawings for slab-on-grade shall be submitted indicating location and size, placement sequence, joint locations, and embedded items.
 - 2) Procedure for mixing and transporting concrete to the point of placement.
 - 3) Procedures for placement of concrete.
 - 4) Methods of obtaining and maintaining the required concrete temperature during placement and initial curing.
 - 5) Procedures for consolidating the concrete.
 - 6) Procedures how concrete is finished and cured (slab-on-grade concrete).
 6. Assurance/Control Submittals:
 - a. Test Reports: Submit the following reports directly to Owner from Testing Laboratory, with copy to Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements:
 - b. Submit laboratory test reports for concrete materials and mix design test, including certified copy of results of aggregate tested by ASTM C1260 or C1567. Mix designs for each strength and type of concrete proposed for use. Details to be included are found in section 2.7.
 - c. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - d. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
 7. Delivery Tickets:
 - a. Copies of delivery tickets for each load of concrete delivered to site.
 - b. Indicate on each ticket information required by ASTM C94 including additional information required herein.
 - c. Mix identification number on ticket shall match number on submitted and approved mix design
 - d. Indicate number of drum revolution from when water is added until concrete is discharged.
 - e. Submit copies to Testing Laboratory same day as concrete delivery.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
1. Project Record Documents: Accurately record the following:
 - a. Shop drawings shall be corrected to reflect actual field changes and become part of the "Record As-Built Drawings".
 2. Extra Products: Submit extra products as specified in this Section.

1.4 QUALITY ASSURANCE

- A. Qualifications:
1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
 2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

- B. Pre-Installation Meetings:
1. Convene a pre-installation meeting at least one week prior to commencing Work of this Section.
 2. Require attendance of parties directly affecting Work of this Section including subgrade preparation formwork, reinforcement, pumping, or other means of conveying, placement, finishing, sawing, curing, joint sealing, or other pertinent portions of the work.
 3. Representatives to be present are personnel who are directly involved in the project and who have authority to control the work.
 4. Review conditions of operations, procedures and coordination with related Work. Agenda:
 - a. Tour, inspect, and discuss conditions of concrete work.
 - b. Review concrete testing and their requirements.
 - c. Review required submittals, both completed and yet to be completed.
 - d. Review Drawings.
 - e. Approve proposed equipment.
 - f. Review concrete batching, transporting, placement, consolidation, finishing, and curing procedures.
 - g. Review and finalize construction schedule related to concrete work and verify availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
 - h. Review required inspections, testing, certifying, and material usage accounting procedures.
 - i. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.
 - j. Review safety precautions relating to concrete work operations.
 - k. Environmental procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver materials in unopened containers with labels identifying contents.
- C. Store powdered materials in dry area and in manner to prevent damage. Protect liquid materials from freezing or exceeding maximum storage temperatures set by product manufacturer.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Jobsite Requirements:
1. Conform to ACI 305 R when placing concrete during hot weather.
 2. Conform to ACI 306 R when placing concrete during cold weather.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Applied Concrete Technology, Inc., Post Office Box 548, Grayslake, IL 60030, Toll Free: 800-228-6694, Phone: 847-548-2444, Fax: 847-548-2555. www.protecrete.com
 2. The Euclid Chemical Company, 19218 Redwood Road, Cleveland, OH 44110, Phone: 216-1-9222, Toll Free: (800) 321-7628, Fax: 216-531-9596 www.euclidchemical.com.
 3. Fortifiber Corporation, 419 W. Plumb Lane, Reno, NV 89509, Toll Free: 800-773-4777, Fax: 775-333-6411, Website: www.fortifiber.com.

4. ChemRex Inc., Shakopee, Minnesota 55379, Toll Free: 800-433-9517, Fax: 800-496-6067.
5. BASF Construction Chemicals North America (former Master Builders), 23700 Chagrin Boulevard, Cleveland, OH 44122, Phone: 216-839-7500, Fax: 216-839-8821.
6. W.R. Meadows, Inc., PO Box 338, Hampshire, Illinois 60140-0338, Toll Free: 800-342-5976, Phone: 847-683-4500.
7. Reef Industries, 9209 Alameda Genoa, Houston, Texas 77075, Phone: 713-507-4251, Toll Free: 800-231-6074, Fax: 713-507-4295.
8. Stego Industries LLC, 27442 Calle Arroyo Suite A, San Juan, Capistrano, CA 92675, Phone: 877-464-7834, Fax: 949-493-5165, www.stegoindustries.com.
9. L & M Construction Chemicals, Inc. 14851 Calhoun Rd., Omaha, NE 68152-1140; Phone: 402-453-6600, Fax: 402-453-0244.
10. Curecrete Chemical Company, Inc., 1203 W. Spring Creek Pl., Springville, UT Phone: 801- 489-5663.
11. Midwest Floor Care Inc., 17202 Princeton Rd, Adams, NE 68301, Phone: 402-788-2820.
12. General Resource Technology, Inc., 2978 Center Court, Eagan, MN 55121, Phone: 800-324-8154, Fax: 651-454-4252, www.grtinc.com.

B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 CONCRETE MATERIALS

A. Concrete:

1. Concrete shall be in accordance with ASTM C94. If a conflict exists between ASTM C94 and these specifications, these specifications shall govern.

B. Portland Cement: ASTM C150 – Type I unless otherwise specified or approved by the Engineer.

1. Assume full responsibility for the quality and soundness of cement. Cement is to be of one type and from the same mill; it is to be of uniform color for all concrete with permanently exposed concrete finishes.

C. Liquid admixtures: All admixtures shall be used in conformance with the manufacturer's recommendations. When air entraining admixtures, water reducing admixtures, high range water reducing admixtures, and non-corrosive accelerating admixtures are used in any combination, all products shall be from the same manufacturer or the ready-mix concrete producer shall certify that they are compatible. The following admixtures are permitted when approved in writing prior to use or are required as specified herein and shall be used in strict accordance with the manufacturer's specifications or recommendations:

1. Calcium chloride: Conform to ACI 301. The water-soluble chloride ion level shall not exceed 0.3 percent by weight of cement.
2. Air-entraining admixtures: ASTM C260 shall be used to achieve the specified air content in all permanently exposed exterior concrete. For steel hard trowel interior slab finish, do not use air entrainment admixtures. The total air entrainment (entrained and entrapped air) must not exceed 3 percent. For steel trowel exterior slab finish, comply with ACI 318 and ACI 302.
 - a. Euclid: AEA-92 or Air Mix 200.
 - b. BASF: Micro-Air, MBVR-Standard, and MB AE 90.
 - c. Sika: Sika AEA-14, Sika AEA-15, and Sika Air.
 - d. W.R. Grace: Darex EH, Darex II AEA, Daravair AT60, Daravair 1400, and Daravair 1000.
3. Water-reducing admixtures: Conform to ASTM C494, Type A, containing not more chloride ions than allowed in paragraph C., above.
 - a. Euclid: Eucon WR series or Eucon MR.
 - b. BASF: Masterpave, Masterpave N, PolyHeed 997, Pozzolith 220N, and Glenium 7500.
 - c. W.R. Grace: Daracem 55 and Daracem 65, WRDA 82 and WRDA with HCOL.

- d. Sika: Sikament HP, Plastocrete 161, and Sikament 686.
 - e. General Resource Technology: Polychem 400 NC and Polychem 1000.
4. Water-reducing/accelerating admixtures: Conform to ASTM C494, Type C or E having long-term test results showing non-rusting on metal deck and reinforcing steel.
 - a. Euclid: Accelguard series.
 - b. BASF: Pozzutec 20+, Pozzolith NC 534, and Rheocrete CNI.
 - c. Sika: Sika Rapid-1 and Plasocrete 161FL.
 - d. W.R. Grace: Lubricon NCA, Polarset, and DCI.
 5. Water-reducing/retarding admixtures: Conform to ASTM C494, Type D containing not more than 1 percent chloride ions.
 - a. Euclid: Eucon Retarder series.
 - b. BASF: Delvo Stabilizer, Masterpave series, and Pozzolith 100XR, 200N, 220N and 322N.
 - c. Sika: Plastimet.
 - d. W.R. Grace: Daratard 17, WRDA-64, and WRDA-82.
 6. High-range/water-reducing (HRWR) admixtures: Conform to ASTM C494, Type F or G super plasticizers containing 1 percent maximum chloride ions may be used with low slump (3 inches maximum) concrete to produce flowable concrete (up to 8 inches slump) with early strength gain and 28-day strengths equal to reference concrete. HRWR admixture may be used providing not more than 60 minutes is allowed from addition of admixture to final placement of concrete. HRWR admixture shall be used in concrete with a maximum water/ cement ratio of 0.50 or less and is suggested in the following:
 - a. In pumped concrete.
 - b. In concrete topping slabs
 - c. In lieu of the specified water-reducing admixture (Type A) where confinement of placing due to heavy reinforcement or narrow space requires flowable concrete.
 - d. Where more than 30 minutes is required between the addition of admixtures to final placement of the concrete, a combination of water-reducing, set controlling admixtures (ASTM C494, Types A, D, & E) as in Master Builders Company "Synergized Performance System" may be used.
 - 1) Euclid: Eucon 37 or Eucon 537.
 - 2) BASF: Rheobuild 1000, Glenium 3000 NS, and Glenium 3400NV.
 - 3) Sika: Sikament 300, Viscocrete 2100, and Sikament 686.
 - 4) W.R. Grace: Daracem 100, ADVA Cast 530, Mira 92, and ADVA Cast 575.
- D. Certification: Certification of the above requirements is required from the admixture manufacturer prior to mix design review and approval by the Owner. Upon request by the Owner, a qualified representative is to be provided to assure proper use of admixtures. Use of admixtures, other than listed above will be permitted only when approved.
- E. Aggregates:
1. Normal-weight concrete - ASTM C33. For slabs, also conform to combined aggregate grading recommendations of ACI 302 and ACI 302.1R, unless otherwise permitted.
 2. All concrete exposed to the weather shall conform to the limits of deleterious substances and physical properties of Table 3, ASTM C 33.
 3. Local aggregates: Local aggregates not complying with ASTM C33, but which have been shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Owner.
 4. The nominal size of an aggregate particle shall not exceed:
 - a. 20 percent of the narrowest dimension between sides of forms.
 - b. 33 percent of the depth of slabs.
 - c. 75 percent of the dimension between reinforcing bars.

- d. 75 percent of the dimension between reinforcing bars and forms.
5. Maximum size of coarse aggregates and minimum cementitious contents: ACI 301 and ACI 302.1R.
6. Concrete aggregate alkali-silica reactivity (ASR) shall be tested in accordance with ASTM C1260 with a 14-day expansion (no supplementary cementing materials) or ASTM C1567 (with supplementary cementing materials) of less than 0.1 percent. Materials (cement, supplementary cementing materials, and aggregates) to be used in the concrete shall be tested. Coarse aggregates and fine aggregates shall be individually tested. If two grades of coarse aggregates are blended they shall be individually tested.
7. Abrasive aggregates non-slip finishes: Fused aluminum oxide grits, or crushed emery, as abrasive for non-slip finish with emery aggregate containing not less than 40 percent aluminum oxide and not less than 25 percent ferric oxide. Use material that is factory-graded, packaged, rustproof, non-glazing, and unaffected by freezing, moisture, and cleaning materials.

F. Water:

1. Clean, potable, and free of injurious amounts of oil, acid, alkali, organic or other deleterious matter not detrimental to concrete; drinkable.
2. Water shall contain no more than 650 parts per million of chlorides as Cl or more than 1000 parts per million of sulfates as SO₄. In no case shall the water contain an amount of impurities that will cause a change in the setting time of Portland cement of neither more than 25 percent nor a reduction in compressive strength of mortar at 14 days of more than 5 percent when compared to the results obtained with distilled water when tested in accordance with ASTM C109.
3. Water used for curing shall not contain impurities in amounts to cause discoloration of the concrete or mortar or to produce etching of the surface.
4. Recycled water shall conform to ASTM C94.

2.3 GROUT/MORTARS

A. Cement grout: Conform to ASTM C387 "Dry packaged mixtures" or:

1. Mix at the site, in composition of one volume of Portland cement to 2-1/2 volumes of fine aggregate.
2. Mix the materials dry; then add sufficient water to make the mixture flow under its own weight.
3. Submittals: The following laboratory test results shall be submitted to show compliance with the requirements of this specification:
 - a. Initial setting time: 8 hours maximum
 - b. Vertical shrinkage: 0
 - c. Compressive strength: 4500 psi 1 day
 - d. Compressive strength: 8500 psi 7 days
 - e. Compressive strength: 10,000 psi 28 days
4. Field service: When required by the Owner, provide a qualified concrete technician employed by the Grout Manufacturer to assist in the initial grouting operations.
 - a. Euclid: NS Grout or Hi Flow Grout or E3 Grout series.
 - b. Sika: SikaGrout #212.
 - c. BASF: Masterflow 555 and Masterflow 928.

2.4 CURING/SEALING/HARDENERS

- A. Dissipating liquid membrane-forming compounds for curing concrete; Conform to ASTM C309, Type 1. Curing compound shall be compatible with floor sealer or finish used. Low VOC.
1. Euclid: VOX Kurex DR VOX series; waterborne products.
 2. W.R. Meadows: 1100-Clear series.
 3. Edoco: Burke Aqua Resin Cure.
 4. L&M Construction Chemicals: Cure R.

5. BASF: Kure 200W
6. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

B. Method of curing shall be approved by the finish flooring applicator where finishes are indicated.

C. Exterior Sealers: applied to horizontal concrete surfaces permanently exposed to salts, deicer chemicals and moisture, including parking decks. The manufacturer shall provide a five-year labor and materials warranty on performance of the sealer. Sealer shall be compatible with the curing compound used.

1. Euclid: Eucoguard or Diamond Clear or Super Diamond Clear.
2. ChemREX: Hydrozo Clear 40.
3. Substitutions: Permitted.

2.5 JOINTS AND EMBEDDED ITEMS:

A. Construction and Contraction Joints: Comply with ACI 301 and recommendations of ACI 302.1R. Sealant shall be two-part semi-rigid epoxy and shall have minimum Shore A Hardness of 80 when measured with ASTM D2240.

B. Isolation Joints: Fillers shall consist of 1/8-inch width strips of neoprene, synthetic rubber, or approved substitute, extending the full depth of the slab. Sealant shall be two-part elastomeric type, polyurethane base.

2.6 PROPORTIONING

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If laboratory trial batch method is used, use an independent testing facility acceptable to Owner for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing and inspection unless otherwise acceptable to Owner.

B. Submit written reports to the testing laboratory of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed and approved. Include the following information for each concrete mix design:

1. Method used to determine the proposed mix design.
2. Gradation of fine and coarse aggregates, plus combined aggregate gradation for slabs, ACI 302.1R.
3. Aggregate specific gravities and absorptions.
4. Proportions of all ingredients including reported on a saturated surface dried basis all admixtures added either at the time of batching or at the job site.
5. Water-cementitious ratio.
6. Slump, ASTM C143.
7. Certification of the chloride content of individual admixtures and of the mixes as proposed.
8. Air Content: ASTM C173 (Volumetric Method).
9. Unit weight of concrete, ASTM C138.
10. Strength at 3, 7, and 28 days, ASTM C39.
11. Method of recording batch proportions.
12. Substantiating test reports.

C. Concrete types and strengths: Minimum 28 Day Compressive Strength shall be per design requirements but not less than:

1. Paving base, columns, beams, walls, foundations, and footings: 3,500 psi.
2. Slab-on-grade: 4,000 psi.
3. Normal or Lightweight concrete on metal deck: 3,000 psi.
4. Tilt-up: 4,000 psi.
5. All concrete exposed to weather shall be air entrained (ASTM C260).
6. All concrete shall be normal weight except as noted above.

When the concrete mix design is developed from laboratory trial batching, adjust proportions to produce a design mix at least 1200 psi greater than the specified strength.

When the field experience method is used, the required average compressive strength shall be determined in accordance with ACI 318. Documentation that proposed concrete proportions will produce an average compressive strength equal to or greater than the required average compressive strength shall consist of a field strength test record representing materials and proportions to be used for this project. A field strength test record shall consist of at least 10 consecutive tests encompassing a period of time of not less than 45 days and made within the past 12 months.

Also, see general and specific notes on structural drawings.

- D. Weights: All concrete shall be normal-weight concrete unless otherwise designated on the structural drawings.
- E. Aggregate gradation: For slabs, also conform to combined aggregate grading recommendations of ACI 302.1R, unless otherwise permitted. For all other concrete not otherwise noted the coarse aggregate gradation shall conform to ASTM C33 size no. 57 or larger.
- F. Durability: Conform to ACI 301.
1. All concrete exposed to potentially destructive weathering, such as freezing and thawing, or to de-icer chemicals is to be air-entrained, 6 percent \pm 1 percent, a minimum six sacks cementitious per cubic yard of concrete, 0.45 maximum water-cementitious ratio, and, 4-inch maximum slump.
 2. Water-cement ratio: For concrete subject to freezing and thawing or deicer chemicals, the water-cement ratio shall not exceed 0.53 by weight including any water added to meet specified slump in accordance with the requirements of ASTM C94 unless otherwise noted.
- G. Slump: Conform to ACI 301.
1. 3 ½ inch maximum for consolidation by vibration
 2. 5 inch maximum for consolidation by other methods
 3. 8 inch maximum for flowable concrete. Concrete containing HRWR admixture (super plasticizer): 3 inch maximum before addition of HRWR
 4. Where field conditions require slump to exceed that specified above, the increased slump shall be obtained by the use of a superplasticizer only, and the Contractor shall obtain written approval from the Owner who may require an adjustment to the mix.
- H. Slab-On-Grade
1. Concrete shall conform to ACI 302.1R except that the minimum 28-day compressive strength shall be 4000 psi.
 2. The minimum cementitious content shall be in accordance with ACI 302.1R Table 6.2.
 3. The maximum water-cementitious ratio shall be 0.48.
 4. The maximum water content shall not be greater than 250 lbs per cubic yard of concrete.
 5. The air content shall be less than 3 percent.
- I. Production of concrete: Conform to ACI 301:
1. Cast-in-place concrete used in the work shall be produced at a single off-site batching plant or may be produced at an on-site batch plant.

2. All concrete shall be proportioned conforming to the approved mix designs and of the materials contained in those approved mixes. A certified copy of the design weights for each mix shall be kept at the producing plant for each class of concrete used on the project.
3. Plant equipment and facilities are to conform to the "Check List for Certification of Ready -Mixed Concrete Production Facilities" of the National Ready-Mixed Concrete Association (NRMCA) and have NRMCA or approved certification within the past year.
4. Coarse aggregates shall be washed and, if necessary, shall be uniformly moistened just before batching. Each size of coarse aggregate shall be batched from separate bins as required to produce the combined grading requirements.
5. Prior to adding a high-range water reducer (super plasticizer), slump shall not exceed the working limit. The high-range water reducing admixture shall be accurately measured and pressure-injected into the mixer as a single dose. If added at the jobsite, the field dispensing system shall conform to the same requirements as a plant system and tested prior to each day's operation. After the addition of the high-range water reducer, the concrete shall be mixed at mixing speed for a minimum of 5 minutes.
6. Ready-mixed and on-site batched concrete shall be batched, mixed, and transported in accordance with ASTM C94.
 - a. Truck mixers and their operation shall ensure that the discharged concrete is uniformly within acceptable limits of consistency, mix, and grading. All mechanical details of the mixer, such as water-measuring and discharge apparatus, conditions of the blades, speed of rotation, general mechanical condition of the unit, and clearance of the drum shall be checked before the use of the unit will be permitted.
 - b. Truck mixers shall be equipped with approved revolution counters by which the number of revolutions of the drum or blades may readily be verified. The water tank system of the truck shall be equipped with gauges that permit accurate determination of the tank contents.
 - c. Each batch of concrete shall be mixed in a truck mixer for not less than 80 revolutions of the drum or blades and at the rate of rotation designated as mixing speed by the manufacturer of the equipment. Additional mixing, if any, shall be at the speed designated as the agitating speed by the manufacturer of the equipment. All materials, including mixing water but excluding any high-range water reducers added onsite, shall be in the mixer drum before actuating the revolution counter for determining the number of revolutions of mixing.
 - d. The concrete producer shall furnish duplicate delivery tickets, one for the Contractor and one given to the Owner's Representative for each batch of concrete. The information provided on the delivery ticket shall include the quantity of materials batched including the amount of free water in the aggregate and any water added onsite. Show the date, time of day batched, and if ready-mixed the time of discharge from the truck. The quantity of water that can be added at the site without exceeding the maximum water-cementitious ratio specified shall be noted on the delivery ticket.
7. Concrete produced by on-site volumetric batching and continuous mixing if approved shall conform to ASTM C685.
8. For concrete produced on site with a central batch plant, mixing shall be done in an approved batch mixer.
 - a. The Contractor shall maintain and operate the on-site batch plant and transportation equipment in a manner that will produce the results specified in this section.
 - b. The Engineer reserves the right to reject the proposed on-site plant if, in his/her opinion, the on-site plant will interfere with other operations or impair the quality of the concrete.
 - c. The quantities of cement, pozzolanic materials, and aggregates used in each batch shall be determined by automatic weighing. The quantity of water shall be determined by weighing or volumetric measurement.
 - d. The weighing equipment for aggregates shall be readily adjustable both to compensate for variation in moisture content of the aggregates and for changing mix proportions. Moisture-sensing devices shall automatically compensate the aggregate weights for changes in moisture content. The charging of weigh hoppers directly from aggregate handling equipment such as front-end loaders will not be permitted.

- e. Mixers in centralized batching and mixing plants shall be arranged so that mixing actions can be observed from a location convenient to the mixing-plant operator's station.
 - f. Equipment shall be provided that discharges pozzolanic material into the cement hopper only after the addition of the Portland cement. Pozzolanic materials shall be stored in such a manner as to permit ready access for the purpose of inspection and sampling and be suitably protected against contamination of moisture. Should any pozzolan show evidence of contamination or be otherwise unsuitable, the Engineer will reject it and require that it be removed from the site.
 - g. Dispensers for admixtures shall have the capacity of the full quantity of the properly diluted solution required for each batch. They shall be maintained in a clean and freely operating condition. Admixtures shall be added to the premeasured water for the batch or shall be discharged into the batch by flowing automatically and uniformly into the stream of mixing water from the beginning to end of its flow into the mixer. Equipment for measurement shall give visual confirmation of the accuracy of the measurement for each batch.
 - h. The central batch mixer shall be rotated at a speed recommended by the manufacturer and mixing shall be continued for a minimum of 1-1/2 minutes after all materials are in the drum.
 - i. Each stationary mixer shall be equipped with a mechanically operated timing and signaling device that will indicate and ensure the completion of the required mixing period and will count the batches.
 - j. All concrete shall be mixed until there is a uniform distribution of the materials and shall be discharged completely before the mixer is recharged.
9. The Engineer may increase the mixing time when the charging and mixing operations fail to produce a delivered batch in which variations of consistency, mix, or grading are within the limits specified.
 10. Variations in consistency during the discharge of a single batch shall not exceed 1 inch of slump, except that a greater variation will be permitted if the slump of the concrete decreases and no water is added. Variations in mix and in grading of different parts of the delivered batch shall be within limits stated in ASTM C94.
 11. Water shall be introduced prior to, during, and following mixer-charging operations.
 12. When a mixer produces unsatisfactory results, it shall be repaired promptly and effectively, or it shall be replaced.
 13. Mixers shall not be loaded in excess of their rated capacity.
 14. Overmixing, such as to require addition of water to preserve the required consistency or to reduce slump, will not be permitted.
 15. All other concrete: Conform to ACI 301
 16. Use of accelerating admixtures in cold weather and retarding admixtures in hot weather shall not relax placement requirements specified herein.
 17. All concrete placed at ambient temperatures below 50 degrees F is to contain an approved accelerator. The concrete temperature when delivered at the site shall be at least 50 degrees F.
 18. All concrete placed at ambient temperatures above 80 degrees F is to contain an approved retarder.
 19. All concrete required to be air-entrained is to contain an approved air-entraining admixture.
 20. When improved workability, pumpability, lower water-cement ratio, or high ultimate and/or early strength is required, the HRWR admixture (super plasticizer) may be used.
 21. Ensure air content for slabs with steel trowel finish is less than 3.0 percent.
 22. The concrete shall be of such consistency and composition that it can be worked readily into the corners and angles of the forms and around reinforcement without permitting materials to segregate or free water to collect on the surfaces. Within the limiting requirements, adjust the consistency of the concrete as may be necessary to produce mixtures which will be placeable with reasonable methods of placing and compacting. Maintain on the job at all times adequate extra cement to be used at rate of 1/2 sack cement per cubic yard concrete for each 2" slump increase for corrections due to wetness desired or obtained. No water shall be added to concrete except under the direct awareness of the project inspector.

23. No water shall be added to concrete except under the direct awareness of the project inspector. The water-cementitious ratio stated on the approved mix designs shall not be exceeded unless approved by the Engineer. Re-tempered concrete shall be mixed for not less than 80 revolutions of the drum or blades and at the rate of rotation designated as mixing speed by the manufacturer of the equipment.
24. Adjustments to concrete mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant at no additional cost to Owner. Laboratory test data for revised mix design and strength results must be submitted and accepted before using in work.

2.7 FORMWORK

- A. Section 031000: Concrete Forming and Accessories

2.8 REINFORCING MATERIALS

- A. Section 032000: Concrete Reinforcement

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 INSTALLATION - GENERAL

- A. Install all cast-in-place concrete work in accordance with ACI 301 except as herein specified.
- B. All bearing materials shall be inspected by the Geotechnical Engineer prior to placing concrete. The Geotechnical Engineer shall be the sole judge as to the suitability of the bearing material.
- C. Compact stone base aggregate to thickness indicated on drawings. Roll poof stone screenings topping to provide smooth hard surface on which to place slab. Surface should not show footprints or truck tracks when driven over
- D. Immediately before placing concrete, spaces to be occupied by concrete shall be free from standing water, ice, mud, and debris.
- E. Concrete shall not be deposited under water or where water in motion may injure the surface finish of the concrete.
- F. Immediately before placing concrete for exterior sidewalk, curb and gutter, pavements, and slab-on-grade, subbases and compacted subgrades shall be thoroughly moistened, but not muddied, by sprinkling with water. Surfaces shall be kept moist by frequent sprinkling, as required, up to the time of placing of concrete.

- G. Forms and the reinforcement shall be thoroughly cleaned of ice and other coatings. Remove surplus form releasing agent from the contact face of forms.
- H. Notify all trades concerned and the Owner's Representative sufficiently in advance of the scheduled time for concrete placement to permit installation of all required work by other trades.
- I. Before placing concrete, all required embedded items, including dovetail anchor slots, anchors, inserts, curb angles, metal frames, fixtures, sleeves, drains, stair nosings, accessory devices for Mechanical and Electrical installations shall be properly located, accurately positioned and built into the construction, and maintained securely in place.
- J. Build into construction all items furnished by the Owner and other trades. Provide all offsets, pockets, slabs, chases and recesses as job conditions require.
- K. Place and properly support reinforcing steel and anchor bolts.
- L. The alignment, orientation, spacing, and embedment length of mechanical load transfer devices in slab-on-grade and pavements shall conform to dimensions and tolerances shown on the drawings.
- M. The Owner Representative should attend the first concrete pour.

3.3 INSTALLATION - FORMWORK

- A. Section 031000 - Concrete Forming and Accessories
- B. Construction and Contraction Joints: Conform to ACI 301 and recommendations of ACI 302.1R.

3.4 REINFORCEMENT

- A. Placement: Section 032000 - Concrete Reinforcement

3.5 METHODS OF PLACEMENT AND PLACING CONCRETE

- A. Placement: Conform to ACI 301:
 - 1. Maintain concrete cover around reinforcing as per Section 3.3 above and ACI 301.
 - 2. The methods and equipment used for transporting concrete to the site work and the time that elapses during transportation shall not cause segregation of coarse aggregate or slump loss in excess of 1 inch when measured at the point of discharge.
 - 3. Concrete shall be placed within 90 minutes after the water has been added to the cement and aggregates. Concrete shall be placed prior to initial concrete set.
 - 4. Placing of concrete will not be permitted during rainfall or when rain appears imminent. If rain should fall subsequent to placement, the concrete shall be completely protected until curing is complete.
 - 5. Cold-Weather Placement: Comply with provisions of ACI 306.1 "Standard Specifications for Cold-Weather Concreting" and as follows.
 - a. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
 - b. When necessary, arrangements for heating, covering, insulating, or housing the concrete work shall be made in advance of placement and shall be adequate to maintain the required temperature during the first 24 hours.
 - c. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
 - d. Concrete shall not be placed on frozen ground or placed when the ambient temperature is 40 deg F or less and dropping.
 - e. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

- f. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures using vented heaters and insulating blankets.
 - g. Vent heater exhaust gases that contain carbon dioxide outside of enclosed areas.
 - h. Concrete temperatures shall be maintained above 50 degrees F for the first 7 days of curing.
6. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305R "Standard Specification for Hot-Weather Concreting" and as specified.
- a. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice of a size that will melt completely during mixing may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - b. Reject any concrete that has a temperature at the point of placement above 90 deg F, unless approved otherwise by the Construction Project Manager. When air temperatures are between 80 and 90 deg F the maximum mixing and delivery time is reduced to 75 minutes. When air temperatures exceed 90 deg F, the maximum mixing and delivery time is reduced to 60 minutes.
 - c. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
 - d. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
 - e. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Owner.
 - f. Spray evaporative retardants, wind breaks, misters, or shade concrete when the rate of surface evaporation when calculated in accordance with ACI 305.5 exceeds 0.2 lb/sq. foot per hour.
- B. Depositing Concrete
1. Deposit concrete as near its final position as possible to avoid segregation due to rehandling or flowing. Hoppers, tremies, pump line, ducts, chutes, or other methods approved by the Engineer shall be used to deposit concrete in its final position within the specified time limits and without segregation of the mix.
 2. The sequence of concrete placement and the number, type, position, and design of joints shall be approved by the Engineer prior to concrete placement.
 3. Place floor slabs-on-grade by "strip cast" method.
 4. Concrete shall be deposited as nearly as practical in its final position to avoid segregation due to re-handling or flowing. No concrete shall have a free fall of over three feet from truck, mixer, or buggies.
 5. The concreting shall be carried on at such a rate that the concrete is plastic at all times and flows readily into the spaces between reinforcing bars. No concrete that has partially hardened or been contaminated by foreign materials shall be deposited in the work
 6. When concreting is started, it shall be carried on as a continuous operation until the placing of the section is completed.
 7. Except as intercepted by joints, concrete shall be placed in continuous layers. The depth of layers shall not exceed 20 inches. Succeeding layers shall be placed while the previous layer is still plastic. Concrete placement shall begin at the lowest point in each section of concrete to be placed.
 8. Protect adjacent surfaces from concrete drippings, spillage, and splashes. Hardened or partially hardened splashes or accumulations of concrete on forms or reinforcement shall be removed before the work proceeds. Clean all damaged surfaces immediately.
 9. All conveyances shall be thoroughly cleaned at frequent intervals during the placement of the concrete, and before the beginning a new run of concrete all hardened concrete and foreign materials shall be removed from the surfaces.

10. The Superintendent of Foreman in charge of concrete work shall mark on the drawings the time and date of the placing of each concrete pour. Locations where concrete test cylinders are made shall also be noted on the drawings. Such drawings shall be kept on file at the job until its completion and shall be subject to the inspection of the Owner's Representative at all times.
- C. Conveyor Belts and Chutes
1. Chutes or conveyor belts shall not be used except as approved by the Engineer.
 2. Concrete shall be conveyed from the mixer to the place of final deposit by methods that will prevent separation and loss of material.
 3. Chutes longer than 50 feet and conveyor belts longer than 110 feet will not be permitted.
 4. Equipment for conveying and chuting concrete shall be of such size and design as to insure a practically continuous flow of concrete at the delivery point without separation of material.
 5. Provide runways or other means for wheeled equipment to convey concrete to point of deposit. Construct runways so that supports will not bear upon reinforcement or fresh concrete.
 6. The minimum slope of chutes shall enable concrete of the specified consistency to readily flow.
 7. Ends of chutes, hopper gates, and other points of concrete discharge throughout the conveying, hoisting, and placing system shall be designed and arranged so that concrete passing from them will not fall separated into whatever receptacle immediately receiving the concrete. Adequate headroom provision must be made at such points for a vertical drop and for proper baffling.
 8. If a conveyor belt is used, it shall be wiped clean by a device operated so that none of the mortar adhering to the belt will be wasted.
- D. Pumping of Concrete
1. The type and operation of a concrete pump shall be subject to the approval of the Engineer. The equipment used in placing the concrete and the method of its operation shall introduce the concrete into the forms without high velocity. Placing equipment shall be operated only by experienced operators.
 2. During pumping, the Contractor shall have on-site a standby placing system, acceptable to the Engineer, to ensure that in the event of breakdown of the primary placing equipment, the concrete placement can continue without cold joints.
 3. The minimum diameter of the hose or conduit shall be 4 inches unless otherwise approved by the engineer. Aluminum conduits shall not be used for conveying the concrete. Pumping equipment, hoses, and conduits that are not functioning properly shall be replaced.
- E. Joints
1. Joints shall be vertical in walls and horizontal in slabs.
 2. Dowel bars and tie bars shall be inspected
 3. Control joints for controlling concrete shrinkage shall be provided in floor slabs, walls, decks, conduits, and channels as shown on the plans or approved by the Engineer.
 4. Joint spacing and sawcut depth for slab-on-grade and concrete pavement shall conform to that shown on the pour sequencing plan and/or drawings.
 - a. Sawed control (contraction) joints for pavements and slab-on-grade shall be installed as soon as practical so as not to ravel the concrete but less than 12 hours.
 - b. The minimum sawcut joint depth shall be 1/4 of the slab thickness unless an early-entry SOFF-CUT saw is used in accordance with manufacturer recommendations (typically sawed between 1 to 4 hours after finishing to a 1-inch minimum depth.
 - c. Joint spacing shall not exceed 15 feet on center each way unless otherwise approved by the Engineer.
 - d. The long dimension of a slab shall not exceed 1.5 times the short dimension unless otherwise approved by the Engineer.
 5. Joints in slabs shall align with column lines and joints in adjoining walls unless otherwise approved by the Engineer or shown in the drawings. Joints shall also line up with architectural reveals and form lines. All corners shall be relieved by cutting joint to adjacent control joint.
 6. When not otherwise shown on the drawings or specified, concrete placement for walls shall be constructed in segments no longer than 30 unless otherwise approved by the Engineer.
 7. If there is a delay in casting but prior to concrete initial set, the concrete placed after the delay shall be thoroughly spaded and consolidated at the edge of that previously placed to avoid cold joints.

- Concrete shall then be brought to correct level and struck off with a straight edge. Bullfoats shall be used to smooth slab surfaces, leaving it free of humps or hollows.
8. Where placing concrete is interrupted long enough for the concrete to take its initial set, the working face shall be made a construction joint.
 - a. Preparation and disposition of unplanned cold joints in walls shall be approved by the Engineer.
 - b. For slab-on-grade, pavements, sidewalk, and curb and gutter, concrete shall be removed back to the nearest planned joint and a construction joint installed.
 9. Unless otherwise noted on the drawings, where concrete is to be placed against existing concrete, except in the case of expansion joints, the joint face of the existing concrete shall be roughened.
 - a. Before new concrete is placed against hardened concrete, the bonding surface of the existing concrete shall be roughened to an amplitude of 0.25 inch using bush hammers, abrasive blasting, or high-pressure water blasting.
 - b. Fresh concrete may be green-cut with water blasting and hand tools to remove concrete laitance and spillage and to expose sound aggregate.
 - c. The prepared surfaces of hardened concrete shall be kept thoroughly wet during the 24-hour period immediately prior to the placement of the new concrete. Wetting shall be accomplished by continuous sprinkling or by covering exposed surfaces with wet burlap.
 - d. Where shown on the drawings or permitted by the Engineer, bond-preventing compound shall be applied by brush in accordance with the manufacturer's printed instructions.
 10. Corner sections of walls shall not be placed until the adjoining wall sections have cured at least 14 days.

F. Consolidation

1. All concrete shall be thoroughly consolidated by internal mechanical vibrators during the placing operation and shall be thoroughly worked around the reinforcement and embedded fixtures and into corners of the forms.
2. Concrete for slabs 8 inches thick or less may be consolidated with vibrating screeds. Slabs between 8 to 12 inches thick shall be compacted with internal vibrators and (optionally) with vibrating screeds.
3. Concrete shall be consolidated by vibration to the maximum practicable density. The concrete shall be free from pockets of coarse aggregate and entrapped air.
4. Vibrators shall have a minimum diameter of 3 inches with a frequency of at least 7000 vibrations per minute and with an amplitude adequate to consolidate the concrete in the section being placed.
5. Forms shall contain sufficient windows or shall be limited in height to allow visual observation of the concrete during placement. Sufficient illumination shall be provided in the interior of forms so that at the places of concrete deposition the concrete shall be visible from the deck or runway.
6. Vibrators shall not be secured to forms or reinforcement.
7. Keep a minimum of two standby vibrators in operable condition on the job during concreting operations.
8. Consolidation shall be carried on continuously with the placing of concrete.
9. The number of vibrators employed shall be sufficient to consolidate the concrete within 15 minutes after it is deposited in the forms.
10. When consolidating each layer of concrete, the vibrator shall be operated at regular and frequent intervals 18 to 30 inches apart.
11. The vibrator shall be kept in nearly a vertical position as practicable. The use of vibrators to shift or drag concrete after deposition will not be permitted. Vibrators shall not be laid horizontally or laid over.
12. The vibrator head shall penetrate 6 to 8 inches into the preceding layer and then be withdrawn at a slow rate. The top part of each layer shall be re-vibrated systematically at the latest time the concrete can be made plastic by means of vibration.
13. Concrete shall not be placed until the previous layer has been vibrated.

14. Unless directed otherwise by the Engineer, the top 2 feet of walls shall be re-vibrated approximately 1 hour after placement of concrete and while a running vibrator will still sink under its own weight into the concrete and liquefy it momentarily.
- G. Protection of cast concrete: Conform to ACI 301.
- H. Repair of surface defects: ACI 301.
1. Inspect concrete surfaces and surfaces to be painted immediately upon removal of forms. Irregularities shall be immediately rubbed or ground to secure a smooth, uniform, and continuous surface.
 2. Clean surfaces of tie holes. Tie holes shall be filled solid with patching mortar.
 3. Surfaces to be smoothed shall not be plastered or coated.
- Patch imperfections as needed or as directed by the Owner. Repairs in accordance with Section 3.8 shall not be made until the surface has been inspected and repair methods have been approved by the Owner.

3.6 FINISHING

- A. Finishing of formed surfaces: ACI 301:
1. Tops of forms:
 - a. Strike concrete smooth at tops of forms.
 - b. Float to texture comparable to formed surfaces.
 2. Formed surfaces:
 - a. Finished formed surfaces shall conform accurately to the shape, alignment, grades, and sections shown on the drawings or prescribed by the Engineer.
 - b. Surfaces shall be free from fins, bulges, ridges, honeycombing, or roughness of any kind and shall present a finished, smooth, continuous hard surface.
 - c. Permanently exposed surfaces: ACI 301 - "Smooth Form Finish" with the fins ground smooth and air holes shall be filled with a non-shrink mortar. The color of the patch material shall match the color of the surrounding concrete. Surfaces in unfinished areas unexposed to public view: ACI 301- "Rough Form Finish".
- B. Slabs: Minimum slab surface tolerance must satisfy ACI 301 and ACI 302.1R as measured in accordance with ASTM E1155.
1. Slabs-on-grade:
 - a. For exposed slabs, install semi-rigid epoxy sealant in construction and contraction joints after slab has a minimum of 60 days or otherwise approved by the Engineer.
 - b. Separate slabs-on-grade from vertical surfaces with 1/2-inch-thick joint filler. Extend joint filler from bottom of slab to within 1/8 inch of finished slab surface.
 - c. Allowable tolerance for slab on grade surfaces, measured in accordance with ACI 117 and ASTM E1155, shall meet or exceed an overall value of FF35/FL25, with minimum local value of FF24/FL17.
 2. Suspended Floor Slab:
 - a. Minimum surface tolerances: FF25 & FL20 overall and FF20 & FL15 local.
 3. Concrete Finishes:
 - a. The following will not be permitted on slab or floor finishes:
 - 1) Dusting dry cement or sand on the surface to absorb excess moisture.
 - 2) Use of a mortar finishing coat.
 - 3) Excessive troweling or manipulation that brings water or a large amount of fines to the surface.
 - 4) Use of a Fresno.
 - 5) Addition of water to the surface during the finishing operation.
 - 6) Use of the floor during construction in a manner that leads to marring or staining the finish.
 - b. Surface preparation

- 1) The concrete shall be brought up evenly to slightly above finished grade and shall be thoroughly compacted and consolidated. The top shall be struck off to accurately established grade strips or grade blocks. Complete screening before any excess moisture or bleedwater is present on the surface.
 - 2) After bull floating, defer additional finishing operations until the concrete has stiffened sufficiently to sustain foot traffic pressure with an indentation of not more than ¼ inch.
- c. Floor Slabs: Steel trowel finish unless otherwise noted on the plans. As soon as the moisture sheen has disappeared from the floated surface and the concrete has hardened sufficiently to prevent drawing moisture and fine materials to the surface, the surface shall be steel troweled to produce a smooth, hard, uniform finish. Final steel troweling shall be conducted after the concrete is hard enough that no mortar accumulates on the trowel when manipulated with heavy pressure. Machine finishing may be used for troweling.
- d. Exposed concrete slabs sealed or sealed and hardened using a liquid compound compatible with the curing method used.
- e. Exterior Concrete Finishes: Unless otherwise noted on the drawings, floors, walkways, and roof finishes shall be sloped a minimum 0.125 inch per foot to drain water. A light steel trowel with broom finish unless otherwise noted on the plans. Apply exterior sealer to surfaces exposed to deicer chemicals that is compatible with the curing method used.
- f. Exposed Ramps, Landings and Stair Treads: A light steel trowel with broom finish unless otherwise noted on the plans. Surfaces shall be sealed or sealed and hardened using a liquid compound compatible with the curing method used.
- g. A heavy broom finish shall be provided on disabled person ramps, utility ramps, and around exterior loading docks.

3.7 CURING, PROTECTION, LIQUID HARDNERS AND SEALERS

A. Temperature, Wind, and Humidity

1. When concrete slabs and other unformed concrete is placed in warm, dry, dusty, or windy conditions, concrete surfaces shall be protected from rapid drying by use of windbreaks, shading, fogging with properly designed nozzles, or a combination of these measures. Hot weather concreting procedures provided in ACI 305R shall be used when ambient conditions dictate.
2. Cold weather concreting procedures provided in ACI 306R shall be used when ambient conditions dictate.
3. Changes in air temperature immediately adjacent to the concrete during and immediately following the 7-day initial curing period shall be kept as uniform as possible and shall not exceed 5 deg. F in any 1 hour or 50 deg. F. in any 24-hour time period.

B. Curing Compound

1. All curing methods shall be placed immediately after final finishing (i.e., within two hours). Contractor's attention is directed to the fact that experience shows the most important time of curing is from three to four hours after placing and extending five to six hours thereafter. It is extremely important, therefore, to prevent loss of moisture, particularly during this period when concrete is especially vulnerable to plastic shrinkage cracks. All exposed surfaces of concrete including floor slabs, whether or not they receive a finish flooring, shall be protected from premature drying for a minimum of seven days.
2. Apply the specified curing compound in strict accordance with manufacturer's written instructions. Curing compound shall not be diluted by the addition of solvents or thinners, nor shall it be altered in any other manner. Curing compound that has become chilled and is too viscous for satisfactory application shall be heated by steam or hot water bath until it has proper fluidity. The temperature of the compound shall not exceed 100 °F. Curing compound shall not be heated by direct exposure of the container to fire.
3. When used on an unformed concrete surface, application of the first coat of curing compound shall commence immediately after finishing operations have been completed. When curing compound

is used on a formed concrete surface, the surface shall first be moistened with a fine spray of water immediately after the forms have been removed. The spray shall be continued until the surface does not readily absorb further water. As soon as the surface film of water has disappeared and the surface is almost dry, the first coat of curing compound shall be applied. In the event that application is delayed on either formed or unformed surfaces, the surface shall be kept continuously moist until the compound has been applied or the specified period of water curing has elapsed.

4. Surfaces shall be sprayed uniformly with 2 coats of curing compound. Each coat shall provide a minimum coverage of 1 gallon per 250 square feet of surface. As soon as the first coat has become dry, a second coat shall be applied in the same manner. The direction of application of the second coat shall be perpendicular to the first coat. The curing compound shall be sprayed using approved pneumatic or pump driven equipment having the following characteristics:
 - a. Separate lines to the nozzle for material and for compressed air
 - b. A filtering system for the removal or entrapment of contaminants
 - c. A constant application pressure
5. Curing compound shall not be used on any concrete surface specified to receive additional concrete, coatings, grout, and chemical treatment

C. Protection

1. Freshly placed concrete shall be protected against wash by rain.
2. Dust control shall be provided in the surrounding areas during placement. If, in the opinion of the Engineer, these conditions are not satisfactory met, concrete shall not be placed.
3. During the first 2-day period of curing, no traffic on or loading of the floors will be permitted.
4. The contractor shall allow no traffic and take precautions to avoid damage to the membrane of the curing compound for a period of not less than 28 days. Damage shall be repaired immediately to the satisfaction of the Engineer.
5. Special care shall be taken to prevent avoid damaging the surfaces and joints due to load stresses from construction equipment, heavy shock, and excessive vibration. During construction activities, concrete shall be protected against damage with plywood or other approved materials until final acceptance by the Engineer.
6. Precautions shall be taken to prevent overloading floors, pavements, slabs, beams, and other members. The Contractor shall comply with the Engineer's instructions regarding the loads that will be permitted on these members during construction.
7. Self-supporting structures shall not be loaded in such a way to overstress the concrete.

D. All floor slabs shall be cured using products and methods compatible with selected floor adhesives, toppings, and other finish materials.

E. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

1. Remove curing compounds per the manufacturer's instructions after curing is complete as required to ensure compatibility of any finish treatments, paints, or coatings.
2. Remove sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
3. Apply liquid in accordance with manufacturer's instructions and until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water to remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

F. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instruction.

3.8 PATCHING AND REPAIR

A. Concrete will be considered by the Engineer as not conforming to the intent of the drawings and specifications for the following reasons:

1. Concrete this is not formed as shown on the drawings.
 2. Concrete this is not in true alignment or level.
 3. Concrete which exhibits a defective surface.
 4. Concrete with defects that reduce the structural integrity of a member or members.
 5. Concrete jointed slabs with uncontrolled random cracking.
- B. Non-conforming concrete to required thickness, lines, details, and elevations will be rejected by the Owner and shall be modified or replaced with concrete that conforms to the contract requirements without a claim by the Contractor for additional cost or extension of contract time.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Owner for each individual area. Should the Owner grant permission for the Contractor to attempt restoration of a defective area by patching or other repair methods, such permission shall not be considered a waiver of the Owner's right to require complete removal of the defective area if, in the Engineer's opinion, the restoration does not provide the structural or aesthetic integrity of the member or members.
- D. All repairs of defective areas shall conform to ACI 301. On areas requiring treatment of defects and until such repairs have been completed, only water cure will be permitted
- E. At any time prior to final acceptance, concrete found to be defective, damaged, or not in accordance with the specifications shall be repaired or removed and replaced with acceptable concrete.
- F. If approved by the Owner, repair or replace concrete with excessive honeycombing due to improper placement.
1. Honeycombed areas shall be removed down to solid concrete a minimum of 1 inch over the entire area. Feathered edges will not be permitted. If chipping is necessary, the edges shall be perpendicular to the surface or slightly undercut.
 2. Laitance and soft material shall be removed prior to patching with a pea gravel concrete mix and bonding agent approved by the Engineer.
 3. The area to be patched and an area at least 6 inches wide surrounding it shall be dampened to prevent absorption of water from the patching materials.
 4. If a cement slurry bonding grout is approved, the heavy-cream consistency grout shall then be rigorously brushed into the surface. The concrete patch material shall be installed prior to the bonding grout skimming over or drying.
 5. If approved, a bonding admixture, bonding compound, or epoxy adhesive may be used in strict accordance with the manufacturer's preparation and application recommendations. Comply with ACI 301 and ACI 503.2 for standard specifications for bonding plastic concrete to hardened concrete with a multiple component epoxy adhesive.
 6. The repair concrete shall be thoroughly consolidated in place and struck off so as to leave the patch slightly higher than the surrounding surface. The concrete shall be left undisturbed for at least 1 hour to permit initial shrinkage then finished.
 7. The patched area shall be kept damp for 7 days.
 8. The color of the patch material shall match the color of the surrounding concrete. Repairs shall be made promptly while the base concrete is less than 28 days old
 9. Metal tools shall not be used in finishing a patch in a formed wall that will be exposed.
- G. Areas requiring patching shall not exceed 2 sq. ft. per 1000 sq. ft. of surface area and shall be widely dispersed. Areas showing excessive defects as determined by the Owner shall be removed and replaced.
- H. High spots identified in the floor flatness and levelness survey may be removed with bump grinding. Areas to be ground shall not exceed more than 10 percent of any one slab nor more than 5 percent of the total slab-on-grade area. There are no limitations for exterior concrete pavement areas requiring grinding.
- I. Random hairline cracks in up to 3% of the slab panels will be accepted. Cracks in these panels shall be routed and filled with semi-rigid joint filler. If more than 3% of panels contain cracks, the number of panels exceeding the 3% limit shall be demolished and replaced at the direction of the Owner, crack repairs will not be accepted. Any panels that contain cracks wider than 0.022" shall be demolished and replaced.
- J. Interior slab-on-grade hairline cracks allowed to be repaired that are subjected to lift truck traffic shall be routed and sealed with a semi-rigid epoxy sealant. Exterior slabs may be routed and sealed with the flexible joint sealant to be installed in pavement joints.

3.9 GROUTING

- A. After steel columns have been installed and leveled, grout the space between the bottom of the plate and concrete, using cement grout completely filling the space and forming solid bearing for the column base plate.

3.10 EVALUATION AND ACCEPTANCE OF CONCRETE

- A. Comply with ACI 301 and modifications in this section.
- B. Compressive strength
 1. Sets of standard-cured quality assurance cylinders will be taken by the Engineer during the progress of the work. The number of cylinder sets taken for each concrete mix design placed each day shall not be less than one set per day, nor less than one set for each 150 cu yds of concrete nor less than one set for each 5000 sq ft of surface area for slabs or walls.
 2. A set of cylinders consists of five cylinders cured in accordance with ASTM C31: one to be tested at 7 days and two to be tested and their strengths averaged at 28 days in accordance with ASTM C31. The fourth and fifth cylinders may be used to test at other ages or to verify strength after 28 days in the event the 28-day strengths are low.
 3. A 28-day compressive strength test shall consist of the average strength of at least two cylinders fabricated from a single load of concrete.
 4. The strength level of the concrete will be considered satisfactory so long as the averages of all sets of three consecutive strength tests equal or exceed the specified strength, f'_c , by more than 500 psi, not more than 10 percent of the tests are less than the specified 28-day strength, and no individual test is more than 500 psi below the 28-day specified strength.
 5. Should cylinder tests fail to meet the strength acceptance requirements or if deficient construction is suspected, core tests may be required and the costs of such tests paid by the Contractor. The Engineer shall identify core locations to least to impair the strength of the structure. Four-inch diameter cores shall be tested in accordance with ASTM C42.
 6. At least three representative cores shall be drilled from each member or area of concrete that is considered potentially deficient. If before testing, one or more cores shows evidence of having been damaged subsequent to or during the removal from the structure, it shall be replaced.
 7. Concrete in the area represented by core tests will be considered adequate if the average strength of the cores is equal to or at least 85 percent of and if no single core is less than 75 percent of the specified strength.
 8. Concrete that is deficient shall be isolated and retested to establish the boundary of deficient concrete. Concrete in the deficient area shall be removed and replaced.
 9. Core holes shall be repaired as directed by the Engineer.
- C. Air content will be determined in accordance with ASTM C231. The air content shall be taken with each set of test cylinders. If the air content is outside the specified range, the concrete shall be rejected. If concrete is to be air entrained for freeze-thaw durability, cores will be located to isolate deficient concrete by evaluating the air-void system in accordance with ASTM C457. Concrete in the deficient area shall be removed and replaced.
- D. Slump tests will be performed prior to placing the concrete. Such tests shall be made for each set of test cylinders defined for compressive strength. If the slump is outside the specified range, the concrete shall be rejected.
- E. The frequency of testing shall be increased if concrete fails to meet the acceptance criteria or if deemed by the Engineer to be too variable.

3.11 ACCEPTANCE OF STRUCTURE

- A. Comply with ACI 301 and modifications in this section.
- B. Completed concrete work, which meets all applicable requirements, will be accepted without qualification.

- C. Completed concrete work which fails to meet one or more requirements but which has been repaired to bring it into compliance will be accepted without qualification.
- D. Completed concrete work which fails to meet one or more requirements and which cannot be brought into compliance may be accepted or rejected by the Owner. In this event, modifications may be required to assure that remaining work complies with the requirements.
- E. The costs of any additional tests or analysis, including additional architectural and engineering services, performed to prove the adequacy of the concrete work, shall be borne by the Contractor without extension of contract time.

3.12 MISCELLANEOUS CONCRETE

- A. Curbs: Provide monolithic finish to interior surface of curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- B. Equipment bases and foundations: Provide machine and equipment bases and foundations as shown on drawings. Set anchor bolts for machines and equipment with template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

3.13 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Requirements:
 - 1. Provide and maintain an adequate program of quality control for the materials, production methods, and workmanship to assure conformance of all work to the project contract documents. ACI 121R outlines the essential elements of the Material Control portion of the QA program.
 - 2. All materials, equipment, and methods shall be subject to verification inspections and/or testing as specified herein; ACI 121R.
 - 3. Testing and Evaluation:
 - a. Furnish and pay for the services of an independent Testing Laboratory satisfactory to the Owner. The testing laboratory shall have prime responsibility for review, verification inspection, and testing of the concrete producer's materials, operations, facilities, and quality control procedures and evaluating the results for conformance with these specifications complying with ACI 121R.
 - b. The Testing Laboratory will be required to provide evidence of recent inspection of its facilities by the Cement and Concrete Reference Laboratory of the National Bureau of Standards (NBS) and to show that any deficiencies have been corrected.
 - c. In addition to the requirements and duties in ACI 301 the testing laboratory shall provide the following:
 - 1) One or more additional test cylinders shall be taken during cold weather concrete placement and cured on the job site under conditions of concrete represented to determine safe form-stripping period.
 - 2) Sample (and test when directed by the Owner) each shipment of cement and aggregates and verify approved admixtures. Store samples in a protected place until authorized to dispose of them.
 - 3) Inspect concrete batching, mixing, and delivery operations periodically or as directed by the Owner.
 - 4) Review manufacturer's reports and/or certification for each shipment of cement and reinforcing steel and/or conduct laboratory tests or spot checks of the materials as received for compliance with specifications.

- 5) Submit to the Owner and concrete producer, during construction, the results of concrete tests.
- 6) Include the following information:
 - i. Date of placement.
 - ii. Structure and relative location.
 - iii. The concrete mix design.
 - iv. Unit weight of concrete - ASTM C138
 - v. Slump - ASTM C143
 - vi. Air content of freshly-mixed concrete by the pressure method, ASTM C231 or the volumetric method, ASTM C173.
 - vii. Concrete temperature (at placement time).
 - viii. Air temperature (at placement time).
 - ix. Strength determined in accordance with ASTM C39.
 - x. Other testing or inspection as required.
- d. The Testing Laboratory shall assess and report floor flatness and levelness in accordance with ASTM E1155.
- e. Field and concrete plant inspections are to be made by a competent representative of the Testing Laboratory during all structural concreting operations including periodic audit and spot check of the Producer's and/or Contractor's quality control procedures to assure proper and adequate control. When it appears that any material furnished fails to fulfill specification requirements, the Testing Laboratory is to report such deficiency immediately to the Owner and appropriately record it in his report.

END OF SECTION

SECTION 311000

SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cleaning site of debris, grass, trees and other plant life in preparation for site or building excavation Work.
 - 2. Protection of existing structures, trees or vegetation indicated to remain.
 - 3. Stripping topsoil from areas indicated.

- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

- C. Related Sections:
 - 1.
 - 2. Section 024113 - Selective Site Demolition: Demolition and removal of site structures.
 - 3. Section 312000 - Earth Moving: Cutting, filling, and grading for proposed site improvements.

1.2 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Work shall be performed in accordance with the Rhode Island Department of Environmental Management permits.
 - 2. Work shall be performed in accordance with the Soil Erosion and Sediment Control Plan (SESC). Contractor shall be required to complete the SESC on a weekly basis and provide with each payment requested.

1.3 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Existing Conditions:
 - 1. Notify the Owner of variations to conditions or discrepancies in actual site conditions prior to start of site preparation Work.
 - 2. Traffic: Conduct operations and removal of debris with minimum interference to roads, streets, walks, and other adjacent facilities. Do not close or obstruct streets, walks or other facilities without permission from authorities having jurisdiction.
 - 3. Protections: Provide protection for safe passage of persons around area of site preparation. Take precautions and conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.
 - a. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil: Friable clay loam surface soil containing humus, organic matter, found in a depth of not less than 4 inches free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other unsuitable material.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Locate existing utilities as specified in Section 312000.
 - 2. Verify that survey benchmark and intended elevations for the Work are as indicated and are not located in an area that may be damaged.
 - 3. Verify that existing plant life and clearing limits are clearly tagged, identified and marked in such a manner as to insure their safety throughout construction operations.
- B. Report in writing to Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

- A. Provide temporary erosion control systems as indicated on Drawings or as directed by Owner to protect project site and adjacent properties and water resources from erosion and sedimentation.

3.3 CLEARING

- A. Clear areas required for access to site and execution of Work.
- B. Remove trees, shrubs, grass, other vegetation, improvements, or obstructions interfering with installation of Work as indicated on Drawings. Removal includes digging out stumps and roots. Fill depressions caused by clearing and grubbing operations to subgrade elevation. Prevent water ponding. Place suitable fill material in horizontal layers not exceeding 8 inches loose depth, and compact as specified herein and in Section 312000.

3.4 TOPSOIL EXCAVATION

- A. Strip topsoil from areas that are indicated to be filled, excavated, landscaped, or re-graded to depth that prevents contact with underlying subsoil or unsuitable material. Where trees or planting are indicated to remain, stop topsoil stripping sufficient distance from tree to prevent damage to main root system.

- B. Cut heavy growths of grass from areas prior to start of stripping. Remove heavy growths of grass along with clearing of other vegetation materials.
- C. Topsoil: Organic surface soil found in varying depths not less than 6 inches.
- D. Satisfactory Topsoil: Soil reasonably free of subsoil, clay lumps, stones and other objects over 2 inches in diameter, weeds, roots, and other unsuitable material.
- E. Stockpile topsoil as directed by Owner. Construct stockpile areas to positively drain surface water. Dispose of unsuitable topsoil off-site, unless directed otherwise by Owner. Dispose of excess topsoil as directed by Owner.

3.5 REMOVAL

- A. Remove debris, rock, extracted plant life, paving, curbs, fence, and other structures indicated on Drawings.

3.6 PROTECTION

- A. Protect existing streets, structures, and utilities as specified in Section 312000.
- B. Protect trees, plant growth, and features indicated to remain.

END OF SECTION

SECTION 312300
EXCAVATION AND FILL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavating and backfilling for structures, utilities, infiltration systems, and pavement.
 - 2. Pipe bedding.
 - 3. Compacting fill materials.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 312000 - Earth Moving: Cutting, filling, and grading for proposed site improvements.
 - 2. Section 312317 - Rock Excavation: Removal of rock during excavation.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.
 - 2. ASTM D1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
- B. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO T 180 - Moisture-Density relations of Soils Using a 10 Pound Rammer and an 18 Inch Drop.
- C. American Water Works Association (AWWA):
 - 1. AWWA C 200 - Steel Water Pipe, 6 Inch and Larger.
 - 2. AWWA C 206 - Field Welding of Steel Water Pipe.
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electric code.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Shop Drawings:
 - a. Submit drawings or details indicating proposed alternate earthwork procedures or proposed procedures not indicated in Contract Documents.
 - b. Shop Drawings or details pertaining to Site Utilities are not required unless required by regulatory authorities or unless use of materials, methods, equipment, or procedures are contrary to Drawings or these specifications are proposed. Do not perform work until required shop drawings have been approved by Owner.
 - 2. Assurance/Control Submittals:

- a. Material Source: Submit name of imported materials suppliers. Provide materials from same source throughout the work. Change of source requires Owner approval.
- b. Test Reports: Submit the following reports directly to Owner from Testing Laboratory, with copy to Contractor:
 - 1) Test reports on borrow material.
 - 2) Verification of each footing subgrade.
 - 3) Field density test reports.
 - 4) Optimum moisture-maximum density curve for each type of soil encountered.
 - 5) Report of actual unconfined compressive strength and bearing tests/results for each strata tested. Give "three-dimensional" description of each test location.
- c. Certificates: Gradation and certification of aggregate material for Testing Laboratory review.
- d. Qualification Documentation: Submit earthwork company documentation of experience indicating compliance with specified qualification requirements.

B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.

- 1. Project Record Documents: Accurately record the following.
 - a. Spot elevations for field.
 - b. Location of existing utilities remaining, re-routed utilities, new utilities by horizontal dimensions, elevations or inverts, and slope gradients.

1.4 QUALITY ASSURANCE

- A. Qualifications: Earthwork company specializing in performing the Work of this Section with minimum 5 years documented experience.
- B. Regulatory Requirements: Perform earthwork in accordance with applicable requirements of governing authorities having jurisdiction.

1.5 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Existing Conditions: Requirements specified in Section 312000.
- B. Existing Utilities: Requirements specified in Section 312000.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stockpiled on-site fill and backfill material specified in Section 312000, tested by Testing Laboratory and approved by Owner.
- B. Imported off-site fill and backfill material specified in Section 312000, tested by Testing Laboratory and approved by Owner.
- C. Pipe Bedding Material: Processed sand or as indicated on the drawings.
- D. Filter/Drainage Fabrics:
 - 1. Mirafi 140 N.
 - 2. Amoco Style #4546.
 - 3. Reemay Typar 3341.

4. Carthage Mills, Carthage 6%.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, and conditions are as required, and ready to receive Work.
- B. Report in writing to Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to Owner.

3.2 PREPARATION

- A. Identify required lines, elevations, levels, contours, grades, and datum necessary to perform earthwork operations as indicated on Drawings.
- B. Verify that survey benchmark and intended elevations for the Work are as indicated on Drawings.
- C. Locate, identify, and protect existing utilities to remain and previously installed utilities that may be damaged by construction operations.
 1. Notify Owner, municipality, and utility company immediately of utilities, not indicated on Drawings, encountered.
 2. Maintain existing utilities, active utilities, and drainage systems in operating condition.
 3. Comply with utility company requirements and directions of Construction Manager to keep utilities in operation.
 4. Repair damage to utilities as directed by Owner.
- D. Protect plant life, lawns, fences, existing structures, sidewalks, paving and curbs from earthwork operations, excavating equipment, and vehicular traffic.
- E. Protect bench marks, property corners, and other survey monuments from damage or displacement. Where markers are required to be removed, provide removal and reinstallation by licensed land surveyor licensed in State where project is located.

3.3 EXCAVATION

- A. Excavation for filling and grading specified in Section 312000.
- B. Rock excavation specified in Section 312317.
- C. Excavation for Structures:
 1. Excavate subbase for wall, foundations, and site structures to width and depth indicated on Drawings.
 - a. Cut excavation banks vertically.
 - b. Remove rocks, loose soil, and debris from bottom of excavation.
 - c. Overexcavate wet or unsuitable soil from bottom of excavation.

- d. Provide stable base for concrete reinforcing installation and concrete placement.
 - e. Hand trim to indicated lines and grades just prior to concrete reinforcing installation.
 2. Provide protection for workers within trench areas in accordance with local, state, and national Occupational Safety and Health requirements and regulations.
 - a. Trenches minimum 4 feet in depth.
 3. During excavation, stockpile materials suitable for backfilling away from excavation to prevent overloading, slides, or cave-ins.
 4. Remove material encountered in excavating operations that is unsuitable for backfilling, subgrade or foundation purposes as determined by Testing Laboratory and Owner. Dispose of materials off-site in an approved manner in accordance with requirements of authorities having jurisdiction.
 5. Prevent surface water from flowing into excavations by temporary grading or other approved methods.
 - a. Do not allow water to accumulate in excavations.
 - b. Remove accumulated water in excavations.
 - c. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components required to remove water from excavations.
- D. Excavation for Utilities:
1. Excavate trench width and depth required for laying pipe, conduit, or cable. Cut trench banks vertical. Remove stones from bottom of trench as required to avoid point-bearing. Over excavate wet or unstable soil, if encountered, from trench bottom as required to provide suitable base for continuous and uniform bedding.
 2. During excavation, stockpile materials suitable for backfilling away from trench bank to prevent overloading, slides, or cave-ins.
 3. Remove material encountered in trenching operations that is unsuitable for backfilling, subgrade or foundation purposes as determined by Owner. Dispose of materials off-site in an approved manner in accordance with requirements of authorities having jurisdiction.
 4. Prevent surface water from flowing into trenches or other excavations by temporary grading or other approved methods.
 - a. Do not allow water to accumulate in excavations.
 - b. Remove accumulated water in excavations.
 - c. Provide and maintain pumps, well points, sumps, suction and discharge lines and other dewatering system components required to remove water from excavations.
 5. Open cut excavation using trenching machine or backhoe. Do not use dirt clods for backfill created by use of machines other than ladder or wheel-type trenching machines.
 6. Grade trench bottom to provide uniform bearing and support for each section of pipe on bedding material along entire trench length, except where necessary to excavate for bell holes, proper sealing of pipe joints, or other required connections. Dig bell holes and depressions for joints after trench bottom has been graded. Do not excavate trench deeper, longer, or wider than required to make proper joint connection.
 7. Excavate trench width below the top of pipe minimum 300 mm wide and maximum 460 mm wider than outside surface of pipe or conduit installed to elevations and grades indicated on Drawings. Excavate trench width for other pipe, conduit, or cable to least practical width allowing for proper compaction of trench backfill.
 8. Excavate trench depth measured from finished grade or paved surface to the following requirements or applicable codes and ordinances:
 - a. Water Mains: Depths, elevations, and grades indicated on Drawings.
 - b. Storm Sewer: Depths, elevations, and grades indicated on Drawings.
 - c. Electrical Conduits: 24 inches minimum to top of conduit or as required by NFPA 70, or local utility company requirements, whichever is deeper.
 - d. TV Conduits: 18 inches minimum to top of conduit or as required by local utility company, whichever is deeper.
 - e. Telephone Conduits: 18 inches minimum to top of conduit, or as required by local utility company, whichever is deeper.

9. Provide shoring, sheeting, and bracing, as required, in trenches and other excavations where protection of construction personnel is required. Sheeting may be removed after sufficient backfilling to protect against damaging or injurious caving.

E. Excavation for Pavement:

1. Excavate roadway and pavement areas to line and grade indicated on Drawings.
2. Stockpile excavated material suitable for backfilling on-site.
3. Remove excavated materials not required or not suitable for backfill from site.
4. Overexcavate areas of pavement subgrade found to contain unsuitable material. Prepare, fill with suitable material, and compact as specified. Stabilize areas as specified in Section 313200.

3.4 PIPE BEDDING

- A. Excavate trenches, for pipe or conduit installed to elevations indicated on Drawings.
- B. Place geotextile fabric as indicated on Drawings.

3.5 BACKFILLING AND SUBGRADE PREPARATION

A. Backfilling:

1. Verify that imported off-site fill and stockpiled on-site fill is tested and approved.
2. Verify that foundation perimeter drainage installation is inspected and approved.
3. Verify that foundation or below grade structure walls are braced to support surcharge forces imposed by backfilling operations.
4. Verify that backfill areas are free of debris, snow, ice, or water, and that ground surfaces are not frozen.

- B. Prepare building area subgrade pad in accordance with foundation subsurface preparation information indicated on Drawings and specified herein. Do not use rock larger than 6 inches for building subgrade fill.

C. Areas Exposed by Excavation or Stripping:

1. Scarify areas exposed by excavation or stripping on which building subgrade preparations are to be performed to minimum 8 inch depth.
2. Compact to minimum 95 percent optimum density in accordance with ASTM D1557 (Modified Proctor) at minimum moisture content 1 percent below and maximum 3 percent above optimum moisture content.
3. Proofroll to detect any areas of insufficient compaction by making minimum of 2 complete passes with fully-loaded tandem-axle dump truck, or Owner approved equivalent, in each of two perpendicular directions under supervision and direction of Owner.
4. Excavate and recompact areas failing to meet specified requirements.

D. Fill Material Placement:

1. Place in 8 inch maximum lifts compacted minimum 95 percent optimum density in accordance with ASTM D1557 (Modified Proctor) at minimum moisture content of 1 percent below and maximum moisture content 3 percent above optimum moisture content.

- E. Provide material imported from off-site with CBR (California Bearing Ratio) or LBR (Limerock Bearing Ratio) value equal to or above pavement design subgrade CBR or LBR value indicated on Drawings.

3.6 MAINTENANCE OF SUBGRADE

- A. Verify finished subgrades for elevations indicated on Drawings and specified conditions for construction above subgrade.
- B. Protect subgrade from excessive wheel loading during construction, including concrete trucks and dump trucks.
- C. Remove areas of finished subgrade found to have insufficient compaction density. Replace in a manner that will comply with compaction requirements as directed by Owner. Provide hard, uniform, smooth, stable surface, true to grade and cross-section after completion of compaction.

3.7 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Excavation: Notify Testing Laboratory and Owner for visual inspection of bearing surfaces, 48 hours prior to backfilling and other subsequent Work.
- C. If tests indicate the Work does not meet specified requirements, remove Work, replace, compact and retest at no additional cost to Owner.

3.8 PROTECTION

- A. Protect building subgrade pad and building related earthwork from damage by construction operations and erosion.
- B. Prohibit vehicles from entering building subgrade pad area. Vehicles not permitted.
- C. Scarify surface, reshape, and compact areas damaged by construction operations or weather erosion.

END OF SECTION

SECTION 312317

ROCK EXCAVATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Removal of identified and discovered rock during excavation.
 - 2. Rock Excavation shall include any boulder larger than 1 Cubic Yard.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 312000 - Earth Moving: Cutting, Filling, and grading for site improvements.
 - 2. Section 312300 - Excavation and Fill: Earthwork for structures, utilities and pavement.

1.2 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements: Determine all environmental effects associated with proposed rock removal Work and safeguard those concerns as regulated by law and authorities having jurisdiction by approved methods.
- B. Explosives: Not permitted.
- C. Existing Conditions:
 - 1. Geotechnical Data:
 - a. Reports of Subsurface Investigation and data are not a part of Contract Documents.

PART 2 - EXECUTION

2.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to for rock excavation to begin.
- C. Report in writing to Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

2.2 ROCK EXCAVATION

A. Rock Excavation - Mechanical Method:

1. Excavate for and remove rock by mechanical method. Drill holes and utilize expansive tools and wedges to fracture rock.
2. Cut away rock at excavation bottom to form level bearing. Remove shaled layers to provide sound and unshattered base for foundations.
3. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.
4. Remove shaled layers to provide sound unshattered base for footings and foundations.
5. Re-use excavated rock materials on-site in accordance with Section 312000.
6. Remove excavated rock materials not re-used off-site.

2.3 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection.
- B. Inspection: Owner will inspect bearing surfaces and cavities formed by removed rock.

END OF SECTION

SECTION 312500

EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Temporary and permanent erosion control systems.
 - 2. Slope protection systems.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for Quality Assurance/Control submittals.
 - 1. Material Source: Submit name of material suppliers.
 - 2. Provide materials from same source throughout Work. Change of source requires Owner approval.

1.3 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements: Protect adjacent properties and water resources from erosion and sediment damage throughout Work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Quick Growing Grasses: Wheat, rye, or oats.
- B. Straw Bales: Free of weed seed.
- C. Fencing for Siltation Control: Indicated on Drawings.
- D. Erosion Control Blankets and/or Erosion Control Geotextiles.
- E. Bale Stakes:
 - 1. Minimum 4 feet length.
 - 2. 2 No. 4 steel reinforcing bars or,
 - 3. 2 steel pickets or,
 - 4. 2 - 2x2 inch hardwood stakes driven 18 inches to 24 inches into ground.
- F. Temporary Mulches: Loose straw, netting, wood cellulose, or agricultural silage free of seed.
- G. Metal Fence Stakes: Minimum 8 foot length.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting Work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to Owner.

3.2 EROSION CONTROL AND SLOPE PROTECTION IMPLEMENTATION

- A. Owner may direct Contractor to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and may direct Contractor to provide immediate permanent or temporary pollution control measures.
- B. Provide permanent erosion control measures at earliest practical time to minimize requirement for temporary erosion controls. Permanently seed and mulch cut slopes as excavation proceeds.
- C. Maintain temporary erosion control systems installed by Contractor as directed by Owner to control siltation at all times throughout Work. Provide maintenance or additional Work directed by Owner within 48 hours of notification by Owner.

END OF SECTION

SECTION 312000

EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Preparation of subgrade for turf, slabs, walks, pavements, and other sitework.
 - 2. Rough and finish grading.
 - 3. Excavation for filling and grading.
 - 4. Filling and subgrade preparation.
 - 5. Geotechnical Data

- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

- C. Related Sections:
 - 1. Section 024113 - Selective Site Demolition: Demolition and removal of designated existing site items.
 - 2. Section 311000 - Site Clearing: Clearing site of debris, grass, trees, and other plant life.
 - 3. Section 312300 - Excavation and Fill: Earthwork for structures, utilities, and pavement.

 - 4. Section 312500 - Erosion and Sedimentation Controls: Temporary and permanent erosion control and slope protection systems.
 - 5. Section 312317 - Rock Excavation: Removal of rock during excavation.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C 136 - Method for Sieve Analysis of Fine and Course Aggregates.
 - 2. ASTM D 698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.
 - 3. ASTM D 1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
 - 4. ASTM D 1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
 - 5. ASTM D 2167 - Test Method for Density and Unit Weight of Soil In-Place by the Rubber Balloon Method.
 - 6. ASTM D 2487 - Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - 7. ASTM D 2922 - Test Methods for Density of Soil and Soil- Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 8. ASTM D 3017 - Test Method for Moisture Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
 - 9. STM D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

- B. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO T 88 - Particle Size Analysis of Soils

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Shop Drawings:
 - a. Submit drawings or details indicating proposed alternate earthwork procedures or proposed procedures not indicated in Contract Documents.
 - b. Submit drawings or details of design for use of fabrics or geogrids.
 - 2. Assurance/Control Submittals:
 - a. Material Source: Submit name of imported materials suppliers. Provide materials from same source throughout the Work. Change of source requires Owner approval.
 - b. Test Reports: Submit the following reports directly to Owner from Testing Laboratory, with copy to Contractor. Prepare reports in conformance with Section 014000 - Quality Requirements:
 - 1) Test reports on borrow material.
 - 2) Verification of each footing subgrade.
 - 3) Field density test reports.
 - 4) Optimum moisture-maximum density curve for each type of soil encountered.
 - 5) Report of actual unconfined compressive strength and bearing tests/results for each strata tested. Give "three-dimensional" description of each test location.
 - c. Certificates: Gradation and certification of aggregate material for Testing Laboratory review.
 - d. Qualification Documentation: Submit earthwork company documentation of experience indicating compliance with specified qualification requirements.

- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record final grade contours, spot elevations, and slope gradients.

1.4 QUALITY ASSURANCE

- A. Qualifications: Earthwork company specializing in performing the Work of this Section with minimum 5 years documented experience.

- B. Regulatory Requirements: Perform earthwork in accordance with applicable requirements of governing authorities having jurisdiction.

- C. Pre-Installation Meetings:
 - 1. Convene a pre-installation meeting one week prior to commencing Work of this Section.
 - 2. Require attendance of parties directly affecting Work of this Section.
 - 3. Review conditions of earthwork operations, earthwork procedures and coordination with related Work.
 - 4. Agenda:
 - a. Tour, inspect, and discuss conditions of existing soils and soil substrates.
 - b. Review dust control measures and their requirements.
 - c. Review required submittals, both completed and yet to be completed.
 - d. Review Survey and Civil sitework Drawings.
 - e. Approve proposed earthwork equipment.
 - f. Approve excess material dump location.
 - g. Approve import material storage location.
 - h. Review and finalize construction schedule related to earthwork and verify availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
 - i. Review required inspections, testing, certifying, and material usage accounting procedures.
 - j. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.

- k. Review safety precautions relating to earthwork operations.
- l. Review environmental procedures.

1.5 PROJECT CONDITIONS OR SITE CONDITIONS

A. Existing Conditions:

1. Geotechnical Data:
 - a. Soil and subsurface investigations were conducted at site by an Independent Testing Laboratory and a report with log of borings prepared.
 - b. Contractor may make additional test borings and other exploratory operations at no additional cost to Owner. Coordinate tests with Owner.
 - c. Rock excavation specified in Section 312317.
2. Existing Utilities: Contact local utility companies and Owner and make arrangements to obtain utility company location and marking service prior to start of Earthwork operations.
 - a. Locate existing underground utilities in areas of Work. If utilities are to remain in place, provide means of support and protection during Earthwork operations.
 - 1) Pothole and locate existing underground utilities at locations to assure that no conflict with Work of this Contract will occur and required clearance is available to prevent damage to existing utilities.
 - 2) Perform potholing minimum 10 days before start of excavation or underground work.
 - b. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility company and Owner immediately for directions.
 - c. Coordinate with Owner and utility companies to keep existing utility services and facilities in operation.
 - d. Repair damaged utilities to satisfaction of utility company, at no additional cost to Owner.
 - e. Do not interrupt existing utilities serving facilities occupied and used by Owner or others, during occupied hours, except when permitted in writing by Owner and then only after acceptable temporary utility services have been provided and approved by Owner.
 - f. Demolish and completely remove from site existing underground utilities indicated on Drawings to be removed as specified in Section 024113. Coordinate with utility companies for shut-off of services if lines are active.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Rhode Island Department of Transportation (RIDOT) – Materials shall be in accordance with the **Rhode Island Standard Specifications for Road and Bridge Construction** as specified below, (amended August 2013, including all subsequently issued supplements, revisions, and addenda). <http://www.dot.ri.gov/business/bluebook.php>
- B. Approved by Testing Laboratory and Owner.
 1. Common Borrow shall conform to Common Borrow shall conform to Section M.01.01 Common Borrow.
 2. Gravel Borrow shall conform to Sections 406.02 and M.01.09, Table 1, Column I of the RIDOT Standard Specifications.
 3. Sand shall conform to the requirements of AASHTO M-6 and shall be poorly graded.

4. Crushed white shells shall be 1 ½" crushed native shells, Double Washed.
5. Choker Stone shall conform to ASTM No 89 (1/4" to 3/8"), and shall be washed and cleaned of all fines, powder, dust, and debris.
6. Crushed Stone shall be washed and clean of all fines, powder, dust and debris.

SIEVE SIZE	PERCENT PASSING
1.5 inch	100
1 inch	95 to 100
1/2 inch	25 to 80
#4 inch	0 to 10
#8 inch	0 to 5

7. Septic Gravel shall meet the requirements of the RIDEM OWTS Rules Section 32.12.

SIEVE SIZE	PERCENT PASSING
3/4" inch	90-100
#4 inch	55 to 100
#10 inch	40 to 100
#40 inch	10 to 50
#100 inch	0 to 20
#200 inch	0 to 5

2.2 SOURCE QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Testing Laboratory services.
- B. Testing and Analysis:
 1. Soil: Perform in accordance with [ASTM D 698], [ASTM D 1557], [ASTM D 2167], [ASTM D 2922], and [ASTM D 3017].
 2. Aggregate: Perform in accordance with [ASTM D 698], [ASTM D 1557], [ASTM D 2167], [ASTM D 2922], [ASTM D 3017], [ASTM D 4318], and [ASTM C 136].
- C. If tests indicate materials do not meet specified requirements, change material and retest.
- D. Provide materials from same source throughout the Work.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to for earthwork operations to begin.
 1. Verify that existing site soils and soil conditions encountered are as indicated in Geotechnical Data.
 2. Verify quantity and type of each soil material before start of material installation.
 3. Backfilling:
 - a. Verify imported fill and stockpiled fill to be reused is approved.
 - b. Verify field infiltration drainage installation has been inspected and approved.
 - c. Verify areas to be backfilled are free of debris, snow, ice, or water, and ground surfaces are not frozen.

- B. Report in writing to Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

- A. Clear site as specified in Section 311000.
- B. Identify required lines, elevations, levels, contours, grades, and datum necessary to perform earthwork operations as indicated on Drawings.
- C. Examine Project Site with Owner before start of earthwork operations. Identify areas and prepare to brace or shore areas of adjacent property subject to rotation, slumping, or cave-in to prevent dislocation of adjacent soil, pavement, utilities, structures, or other items to remain.
- D. Verify that survey benchmark and intended elevations for Work are as indicated on Drawings. Short form contour designations are intended to be a continuing of the long form bench mark.
- E. Locate, identify, and protect existing utilities to remain and previously installed utilities that may be damaged by construction operations.
 - 1. Notify Owner and utility company immediately of utilities, not indicated on Drawings, encountered.
 - 2. Maintain existing utilities, active utilities, and drainage systems in operating condition.
 - 3. Comply with utility company requirements and directions of Owner to keep utilities in operation.
 - 4. Repair damage to utilities as directed by Owner.
- F. Protect plant life, lawns, fences, existing structures, sidewalks, paving and curbs from earthwork operations, excavating equipment, and vehicular traffic.
- G. Protect benchmarks, property corners, and other survey monuments from damage or displacement. Where markers are required to be removed, provide removal and reinstallation by licensed land surveyor licensed in State where project is located.
- H. Remove material encountered in grading operations that is unsuitable for backfilling, subgrade or foundation purposes as determined by Testing Laboratory and as directed by Owner. Dispose of materials off-site in an approved manner in accordance with requirements of authorities having jurisdiction.
- I. Prior to placing fill in low areas, such as previously existing creeks, ponds, or lakes, perform following procedures:
 - 1. Drain water out by gravity with ditch having flow line lower than lowest elevation in low area. If drainage cannot be performed by gravity ditch, use pumping equipment.
 - 2. After drainage of low area is complete, remove mulch, mud, debris, and other unsuitable material by using equipment and methods keeping natural soils underlying low areas dry and undisturbed.
 - 3. If proposed for fill, dry muck, mud, and other materials removed from low areas on-site by spreading in thin layers for inspection by Testing Laboratory and Owner. Place material determined by the Testing Laboratory and Owner suitable for use as fill material into lowest elevation of site filling operation. Do not place under building subgrade pad or paving subgrade. If material is determined by the Testing Laboratory and Owner to be unsuitable, remove material from site.

3.3 EXCAVATION FOR FILLING AND GRADING

- A. Provide dewatering, drainage, and ground water management to control moisture of soils when performing grading operations during periods of wet weather.
- B. Shore, brace, and drain excavations to maintain excavations safe, secure, and free of water at all times.
- C. Provide protection for workers within trench areas in accordance with local, State, and Federal Occupational Safety and Health requirements and regulations.
- D. Unacceptable Fill Material for Paving Areas: Excavated material containing rock or stone greater than 6 inches in largest dimension.
- E. Acceptable Fill Material:
 - 1. Rock or stone less than 6 inches in largest dimension as fill to within 24 inches of surface of proposed subgrade when mixed with suitable material.
 - 2. Rock or stone less than 2 inches in largest dimension mixed with suitable material as fill within the upper 24 inches of proposed subgrade.

3.4 FILLING AND SUBGRADE PREPARATION

- A. Fill areas to contours and elevations as indicated on Drawings with materials specified herein.
- B. Place fill in continuous lifts as specified herein.
- C. Refer to Section 312300 for filling requirements for structures, utilities, and pavements.
- D. Fill Material Placement:
 - 1. Place in 8-inch maximum lifts compacted minimum 95 percent optimum density in accordance with ASTM D 698 or 92 percent optimum density in accordance with ASTM D 1557 at minimum moisture content of 1 percent below and maximum moisture content 3 percent above optimum moisture content.

3.5 MAINTENANCE OF SUBGRADE

- A. Verify finished subgrades for conformance to elevations as indicated on Drawings and for specified conditions for subgrade.
- B. Protect subgrade from excessive wheel loading during construction, including concrete trucks and dump trucks.
- C. Remove areas of finished subgrade with compaction density below specified density to depth required as directed by Testing Laboratory and Owner. Fill removed areas and compact to specified compaction density
- D. Provide surface of subgrade after compaction hard, uniform, smooth, stable, and true to grade and cross-section.

3.6 FINISH GRADING

- A. Grade areas other than paved areas and building pad areas to finish grade elevations or contours as indicated on Drawings including the following:
 - 1. Excavated areas.

2. Filled and transition areas.
3. Landscaped areas.

- B. Provide finish graded areas uniform and smooth, free from rocks, debris, or irregular surface changes with maximum tolerance of 0.10 feet above or below established finish subgrade elevation. Provide graded surfaces sloping uniformly between indicated elevations.

3.7 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Excavation: Owner will request testing throughout contract which will be paid through the contract allowance.

3.8 PROTECTION

- A. Protect building subgrade pad and building related earthwork from damage by construction operations and erosion.
- B. Prohibit vehicles from entering building subgrade pad area. Vehicles not permitted.
- C. Scarify surface, reshape, and compact areas damaged by construction operations or weather erosion.

END OF SECTION

SECTION 321216

ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Bituminous concrete paving.
 - 2. Surface course.
 - 3. Binder course.
 - 4. Paving base course.

- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

- C. Related Sections:
 - 1. Section 312000 - Earth Moving: Earthwork for Pavement.
 - 2. Section 321313 - Concrete Paving: Concrete paving, curbs and sidewalks.
 - 3. Rhode Island Department of Transportation (RIDOT), Standard Specifications for Road and Bridge Construction, (amended August 2013, including all subsequently issued supplements, revisions, and addenda), hereinafter referred to as the "RIDOT Standard Specifications.", <http://www.dot.ri.gov/business/bluebook.php>

1.2 REFERENCES

- A. Asphalt Institute (AI):
 - 1. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot Mix Types.
 - 2. AI MS-3 - Asphalt Plant Manual.
 - 3. AI MS-8 - Asphalt Paving Manual.
 - 4. AI MS-19 - Basic Asphalt Emulsion Manual.

- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM D 242 - Specification for Mineral Fiber for Bituminous Paving Mixtures.
 - 2. ASTM D 698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 Pound Rammer and 12 inch Drop.
 - 3. ASTM D 1188 - Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens.
 - 4. ASTM D 1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 Pound Rammer and 18 inch Drop.
 - 5. ASTM D 1560 - Test Method for Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus.
 - 6. ASTM D 2397 - Specification for Cationic Emulsified Asphalt.
 - 7. ASTM D 2399 - Practice for Selection of Cutback Asphalt.
 - 8. ASTM D 2726 - Test Method for Bulk Specific Gravity and Density of Nonabsorbative Compacted Bituminous Mixtures.
 - 9. ASTM D 3381 - Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.

10. ASTM D 3549 - Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.
 11. ASTM D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- C. American Association of State Highway and Transportation Officials (AASHTO):
1. AASHTO T 88 - Particle Size Analysis of Soils.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements: Provide asphalt-aggregate mixture as recommended by local or state paving authorities to suit project conditions. Use locally available materials and gradations which meet standard state highway specifications and exhibit satisfactory records of previous installations.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
1. Assurance/Control Submittals:
 - a. Design Data:
 - 1) Submit design mix following format indicated Asphalt Institute Manual MS-2, Marshall Stability Method; including type/name of mix, gradation analysis, grade of asphalt cement used, Marshall Stability (pounds), flow, effective asphalt content (percent), and direct references to applicable state highway department specification sections for each material.
 - 2) Provide design mixture listed in current edition of applicable state highway department specifications.
 - 3) Use mix designs prepared within 3 years maximum.
 - 4) Provide documentation of state highway limitations, if any, on use of recycled content materials.
 - b. Certificates: Submit materials certificate to Testing Laboratory signed by material supplier and Contractor, certifying that materials comply with, or exceed, the requirements specified herein.
 - c. Qualification Documentation: Paving installer documentation of experience indicating compliance with specified qualification requirements.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with AI MS-8
- B. Installer Qualifications: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
- C. Regulatory Requirements:
1. Conform to applicable requirements for paving work on public property.
 2. Maintain access for vehicular and pedestrian traffic as required for other construction activities. Use temporary striping, flagmen, barricades, warning signs, and warning lights as required.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Jobsite Requirements:

1. Apply prime and tack coats when ambient temperature is above 40 degrees F, and when temperature has been above 35 degrees F for 12 hours immediately prior to application. Do not apply when base is wet, contains excess moisture, or during rain.
2. Construct bituminous concrete paving when atmospheric temperature is above 40 degrees F.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Base Course and Surface Course: As indicated on Drawings, and conforming to the RIDOT Standard Specifications and all addenda.
- B. Tack Coat: Conforming to the RIDOT Standard Specifications and all addenda.

2.2 EQUIPMENT

- A. Maintain equipment in satisfactory operating condition and correct breakdowns in a manner that will not delay or be detrimental to progress of paving operations.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to for earthwork operations to begin.
 1. Verify gradients and elevations of base are correct, and base is dry.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

3.2 BASE COURSE PLACEMENT

- A. Perform base course construction in accordance with the RIDOT Standard Specifications and all addenda.

3.3 APPLICATIONS

- A. Tack Coat: Tack coat shall be applied conforming to the RIDOT Standard Specifications and all addenda.

3.4 BITUMINOUS CONCRETE PLACEMENT

- A. Place bituminous concrete mixture in accordance with RIDOT Standard Specifications and all addenda.

3.5 ROLLING AND COMPACTION

- A. Rolling and compaction shall be completed in accordance with RIDOT Standard Specifications and all addenda.
- B. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot bituminous concrete. Compact by rolling to maximum surface density and smoothness.
- C. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.6 CONSTRUCTION

- A. Site Tolerances:
 - 1. Paving Surface Smoothness: Maximum allowable 10 foot straightedge tolerance for smoothness.
 - a. Base Course Surface: 1/4 inch.
 - b. Wearing Surface Course: 3/16 inch.

3.7 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection and testing procedures
- B. Site Tests:
 - 1. Paving Base Course: Perform testing of in-place base courses for compliance with requirements for thickness, compaction, density, and tolerance as directed by the Owner.
 - a. Moisture/Density Test: ASTM D 698 or ASTM D 1557.
 - b. Mechanical Analysis Test: AASHTO T-88.
 - c. Plasticity Index Test: ASTM D 4318.
 - d. Base Material Thickness Test: Minimum one test for every 20,000 square feet.
 - e. Base Material Compaction Test: Minimum one test for every 20,000 square feet.
 - f. Field Density Tests: Perform testing of in-place base courses for compliance with requirements for density using one of the following methods:
 - 1) Sand-cone Method: ASTM D 1556.
 - 2) Balloon Method: ASTM D 2167.
 - 3) Nuclear Method: ASTM D 2922, Method B (Direct Transmission).
 - g. Test each source of base material for compliance with applicable state highway specifications.
 - 2. Asphalt Concrete Paving: Perform testing of in-place asphalt concrete paving courses for compliance with requirements for thickness, compaction, and surface smoothness.
 - a. Thickness: ASTM D 3549; Thickness shall not be less than thickness specified on Drawings.
 - 3. Compaction: Field density test for in place materials shall be performed as directed by the Owner.

END OF SECTION

SECTION 321313

CONCRETE PAVING

A. Section Includes:

1. Concrete walks and curbs

B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:

1. Section 312000 - Earth Moving: Earthwork for pavement.
2. Section 321216 - Asphalt Paving.
3. Section 033000 - Cast-In-Place Concrete

1.2 REFERENCES

A. American Concrete Institute (ACI):

1. ACI 301 - Specifications for Structural Concrete.
2. ACI 308 - Standard Practice for Curing Concrete.

B. American society for Testing and Materials (ASTM):

1. ASTM A 185 - Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.
2. ASTM A 615 - Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
3. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.
4. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
5. ASTM D 1751 - Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

C. Rhode Island Department of Transportation (RIDOT), Standard Specifications for Road and Bridge Construction, (amended August 2013, including all subsequently issued supplements, revisions, and addenda), hereinafter referred to as the "RIDOT Standard Specifications.", <http://www.dot.ri.gov/business/bluebook.php>

D. Submittal Procedures: Procedures for submittals.

1. Product Data: Submit product data for the following:
 - a. Joint filler.
 - b. Joint sealant.
 - c. Concrete admixtures.
 - d. Concrete curing compounds.
2. Assurance/Control Submittals:
 - a. Concrete Mix Design: Submit three copies of each proposed mix design for each class of concrete in accordance with ACI 301, Sections 3.9 "Proportioning on the basis of previous field experience or trial mixture", or 3.10 "Proportioning based on empirical data". Submit separate mix design for concrete to be placed by pumping, in addition to the mix design for concrete to be placed directly from the truck chute.
 - b. Include the following information in concrete mix design:
 - 1) Proportions of cement, fine and coarse aggregate, and water.
 - 2) Water-cement ratio, 28-day compressive design strength, slump, and air content.

- 3) Type of cement and aggregate.
- 4) Aggregate gradation.
- 5) Type and dosage of admixtures.
- 6) Special requirements for pumping.
- 7) Range of ambient temperature and humidity for which design is valid.
- 8) Special characteristics of mix which require precautions in mixing, placing, or finishing techniques to achieve finished product specified.

1.3 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301.
- B. Conform to ACI 305R when mixing and placing concrete during hot weather.
- C. Conform to ACI 306R when mixing and placing concrete during cold weather.
- D. Regulatory Requirements:
 1. Conform to applicable requirements for paving work on public property.
 2. Contractor shall maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize temporary striping, flagmen, barricades, warning signs, and warning lights as required.

PART 2 - PRODUCTS

2.1 FORM AND REINFORCING MATERIAL

- A. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required.
 1. APA Exterior Plyform BB with a medium density, smooth, hard, fused resin fiber overlay, or metal forms.
 2. Form Oil: Coat forms with nonstaining type coating that will not discolor or deface surface of concrete. Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Eucoslip" - Euclid Chemical Co., Cleveland, OH (800) 321-7628.
 - b. "Form Coating" - Nox-Crete Chemicals, Omaha, NE (800) 669-2738.
 - c. Substitutions: Under provisions of Section 016000.
- B. Curb, Curb and Gutter Forms: Use flexible spring-steel forms or laminated boards to form radius bends. Tolerance: Not to deviate more than 1/4 inch in 10 feet in grade and alignment.
- C. Reinforcing:
 1. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM A 185. Furnish in flat sheets, not rolls, unless otherwise acceptable to Owner.
 2. Reinforcing Bars: Deformed steel bars, ASTM A 615, Grade 60.
- D. Reinforcing Accessories:
 1. Reinforcing Accessories: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. Dayton Superior Corp., Miamisburg, OH (800) 745-3700.

- b. Heckmann Building Products, Inc., Chicago, IL (800) 621-4140.
 - c. Hohmann & Barnard, Inc., Hauppauge, NY (800) 645-0616.
 - d. Richmond Screw Anchor Co., Inc., Ft. Worth, TX (817) 284-4981.
2. Conform to Concrete Reinforcing Steel Institute Manual of Standard Practice. Include spacers and chairs with plastic tipped legs, ties and other devices necessary for properly assembling, placing, spacing and supporting forms and reinforcement in place.
 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 CONCRETE MATERIALS

- A. Comply with requirements of applicable Section 033000 for concrete materials, admixtures, bonding materials, curing materials, surface sealers and others as required.
- B. Cement:
 1. Portland Cement: ASTM C150 Type 1.
 2. High-early Strength Portland Cement: ASTM C150, Type III.
- C. Aggregates: ASTM C33.
 1. Fine aggregate shall be natural sand, or sand prepared from stone or gravel. Grains shall; be clean, hard, durable, uncoated and free from silt, loam and clay.
 2. Coarse Aggregates: Crushed stone, gravel, or other approved inert materials of similar characteristics, or combinations thereof, having hard, strong, durable pieces free from adherent coatings. Maximum size of pieces shall be 3/4" to #4 except for footings, which may be 1-1/2". The maximum size of aggregate may also be not larger than one fifth of the narrowest dimension between forms, nor larger than three fourths of the minimum clear spacing between reinforcing bars.
- D. Water: Clean and free from injurious amounts of oil, acids, salts, organic or other deleterious matter.
- E. Air Entrainment: ASTM C260.
 1. Use air-entrained concrete for exterior exposed concrete including walls, walks, paving, etc. where minimum daily temperatures are expected below 38 degrees F during pouring or subsequent 38 day curing period.
 2. Proportion air-entraining concrete to attain minimum 28-day compressive strength specified.
 3. Total Air Entrainment in Concrete: Not less than four percent nor more than six percent volume of concrete.
- F. Admixtures:
 1. May be used at contractors' option to provide workability at low slumps, increased compressive strength, retardation or acceleration of the concrete.
 2. Chemical Admixtures: ASTM C494. Mineral Admixtures: ASTM C618.
 3. The cement factor shall not be reduced and changes shall be made in the other mix proportions to ensure the minimum strength requirements.
 4. Use of admixtures approved in writing by Architect. No additional expense to the Owner will be allowed.
 5. No calcium chloride shall be used.
 6. Before any admixture is accepted for use, the Contractor shall submit certified laboratory reports on each additive material to the architectural consultant. The report shall show the following:
 - a. Confirmation of compliance with the applicable ASTM Standard.
 - b. Evaluation of the effects of the admixture on the properties of the concrete to be made on the job, including consideration of the anticipated ambient conditions on the job, and proposed construction procedures.

- c. Determination of within-lot uniformity of product proposed for use.

2.3 CONCRETE MIXES

A. Concrete Proportions:

1. Concrete shall be homogenous, and when hardened, shall have the required strength, resistance to deterioration, durability, water tightness and the properties as specified.
2. Minimum concrete strength at 28 days shall be;
 - a. 4,000 psi for walks, terraces, curbs and gutters.
 - b. 4,000 psi for concrete pavement, pads, and edgings.
3. Slump of concrete:
 - a. Pavement: 2-1/2 inch minimum to 4 inch maximum.
 - b. Ramps and sloping surfaces: Not more than 3 inches.

B. Ready-Mix Concrete:

1. Ready-mix concrete shall conform to ASTM C94. The mixing agitation shall begin within 30 minutes, and the concrete shall be discharged from the truck within one hour after the water has been added to the concrete mix.
2. Delivery tickets are to accompany each concrete truck and shall be kept in the job superintendent's file. Delivery tickets must indicate the following information or be subject to rejection:
 - a. Name of project.
 - b. Supplier of concrete.
 - c. Truck identity and ticket serial number.
 - d. Date of delivery.
 - e. Brand of cement.
 - f. Cement content.
 - g. Strength classification.
 - h. Batching time.
 - i. Point of deposit.
 - j. Total amount of water.
 - k. Weight of aggregate.
 - l. Daily temperature.
 - m. Number of cubic yards in load.
 - n. Admixture content.
 - o. Name of Contractor.
 - p. Name of driver.
 - q. Time loaded and first mixing of concrete.
 - r. Reading of revolution counter.
3. Quantity of water used for each batch shall be accurately measured.

2.4 JOINT MATERIALS

- A. Sealed expansion and contraction joints: Filler of nonbituminous rubber or cork conforming to ASTM D1752.

B. Non-sealed joints:

1. Non-sealed Joints: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Flexcell" - Celotex Corp., Tampa, FL (813) 873-1700.
 - b. "Seal Tight Fiber Expansion Joint" - W.R. Meadows, Inc., Hampshire, IL (800) 342-5976.
2. Filler premolded bituminous type conforming to ASTM D1751.

3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- C. Noncompressive Filler:
1. Noncompressive Filler: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Styrofoam SM" - Dow Chemical Co., Midland, MI (517) 636-0754.
 - b. "Foamular" - Owens Corning, Toledo, OH (800) 828-7155.
 2. 2 inch or 1 inch thick sheets.
 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- D. Compressive Filler:
1. Compressive Filler: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Ethafoam" - Dow Chemical Co., Midland, MI (800) 322-8723.
 - b. "Rodofoam No. 423" - Sternson Group, Brampton, ON (800) 265-8417.
 2. 2 inch or 1 inch thick sheets, compression modulus within the range of 15 to 25 pounds per square inch per inch.
 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- E. Filler Adhesive for Noncompressive Filler and Compressive Filler:
1. Filler Adhesive: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "General Purpose Mastic No. 11" - Dow Chemical Co., Midland, MI (800) 322-8723.
 - b. "Rodofast" - Sternson Group, Brampton, ON (800) 265-8417.
 2. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- F. Slab-on-grade Construction Joints: Provide a full slab depth 24 gauge metal preshaped key, approximate depth of key to be 1/4 slab thickness and a key width of about 1/10 slab thickness.
- G. Joint Sealants: ASTM C920. Non-priming, pourable, self-leveling polyurethane. Subject to compliance with project requirements manufacturers offering joint sealants which may be incorporated in the Work include, but are not limited to the following:
1. Sonolastic Paving Joint Sealant, by Sonneborn, Shakopee, MN (800) 433-9517.
 2. Sonomeric CT 1 Sealant, by Sonneborn, Shakopee, MN (800) 433-9517.
 3. Sonomeric CT 2 Sealant, by Sonneborn, Shakopee, MN (800) 433-9517.
 4. Vulkem 45, by Mameco, Cleveland, OH (800) 321-6412.
 5. Chem-Caulk, by Bostik, Middleton, MA (800) 726-7845.
 6. "THC-900" - Tremco, Beachwood, OH (800) 562-2728.
 7. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.5 CURING MATERIALS

- A. Sealers:
1. Sealers: Subject to compliance with requirements, manufacturers offering specified items which may be incorporated in the work include the following.
 - a. "Polyseal" - W.R. Meadows, Inc., Hampshire, IL (800) 342-5976.
 - b. "Kure-N-Seal" - Sonneborn, Shakopee, MN (800) 433-9517.
 - c. "Cure-Hard" - W.R. Meadows, Inc., Elgin, IL (312) 683-4500.

2. ASTM C156 and ASTM C309, Type I. Material shall become integral part of concrete and leave slab free of residue or film.
 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Membrane: Opaque-white polyethylene sheet, 0.006 inch thick, meeting requirements of ASTM C171.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution Requirements: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to for earthwork operations to begin.
 1. Verify gradients and elevations of base are correct, and base is dry.
- C. Report in writing to Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 SUBGRADE PREPARATION

- A. Conform with the requirements specified in Section 312000 .
- B. Thoroughly wet subgrade and then compact with two passes of a 500 pound roller.
- C. Pumping: Where concrete paving or sidewalks, and curbs are to be placed, yielding material deflecting more than 1/2 inch under a 500 lb. roller shall be removed to a depth of not less than 4 inches below subgrade elevation and replaced with an approved granular material which shall then be compacted as described above.
- D. The subgrade shall be in a moist condition when the concrete is placed. In cold weather the subgrade shall be prepared and protected so as to provide a subgrade free from frost when the concrete is deposited.

3.3 FORM CONSTRUCTION

- A. Comply with the requirements of Section 033000. Install sufficient quantity of forms to allow continuous progress of the work and so that forms can remain in place at least 24 hours after concrete placement.
- B. Check complete formwork for grade and alignment to the following tolerances:
 1. Top of form: Not more than 1/8 inch in 10 feet.
 2. Vertical face: Longitudinal axis not more than 1/4 inch in 10 feet.

3.4 PLACING REINFORCEMENT

- A. Support reinforcing and wire securely together to prevent displacement by construction loads and traffic, or the placing of concrete. For slabs on grade, supporting pieces of concrete blocks or bricks may be used.
- B. Place wire mesh reinforcing two inches above bottom of slab unless otherwise indicated.
- C. Reinforcement shall be kept clean from oil, dirt and loose mill scale or other coatings which might destroy the concrete bond. Remove tags and markings prior to concrete placement.
- D. Do not place concrete until reinforcement has been inspected and approved by local authorities, if required.

3.5 CONCRETE PLACEMENT AND FINISHING

- A. Tamp and consolidate concrete with a suitable wood or metal tamping bar and the surface shall be finished to grade with a wood float.
- B. Finished surfaces shall not vary more than 3/16 inch from the testing edge of a 10 foot straightedge.
- C. Curb Expansion Joints: Fill joints with 1/2 inch thick joint filler strips conforming to ASTM D1751 or ASTM D1752.
- D. Contraction Joints: Divide the surface of paving, walks and terraces into rectangular areas not to exceed 5 feet 0 inches each way.
 - 1. Cut a groove in the top portion of the slab to a depth of at least one-fourth of the slab thickness using a jointer or by sawing a groove in the hardened concrete with a power-driven saw.
 - 2. Membrane-cured surface damaged during the sawing operations shall be resprayed as soon as the surface becomes dry.
- E. Slab Finishes: ACI 301, paragraph 11.7 and as follows:
 - 1. Broom Finish: On stair treads with abrasive nosings and on walks, unless other finishes have been indicated or specified.
 - 2. Broom or Belt Finish: On level walks. Broom in direction perpendicular to travel and approved sample panel. Submit joint pattern layout prior to starting work.

3.6 TOLERANCES

- A. Horizontal slabs: Finished surfaces true with no deviation in excess of 1/8 inch when tested with a 10 foot straightedge, non-accumulative. No coarse aggregate showing.

3.7 EXPANSION JOINTS

- A. Install transverse expansion joints at returns and 15 feet on center.
- B. Install longitudinal expansion joints where curbs and paved areas abut each other, buildings, other concrete slabs and pads or vertical restraints.
- C. Place joint filler with top edge 1/4 inch below the surface and shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing.

- D. Immediately after finishing operations are completed, round joint edges with edging tool having a radius of 1/8 inch. Remove concrete over the joint filler.
- E. At the end of the curing period, clean and fill expansion joints with joint sealer. Fill joints flush with concrete surface. Dummy groove joints shall not be sealed.

3.8 CURING

- A. Immediately after the finishing operations, the exposed concrete surface shall be cured for 7 days by the mat, impervious sheet, or membrane-curing method.

3.9 BACKFILLING

- A. After curing, remove debris and backfill the adjoining areas, grade and compact to conform to the surrounding area in accordance with the lines and grades indicated.

3.10 PROTECTION

- A. Protect the completed work from damage. Repair damaged concrete and clean concrete discolored during construction. Remove work that is damaged and reconstruct to entire length between regularly scheduled joints. Refinishing damaged portion is not acceptable.
- B. Prevent cars and trucks from driving on new pavement for a minimum of 14 days.

END OF SECTION

SECTION 32 18 24 – SYNTHETIC TURF PLAYING FIELD SURFACING PART 1 – GENERAL

1.1 SUMMARY

- A. This section includes the synthetic turf playing field surfacing and associated components, including, but not limited to the following
 1. Infilled Synthetic Turf
 2. Turf Edge Fasteners
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 1. Section 32 18 24 “Synthetic Turf Playing Field Subdrainage” for geotextile fabric, subdrainage pipe and fittings, and drains.

1.2 SCOPE OF WORK

- A. Work included in this Section shall the involve the furnishing of all labor, materials and equipment necessary to install a complete, new, vertically drained infilled synthetic turf system. The Scope of Work shall include, but is not specifically limited to, the following:
 1. Review and certification of previous work performed by others, specifically related to the work indicated in this section.
 2. Installation of infilled synthetic turf system.
 3. Installation of all inlaid or tufted lines, logos, and borders.
 4. Provision of samples per specifications.
 5. Provision of extra turf materials for future repairs.
 6. Provide maintenance and repair manuals as well as warranty package per the specifications.
 7. Infill procedure to be performed per manufacturer specifications.
 8. All testing indicated herein shall be paid for by the contractor.

1.3 SYSTEM DESCRIPTION

- A. General: Synthetic surfacing system shall be comprised of a subsurface infiltration drainage system and synthetic grass with infill material of granulated rubber and silica sand.
 1. Components are to include, but are not limited to:
 - a. Earthwork.
 - b. Aggregate Materials
 - c. Subdrainage System
 - d. Infilled Synthetic Turf
- B. Synthetic Turf System Record of Installations: Proposed synthetic turf surfacing system shall have a record of being previously installed for a minimum period of 5 years, on a minimum of 5 competition football or soccer fields at the NCAA Division 1 level or higher.

1.4 PERFORMANCE REQUIREMENTS

- A. Installed surfacing system shall comply with the following:
 - 1. Synthetic Turf Fibers:
 - a. ASTM D 1577 Denier
 - b. ASTM D 5848, Pile Weight
 - c. ASTM D 5823, Pile Height
 - 2. Relative abrasiveness: Abrasive index of 16 +/- 2, when tested in accordance with ASM F 1015-03.
 - 3. Shock Absorbency: Less than 120 average G_{MAX} when tested in accordance with ASTM F355.
 - 4. Flammability: Passes when tested in accordance with ASTM D 2859-06.
 - 5. System Permeability: Drain up to 15 inches of rainwater over a 24-hour period without visible surface ponding.
 - 6. Final Playing Surface Grade (Top of infill material): One-quarter inch in length of 25 feet of finish grade in any direction.
- B. Dynamic Cushioning Requirements: Shall not exceed the maximum value as stated in the specifications throughout the warranty period.
- C. Synthetic Turf Pile Surface: The pile surface shall provide good traction in all types of weather with the use of conventional "sneaker-type shoes" and composition, molded sole athletic shoes. The pile surface shall be suitable for both temporary and permanent line markings using rubber- based paint where applicable.

1.5 SUBMITTALS REQUIRED WITH BID

- A. Product Data: For each product specified.
- B. Samples: Provide two samples of the following components:
 - 1. Synthetic Turf: 12" X 12" samples each of green turf with perforated backing intact. Include third party test reports.
 - 2. Synthetic Turf and Infill material in an 11 inch x 7 inch containerized conditions resembling and installed conditions as closely as possible. Include third party test reports.
 - 3. Infill Mixture: Two pounds of proposed material. Include toxic analysis from third party testing laboratory.
- C. Turf Vendor Qualifications:
 - 1. Written document describing firm's annual volume and number of years in business under current ownership.
 - 2. Written record of firm's past installation schedules and performances.
 - 3. Provide the names of existing clients for whom significant after-the-sale service work has been performed or significant synthetic turf warranty services have been performed. Provide names of local representatives who will be responsible for warranty and post- installation support for this project.
 - 4. Product Test Reports: Based on evaluation of tests performed by manufacturer and witnessed by a qualified independent testing agency, indicate compliance of surfacing material with requirements based on comprehensive testing of current systems.

- D. Turf Manufacturer's Qualifications:
 - 1. Written document describing the history and experience of the Manufacturer with this particular product. Provide number of years of experience and number of installations, both in North America and world-wide.
 - 2. Provide field locations, client contact (name, address, phone number), type of synthetic turf product installed, date of installation, and general contractor (if used) for a minimum of 5 competition football or soccer installations at the NCAA Division 1 level or higher.
- E. Turf Installer Qualifications:
 - 1. Written document describing the history and experience of the Installer with this particular product. Provide number of years of experience and number of installations, both in North America and world-wide.
 - 2. Provide documentation of Certified Field Builder designation from American Sports Builders Association.
Provide field locations, client contact (name, address, phone number), type of synthetic turf product installed, date of installation, and general contractor (if used) for a minimum of 5 competition synthetic turf football or soccer installations at the NCAA Division 1 level or higher.
- F. Test Data: Provide the following test results for the system specified. All tests shall be certified by an independent testing laboratory experienced with the testing of synthetic turf. The qualifications of the testing laboratory to be utilized for the submittal and pre-shipment testing shall be submitted to the Engineer for approval.
 - 1. Force Reduction: ASTM F1936, Berlin Test Device 55-70%
 - 2. Shock Absorption: ASTM F355, 120 G's per test point
 - 3. Surface Stability: Vertical Deformation ASTM F2157, Average Drop 2 and 3 4 - 9mm
 - 4. Drainage: ASTM F1551, Min. 15" hr. turf system.
 - 5. Color Fastness: AATC 16, Opt E, No discernible color change

1.6 SUBMITTALS REQUIRED AFTER AWARD OF CONTRACT

- A. Product Data: For each product specified. Include details of construction relative to materials and dimensions of individual components.
 - 1. Submit manufacturer's product data on synthetic turf system and infill material.
- B. Shop Drawings: Provide to the Engineer and the Owner (3) copies of complete and detailed drawings showing all components and parts of the infilled synthetic turf system, within two weeks of the Notice to Proceed. The shop drawings shall be to scale and include the following:
 - 1. Seaming Detail
 - 2. Seaming Plan
 - 3. Edge Detail
 - 4. Inlay Detail
 - 5. Lines and Logos.
- C. Samples: Provide to the Engineer and the Owner (3) samples of the following within two weeks of the Notice to Proceed:
 - 1. 36" X 36" samples each of green colored turf showing method of seam make-up with perforations. One sample to have example of tufted-in 5 yard lines.

2. Color Card for each custom synthetic turf color. Color card shall be wound with actual turf fiber, covering an area of no less than 2" square. Owner shall approve custom colors prior to tufting of custom colored turf.
- D. Provide Record Drawings of topographic survey of completed playing surface (after infill installation) and installed carpet layer (prior to infill installation) with spot elevations at 25 feet on center.
- E. Manufacturer's Specifications: Provide to the Engineer and the Owner (3) copies of the Manufacturer's material specifications and installation instructions within two weeks of the Notice to Proceed. Provide vertical permeability properties for the turf in inches per hour.

1.7 QUALITY ASSURANCE

- A. Turf Manufacturer Qualifications: The firm shall comply with the following requirements and shall be experienced in manufacturing synthetic playing surface materials similar to those indicated for this Project and with a record of successful in-service performance.
 1. Assumes responsibility for engineering synthetic playing surface components to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive analysis by a qualified professional engineer.
 2. Has provided infilled synthetic turf playing surface components for at least 5 full-size competition football or soccer fields at the NCAA Division 1 level or higher.
 3. Has sufficient production capacity to produce required materials without delaying the Work.
- B. Turf Installer Qualifications: The Turf Installer chosen to perform the work described in this Section shall comply with the following:
 1. Shall be certified by the American Sports Builders Association (ASBA) as a Certified Field Builder.
 2. Shall have installed at least 5 full-size infilled synthetic competition football or soccer fields at the NCAA Division I level or higher, similar to that required for this Project, and who is acceptable to the manufacturer.
- C. Pre-Shipment Requirements: Prior to shipment of the synthetic turf materials to the jobsite, synthetic turf material from every fifth roll shall be randomly sampled and tested by an independent testing laboratory experienced with testing synthetic turf materials. The testing laboratory shall be completely independent with no ties to the turf manufacturer. The testing shall include the following:
 1. Pile composition and denier
 2. Pile weight
 3. Total Weight
 4. Pile height
 5. Primary backing weight
 6. Secondary backing weight
 7. Permeability
 8. Tuft bind (without infill)
 9. Grab/tear strength (length/width)

- D. Copies of the test results shall be transmitted to the Owner, Engineer, and Owner's Turf Consultant for approval prior to turf shipment. Additionally, samples of the synthetic turf material tested from every fifth roll shall be transmitted to the Owner, Engineer, and Owner's Turf Consultant prior to shipment to the jobsite.
- E. Synthetic turf system shall comply with all EPA, CSPC, and all other relevant regulatory agency requirements.

1.8 WARRANTY

- A. General Synthetic Turf Warranty: Warranty shall cover, in general, the usability of the turf surface, accessories, use characteristics, and suitability of the installation. All items covered by the warranty are to be replaced or repaired with new materials, including installation at the sole expense of the warranting contractor for the period of (8) years to the Owner, for the designated uses enumerated as follows:
 - 1. Football
 - 2. Soccer
 - 3. Lacrosse
 - 4. Rugby
 - 5. Marching Band
 - 6. Physical Exercises
 - 7. Physical Education Activities
 - 8. Pneumatic rubber-tired maintenance and service vehicles.
 - 9. Pedestrian traffic.
- B. A principal of the applicable firm, duly authorized to make contracts, shall sign the turf vendor's warranty. If the turf vendor is not the manufacturer, the manufacturing firm shall also sign the warranty. The term "Contractor" contained herein refers to the firm furnishing the warranty. Warranty period shall be a minimum of (8) years from date of acceptance of the installed system by the Owner.
- C. Form of Warranty of Synthetic Turf System:
 - 1. The Contractor warrants to the Owner that its synthetic turf materials shall not fade, fail, shrink, wrinkle, or reflect excessive wear. Contractor shall, at their sole expense and cost, replace such areas of the synthetic turf system not performing to these standards for the life of the Warranty.
 - 2. The term "Not Fade" in the context of this warranty shall mean that the synthetic turf material shall remain a uniform shade of green, or other color installed, with
 - 3. no significant loss of color.
 - 4. In the event the synthetic turf system does not retain its fiber height or shock absorbency and is consequently no longer serviceable during the warranty period, the Contractor shall, at his sole expense, replace such portion of the system that is no longer service- able.
 - 5. The Contractor warrants to the Owner that the permeable synthetic system shall drain vertically a minimum of 10 inches per hour without visible surface ponding.
 - 6. The Contractor shall not be held liable for any incidental or consequential

damages. These warranties and the Contractor's obligations hereunder are expressly conditioned upon:

- a. The Owner making all minor repairs to the synthetic turf system upon the discovery of the need for such repairs.
 - b. The Owner maintaining and properly caring for the synthetic turf system in accordance with the Contractor's maintenance manual and instructions.
 - c. The Owner complying with the dynamic and static load specifications established by the Contractor.
- D. Warranty Testing: The infilled synthetic turf field is to be tested and paid for by the Contractor through the end of the manufacturer's warranty period for the following criteria upon:
1. Completion
 2. End of Year One
 3. Beginning of Year Five
 4. Year 8 and Every Year After through the end of the manufacturer's warranty period.
- E. Warranty Tests: The following tests are to be performed in accordance with applicable ASTM and other applicable standards (All tests to be paid for by Contractor):
1. G-Max as designated in F-1936-98 (Test shall be performed in 8 locations as opposed to 6 as outlined in the ASTM procedure. Measured depth of infill shall be provided in all 8 test locations)
 2. Force Reduction
 3. Percolation
 4. Infill Level
 5. Pile Height
 6. Tuft Bind
 7. Rotational Resistance
 8. Deformation
- F. Third Party Warranty/Insurance: Provide to the Engineer and the Owner three copies of the Third Party Warranty package within two weeks of the Notice to Proceed. The Third Party insurance shall cover the turf system for the entire warranty period. The insurance shall be in the amount for a full 100% replacement of the turf system.

1.9 EXTRA MATERIALS

- A. Furnish to the Owner extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Receive Owner's written receipt for all materials. Deliver receipt to Owner's Turf Consultant and Engineer.
- B. Turf for Future Repairs: The following are minimum areas for the extra synthetic turf to be provided by the Contractor to the Owner:
 1. Each Green Colored Turf: 500 sq. ft.
 2. Each Custom Colored Turf: 250 sq. ft.
 3. White Turf: 150 l.f. of 4" wide lines

- C. Extra Turf Configuration: Material may be roll ends or cutoffs; however, each piece of fabric shall be at least 5' x 10'. At least one green turf piece shall be a minimum 10' x 15'

PART 2 - PRODUCTS

2.1 General

- A. General: the turf system shall be a vertically draining permeable synthetic turf system. The turf system shall consist of a synthetic grass-like surface pile, which shall be tufted into a synthetic backing. All backing layers and coatings shall be firmly bonded together. Coating material must be completely cured and bonded to the other backing layers. Synthetic turf panels or rolls that do not meet this requirement will be rejected. The entire system shall be resistant to weather, insects, rot, mildew, and fungus growth, and shall be non-allergenic and non-toxic. The entire system shall be constructed to maximize dimensional stability, to resist damage and normal wear and tear from its designated use, and to minimize ultraviolet degradation. All adhesives used in bonding the system together shall be resistant to moisture, bacterial and fungal attacks, and resistant to ultraviolet rays at any point in the system.

2.2 TURF COMPONENTS AND MINIMUM VALUES

- A. Manufacturers: Subject to compliance with requirements, provide football specific infilled synthetic turf from one of the following, or approved equivalent:
 - 1. AstroTurf, LLC – (800) 723-TURF
 - 2. FieldTurf, Inc. - (800) 724-2969
 - 3. Shaw Sports Turf – (866) 703-4004
- B. Turf Fibers:
 - 1. Type: Monofilament, Slit Film, or combination thereof, w/ optional Thatch Layer
 - 2. Material: Polyethylene
 - 3. Denier: 9000 Nominal
 - 4. Stitch Gauge: 3/4" Maximum
 - 5. Yarn Break Strength: 24 lbs.
 - 6. Yarn Elongation: 40% Max
 - 7. Yarn Melting Point: 240 Deg F.
- C. Primary and Secondary Backing:
 - 1. Woven Polypropylene: Single or Multiple
 - 2. Weight: 8 oz. per sq. yd.
 - 3. Polyurethane Coating: 20 oz. per sq. yd.
- D. Fabric:
 - 1. Width: 15 feet.
 - 2. Tuft Bind: 8+ lbs.
 - 3. Pile Height: 2.25"
 - 4. Pile Weight: 60 oz. per sq. yd.

5. Grab Tear Strength: 200 lbs. in both directions
6. Pill Burn Test: Pass
- E. Synthetic Turf Fabric Surface: the fabric surface shall be constructed and installed in minimum 15' widths with no longitudinal or transverse seams, except for head or tee seams at field boundaries and inlaid lines within a finished roll assembly. The seams shall be at 15'0" spacing.
- F. Synthetic Turf Appearance and Colors: The turf color shall be uniform with no visible deviations in shade permitted. Rolls that do not meet this requirement will be rejected. Pile fibers shall resemble freshly grown natural grass in appearance, texture and color. Pile surface shall be nominally uniform in length for all portions of the field. Synthetic turf panels with irregular pile heights or with "J hooked" fibers will be rejected.
 1. Color A: Field Green
 2. Color B: Lime Green
 3. Color C: Light Blue – Pantone PMS 292C
 4. Color D: Dark Blue – Pantone PMS 282C
 5. Color E: White
- G. Shock Absorption (G-Max): The turf system shall score less than 120 G's when tested per ASTM F355, and as described herein, for the entire warranty period.

2.3 SEAMS

- A. All turf seams shall be bonded with a supplemental backing material or sewn with high strength polyester fiber cord. For bonded seams, use either open graded nylon or polyester scrim/backing material, or non-permeable backing with perforation in accordance with paragraph 2.4 of this section.

2.4 SYNTHETIC TURF PERFORATIONS

- A. Synthetic turf with tufted fibers and coated backing must include perforations in the backing for vertical drainage. Perforations to be a minimum of 1/4" diameter clear opening and shall be spaced at a maximum of 4" uniformly on center. The turf shall be perforated with a minimum 95% integrity over the entire surface. Holes must be full diameter, completely through the underside of the turf backing with no material residue or fragmented fibers remaining.

2.5 INFILL MATERIAL

- A. Standard: Combination of silica sand and rubber as recommended by the turf manufacturer for a football application, and in accordance with the physical performance characteristics as outlined herein.

2.6 FIELD MARKINGS

- A. All field markings are to be permanently applied (sewn or tufted) and white in color unless otherwise noted on drawings. Whenever possible, markings shall be tufted at

the factory in lieu of inlaid during the turf installation. Markings shall be uniform in color and shall provide sharp visual contrast to the turf color. Markings shall have sharp and distinct edges, and shall not vary more than 7/32" from specified widths and location.

- B. Manufacturer to guarantee that turf is capable adaptable to painted lines in the event painting is utilized in the future.
- C. Five yard lines, goal lines, sidelines, numbers, and hash marks shall be installed per NCAA rules and regulations. Contractor to provide shop drawing of all field markings for approval by Owner, Engineer and Owner's Turf Consultant prior to fabrication of the turf system.
- D. All Conference and Team logos are to be installed per Conference/Team standards, and in accordance with NCAA rules and regulations. Owner to provide logos to turf manufacturer to be included as part of the turf system.

2.7 CONCRETE CURBING

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- C. Concrete Mix Design: Locally sourced concrete mixture as commonly used in local curb and gutter.
 - 1. Portland Cement: ASTM C 150/C 150M, gray portland cement
 - 2. Normal-Weight Aggregates: ASTM C 33/C 33M. Uniformly graded limestone from a single source.
 - a. Maximum aggregate size: 1-inch
 - b. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
 - 3. Minimum Compressive Strength: 4000 psi.

2.8 TURF EDGE FASTENERS

- A. Turf edge fastener to be comprised of a treated or synthetic 2 x 4 nailer attached to the perimeter concrete or structure in an approved manner.

2.9 SPECIAL MAINTENANCE EQUIPMENT

- A. New Equipment: Provide Turfcare TCA 1400 as manufactured by SMG or Greensgroomer Model 926 Synthetic Turf Groomer. Grooming equipment shall be compatible with attachment to owner provided equipment.

2.10 MAINTENANCE AND OPERATION DATA

- A. Prior to acceptance and/or occupancy by the Owner, furnish to the Engineer (5) copies in hard cover form of the following:
 - 1. Maintenance and operating data with imprinted Project, Owner, Project Engineer, Contractor, and Turf Subcontractor names, and date of turf

- installation.
- 2. Use and Limitations: Provide a separate page stating approved activity usage for the turf and activities not recommended relative to warranty.
- 3. Index with Tab dividers for data as follows:
 - a. Materials installed with their characteristics.
 - b. Small repair procedures.
 - c. Minor seam repair.
 - d. Discussion of precautions to be practiced.
 - e. General maintenance and uses to be avoided to protect turf surface and to maintain installation's warranty.
 - f. G-Max Testing Results per ASTM F355.
- B. Prior to acceptance and/or occupancy by the Owner, contractor shall provide training to the owner on the operation and maintenance of turf grooming equipment provided.

2.11 LIST OF ALTERNATES

- A. Alternate 1 - Dual Polymer Turf System: Provide one of the following dual polymer turf fiber systems, meeting minimum criteria as described above:
 - 1. FieldTurf Core
 - 2. AstroTurf Trionic
- B. Alternate 2 - Non-floating rubber infill.
 - 1. Provide manufacturer's recommended non-floating rubber infill product.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where playing surface will be installed, with Installer present, for compliance with requirements for conditions affecting performance of installed playing surface.
 - 1. Verify that substrates for placing playing surface are firm; dry; clean; free from oil, and waxy films.
 - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located under playing surface has been completed before installing drainage tile.
 - 3. Verify that joints and cracks in substrates will not adversely affect installed playing surface.
 - 4. Verify ambient temperatures are in compliance with manufacturer's recommendations for installation.
- B. Acceptance of Field Base Installation: The Contractor or the Contractor's subcontractor shall perform an inspection of the aggregate subbase and submit written certification of the acceptance of the aggregate subbase prior to the installation of the infilled synthetic turf system. The written certification shall include, but not be limited to:
 - 1. Acceptance of the subbase construction finished surface as totally suitable for the application of work specified in this section.
 - 2. Verification and certification of the infiltration and permeability rates of the

- aggregate subbase per the specified requirements – 15” per hour minimum.
3. Final grade to be within ¼” (one-quarter inch) in 25’ of proposed grades.
- C. Do not proceed with installation until unsatisfactory conditions have been corrected.
- D. Inspection of Materials: Prior to installation and immediately upon delivery of synthetic turf system materials to the project site, the synthetic turf surfacing contractor shall inspect materials as follows:
1. For damaged or defective items.
 2. Measure turf pile height of each roll.
 3. Measure backing perforation diameter and spacing.
 4. Reject damaged materials and all materials out of tolerance with the specifications.
 5. Results of pre-shipment testing of turf as required in section 1.6C.
- E. Owner Testing of Materials: The Owner may at any time have samples of turf submitted and tested for verification of conformance to specifications. Turf system acceptance will be subject to approval of these tests. Any material so tested and found not conforming to specifications will be rejected and replaced with material conforming to the specification at the Contractor’s expense. Resubmittal will be required.
- F. Post Installation Inspection: Immediately after installation, inspect project area for acceptable seaming, adhesive bonding, uniformity of color of turf, field lines and markings, insert installations, and edge details. Remove and/or repair deficient workmanship prior to requesting the Engineer and Owner’s Turf Consultant inspection pursuant to completion and acceptance of the work
- G. Product Testing: the Owner may have samples of the turf submitted and tested for verification of conformance to specifications at any time during the installation process. Turf system acceptance is subject to the results of these tests. Any material so tested and found not in conformance to the specifications will be rejected and replaced with material conforming to the specifications at the Contractor’s expense.

3.2 SYNTHETIC TURF INSTALLATION

- A. Immediately prior to installation of the synthetic turf, the base shall be thoroughly cleaned of all foreign material, soil, and any other substances that may be detrimental to the permeability and the installation of the turf system.
- B. Over drainage gravel layer, install synthetic turf carpet in accordance with manufacturer’s written instructions. Seams shall be sewn with thread especially made for the carpet materials, or glued, bonded or welded according to manufacturer’s written instructions.
- C. Synthetic turf edge shall be attached to the installed turf edge fastener either mechanically or with glue per manufacturer’s instructions and per the drawing details.
- D. Special care shall be taken not to disturb finish grade of approved gravel drainage layer during synthetic turf carpet installation.
- E. Bonding of Material Surface: The bonding or fastening of all system material components shall provide a permanent, tight, secure and hazard-free athletic playing surface. System material components include:
1. Bonding and/or sewing of all seams and inlaid lines and markings

2. Bonding and seaming must maintain their integrity for the total length of the warranty period.
- F. All turf seams shall be bonded with supplemental backing material or sewn with high strength polyester fiber cord. For bonded seams, use either open graded nylon or polyester scrim/backing material. All corners and sharp edges for inlaid turf must be fastened by hand sewing or with other acceptable methods, as approved by the Owner's Turf Consultant and the Engineer. All sewn seams shall be brushed to provide full coverage of fiber over the thread.
- G. Contractor to provide a certified survey of the installed synthetic turf carpet with spot elevations at 25' on center for Owner, Engineer, and Owner's Turf Consultant review. Any disturbance of the gravel drainage layer during the synthetic carpet installation causing the gravel layer to fall out of specified grading tolerance shall be immediately remedied by the Contractor prior to installation of the Infill Material.

3.3 LINES AND MARKINGS INSTALLATION

- A. Field markings shall be provided with the initial installation of the surfacing system. Provide lines and markings in conformance with these specifications. Layouts shall be accurately surveyed and marked prior to installation.
- B. If overlapping backing materials are utilized for the inlaid lines and markings, the backing material shall be perforated after gluing and prior to installation of the infill material.

3.4 ADHESIVE AND INFILL MATERIAL INSTALLATION

- A. Environmental Conditions: Do not apply adhesive materials or infill material when:
 1. Ambient air temperature is below 40 degrees F.
 2. Material temperatures are below 40 degrees F.
 3. Rain is falling or pending
 4. Conditions exist, or are pending that will be unsuitable to the installation of the system.
- B. Vibrate and brush infill materials into synthetic turf at a rate and depth recommended by the manufacturer. Infill material shall be applied in a dry condition, and only when the turf is dry. It shall be applied in uniform layers, utilizing a SandMatic as manufactured by SMG or approved equal.
- C. Special care shall be taken not to disturb finish grade of approved synthetic turf carpet layer during Infill Material Installation
- D. Contractor to provide a certified survey of the final infilled synthetic turf playing surface with spot elevations at 25' on center for Owner, Engineer, and Owner's Turf Consultant review. Any disturbance of synthetic turf layer causing the final playing surface to fall out of specified grading tolerance shall be immediately remedied by the Contractor prior to final acceptance.

3.5 FIELD QUALITY CONTROL

- A. Grade Verification: A certified survey shall be made of the as-constructed condition at:
 1. Top of Turf (Pre-Infill) to assure that the top of gravel remains within a tolerance

of plus or minus 1/4 inch in 25 feet in all directions, post turf installation.

2. Top of Infill to assure that finished playing field surface is within a tolerance of plus or minus 1/4 inch in 25 feet in all directions.

3.6 CLEANING AND PROTECTION

- A. Remove all excess materials of all types; equipment, debris, etc. from site immediately after completion of the work. Remove all stains and other blemishes from all finished surfaces. Leave work in clean, new appearing condition, ready for use by Owner.
- B. Adequate protection of material and work from damage will be the responsibility of the installer during installation and until acceptance of their work. Contractor will be responsible for protection after the acceptance of the work until final acceptance of all contract work by the Owner. All material damaged prior to final acceptance by the Owner shall be replaced at no cost to the Owner.

END OF SECTION

SECTION 32 18 25 – SYNTHETIC TURF PLAYING FIELD SUBDRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the subsurface components of the synthetic turf playing field system, including, but not limited to the following
 1. Earthwork and Compaction
 2. Aggregate Drainage Layer
 3. Geotextile Fabric
 4. Drainage Piping
 5. Cleanouts
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 1. Section 32 18 24 “Synthetic Turf Playing Field Surfacing” for synthetic turf surface.

1.2 SCOPE OF WORK

- A. Work included in this Section shall the involve the furnishing of all labor, materials and equipment necessary to install a complete, new, vertically drained infilled synthetic turf system. The Scope of Work shall include, but is not specifically limited to, the following:
 1. Review and certification of previous work performed by others, specifically related to the work indicated in this section.
 2. Provision for compaction of subgrade
 3. Installation of aggregate base layers to meet tolerances described herein.
 4. Provision of samples per specifications.
 5. All testing indicated herein shall be paid for by the contractor.

1.3 SYSTEM DESCRIPTION

- A. General: Synthetic turf playing system shall be comprised of a subsurface drainage infiltration system and synthetic grass with infill material of granulated rubber and silica sand.
 1. Components are to include, but are not limited to:
 - a. Earthwork Requirements:
 - 1) Excavation, trenching, grading, filling, backfilling, compaction.
 - 2) Graded and compacted subgrade
 - 3) Disposal of spoil materials.
 - b. Porous Aggregate Layers: Thickness per plan over prepared subgrade.
 - c. Subdrainage System:
 - 1) Geotextile Fabric.
 - 2) Aggregate drainage material.
 - 3) Lateral drain pipe, collector pipe, main line pipe and fittings.
 - d. Infilled Synthetic Turf

1.4 SUBMITTALS REQUIRED WITH BID

- A. Product Data: For each product specified.
- B. Samples: Provide two samples of the following components:
 - 1. Aggregate Drainage Materials including gravel borrow, septic gravel, choker stone, crushed stone, and sand 2 pounds of proposed material.
- C. Playing Field Base Builder:
 - 1. Written document describing the history and experience of the Installer with this particular product. Provide number of years of experience and number of installations, both in North America and world-wide.
 - 2. Provide documentation of Certified Field Builder designation from American Sports Builders Association.
 - 3. Provide field locations, client contact (name, address, phone number), type of synthetic turf product installed, date of installation, and general contractor (if used) for a minimum of 5 competition synthetic turf football or soccer installations at the NCAA Division 1 level or higher.
- D. Test Data: Provide the following test results for the system specified. All tests shall be certified by an independent testing laboratory experienced with the testing of synthetic turf. The qualifications of the testing laboratory to be utilized for the submittal and pre-shipment testing shall be submitted to the Engineer for approval.
 - 1. Drainage: ASTM F1551 Min. 50" hr. aggregate base only

1.5 SUBMITTALS REQUIRED AFTER AWARD OF CONTRACT

- A. Product Data: For each product specified. Include details of construction relative to materials and dimensions of individual components.
 - 1. Submit manufacturer's product data on drainage pipe material and geotextile fabric.
- B. Provide Record Drawings of topographic survey of completed aggregate drainage layer and subgrade with spot elevations at 25 feet on center.
- C. Manufacturer's Specifications: Provide to the Engineer and the Owner (3) copies of the Manufacturer's material specifications and installation instructions within two weeks of the Notice to Proceed. Provide vertical permeability properties for the turf in inches per hour.

1.6 QUALITY ASSURANCE

- A. Playing Field Base Builder Qualifications: The Base Builder chosen to perform the work described in this Section shall comply with the following:
 - 1. Shall be certified by the American Sports Builders Association (ASBA) as a Certified Field Builder.
 - 2. Shall have installed at least 5 full-size infilled synthetic competition football or soccer fields at the NCAA Division I level or higher, similar to that required for this Project, and who is acceptable to the manufacturer.
- B. Copies of the test results shall be transmitted to the Owner, Engineer, and Owner's Turf Consultant for approval prior to turf shipment. Additionally, samples of the synthetic turf material tested from every fifth roll shall be transmitted to the Owner, Engineer, and Owner's Turf Consultant prior to shipment to the jobsite.

1.7 OWNER PROVIDED INFORMATION

- A. The Owner shall provide the following during the Bidding Phase of the project:
1. Existing Conditions Survey: Shall include all information related to existing site features, topography, and utilities. An electronic version of the survey shall be provided and shall serve as the base for the Contractor's playing field design submittals.

PART 2 - PRODUCTS

2.1 GENERAL

- A. General: the turf system shall be a vertically draining permeable synthetic turf system. The turf system shall consist of a synthetic grass-like surface pile, which shall be tufted into a synthetic backing. All backing layers and coatings shall be firmly bonded together. Coating material must be completely cured and bonded to the other backing layers. Synthetic turf panels or rolls that do not meet this requirement will be rejected. The entire system shall be resistant to weather, insects, rot, mildew, and fungus growth, and shall be non-allergenic and non-toxic. The entire system shall be constructed to maximize dimensional stability, to resist damage and normal wear and tear from its designated use, and to minimize ultraviolet degradation. All adhesives used in bonding the system together shall be resistant to moisture, bacterial and fungal attacks, and resistant to ultraviolet rays at any point in the system.

2.2 DRAINAGE SYSTEM MATERIALS

- A. Aggregate Drainage Material: Shall consist of a mechanically crushed limestone or granite, angular and elongated in nature, that meets the following criteria:
1. Soft limestone and shale materials are not suitable. Aggregate Drainage Material shall not exceed 18 percent loss of materials as determined by the 2018 MicroDeval method (ASTM D6928).
 2. No shell or shell fragments shall be present and be denoted in the laboratory test reports.
 3. Rounded or river stone is not acceptable.
 4. Infiltration Rates
 - a. Crushed Stone Aggregate: greater than 150 inches per hour
 - b. Choker Stone Aggregate: greater than 50 inches per hour
 - c. Porosity of the finished drainage aggregate layer shall be greater than 25% when compacted and saturated.
 5. Bridging Characteristics
 - a. $3 < (D50 \text{ Base Stone} / D50 \text{ Finish Stone}) < 6$
 - b. $(D85 \text{ Finish Stone} / D15 \text{ Base Stone}) < 2$
 6. The aggregate drainage material shall be submitted to and approved by a qualified independent testing agency for conformance to the specifications prior to delivery to the site. A one-gallon sample from every 200-ton lot shall be submitted.
 7. The aggregate shall conform to the following gradation chart using ASTM Method

C136. Turf manufacturer to review aggregate specification and confirm compatibility with turf system prior to delivery and installation of the drainage aggregate:

8. Common Borrow shall conform to Common Borrow shall conform to Section M.01.01 Common Borrow.
9. Gravel Borrow shall conform to Sections 406.02 and M.01.09, Table 1, Column I of the RIDOT Standard Specifications.
10. Sand shall conform to the requirements of AASHTO M-6 and shall be poorly graded.
11. Choker Stone shall conform to ASTM No 89 (1/4" to 3/8"), and shall be double washed and cleaned of all fines, powder, dust, and debris.
12. Crushed Stone shall be double washed and clean of all fines, powder, dust and debris with the following requirements.

SIEVE SIZE	PERCENT PASSING
1.5 inch	100
1 inch	95 to 100
1/2 inch	25 to 80
#4 inch	0 to 10
#8 inch	0 to 5

- B. Subdrain Laterals:
 1. Round Perforated Corrugated Polyethylene Pipe meeting ASHTO M225CP for 3 to 10 inches diameters N-12 perforated drainage pipe as manufactured by Advanced Drainage Systems (ADS) or Hydraway Systems, sized per drawings.
- C. Collector Subdrain Lines: Perforated Corrugated Polyethylene Pipe meeting ASHTO M294CP for 12 inch to 36 inch diameters. Provide drainage pipe complete with bends, reducers, adapters, couplings, collars, and joint materials. Perforated pipe shall have a minimum inlet area equal to 1.5 square inches per linear foot of pipe.
- D. Clean Out: Provide Nyloplast Drain Basins sized and configured to accommodate pipe layouts as shown on the plans. Minimum Drain Basin diameter is 8 inches.
- E. Geotextile Filter Fabric: Permeable nonwoven filter fabric consisting of long-chain synthetic polymers:
 1. TenCate Geosynthetics Mirafi 140N
 2. Propex Geotex 451
 3. US Fabrics US120NW

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where playing surface will be installed, with Installer present, for compliance with requirements for conditions affecting performance of installed playing surface.
 1. Verify that substrates for placing playing surface are firm; dry; clean; free from

- oil, and waxy films.
 - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located under playing surface has been completed before installing drainage tile.
 - 3. Verify that joints and cracks in substrates will not adversely affect installed playing surface.
 - 4. Verify ambient temperatures are in compliance with manufacturer's recommendations for installation.
- B. Certification of Field Base Installation: The Contractor or the Contractor's subcontractor shall perform an inspection of the aggregate subbase and submit written certification of the acceptance of the aggregate subbase prior to the installation of the infilled synthetic turf system. The written certification shall include, but not be limited to:
- 1. Acceptance of the subbase construction finished surface as totally suitable for the application of work specified in this section.
 - 2. Verification and certification of the infiltration and permeability rates of the aggregate subbase per the specified requirements – 15" per hour minimum.
 - 3. Final grade to be within ¼" (one-quarter inch) in 25' of proposed grades.
- C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 EARTHWORK EXECUTION

- A. General: Remove material of every nature or description encountered in obtaining required lines and grades. Excavate and/or place and compact fill to provide for elevation(s) required by drawings.
- B. Before compaction of subgrade, 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. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
- C. Failings: If, based on the testing and observation agency reports and observations, compacted subgrade or fills are found to be below specified density, provide additional compaction and testing in accordance with specifications.
- D. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.
- E. Moisture Control: Where subgrade soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary 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.
- F. Subgrade Grading: Shape surface of areas under aggregate drainage material to line, grade, and cross-section, with finish surface not more than ½" (one-half inch) in 25 feet either direction above or below required subgrade elevation. At no point shall two adjacent spot elevations vary by more than one-half inch.
- G. Contractor to provide a certified survey of the finished subgrade with spot elevations

at 25' on center for Owner review.

- H. Contractor's Geotechnical Consultant to provide compaction & density reports for Owner review upon completion of subgrade preparation.
- I. Contractor shall bear sole responsibility for the stability and performance of the subgrade throughout the warranty period. Any fluctuation in the subgrade resulting in failure of the finish grade of the playing surface to meet specified tolerances will be immediately corrected by the Contractor.
- J. The Contractor shall not proceed with drainage system trenching operations or installation of aggregate drainage blanket until all subgrade geotechnical tests and certified surveys have been reviewed and approved by the Owner.

3.3 FIELD DRAINAGE INSTALLATION

- A. Placement of Drainage Aggregate: Place drainage fill material after testing of drainage system in a single layer for each layer of aggregate. Place material around drainage pipe located in trench areas until drainage material is level with the surrounding subgrade. After filling of trench areas place drainage fill to depth above subgrade shown in the drawings.
Aggregate Drainage Layer Grading: Shape surface of aggregate drainage layer to line, grade, and cross-section, with finish surface not more than ¼" (one-quarter inch) in 25 feet either direction. above or below required elevation. At no point shall two adjacent spot elevations vary by more than one-quarter inch.
- B. Contractor to provide a certified survey of the finished aggregate drainage layer with spot elevations at 25' on center for Owner review
- C. Contractor shall bear sole responsibility for the stability and performance of the aggregate drainage layer throughout the warranty period. Any fluctuation in the aggregate drainage layer resulting in failure of the finish grade of the playing surface to meet specified tolerances will be immediately corrected by the Contractor.
- D. The Contractor shall not proceed with installation of the synthetic turf until the certified survey of the aggregate drainage layer has been reviewed and approved by the Owner and the Engineer.

3.4 FIELD QUALITY CONTROL

- A. Compaction: Subgrade to be compacted to 95% proctor density in all locations. Testing regimen to be as recommended by Owner's geotechnical testing agent.
- B. Failings: If, based on the testing and observation agency reports and observations, compacted subgrade or fills are found to be below specified density, provide additional compaction and testing in accordance with specifications.
- C. Grade Verification: A certified survey shall be made of the as-constructed condition at:
 - 1. Subgrade level to assure that the subgrade is within a tolerance of plus or minus 1/2 inch in 25 feet in all directions.
 - 2. Top of Aggregate Layer to assure that top of aggregate is within a tolerance of plus or minus 1/4 inch in 25 feet in all directions.

3.5 CLEANING AND PROTECTION

- A. Remove all excess materials of all types; equipment, debris, etc. from site immediately after completion of the work. Remove all stains and other blemishes from all finished surfaces. Leave work in clean, new appearing condition, ready for use by Owner.
- B. Adequate protection of material and work from damage will be the responsibility of the installer during installation and until acceptance of their work. Contractor will be responsible for protection after the acceptance of the work until final acceptance of all contract work by the Owner. All material damaged prior to final acceptance by the Owner shall be replaced at no cost to the Owner.

END OF SECTION

SECTION 323113

CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Chain link fence framework, fabric, and accessories.
 - 2. Excavation for post bases, concrete footings for posts, and center drop for gates.
 - 3. Chain link manual and related hardware.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 033000 - Cast-In-Place Concrete: Post footings.
 - 2. Section 281304 – Physical Access Control System
 - 3. Section 270500 - Common Work Results for Communications.
 - 4. Section 271500 – Communications Horizontal Cabling.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 90 - Tests for Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
 - 2. ASTM A 116 - Specification for Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric.
 - 3. ASTM F 1184 - Specification for Industrial and Commercial Horizontal Slide Gates, Type II, Class 2.
 - 4. ASTM A 123 - Specification for Zinc (Hot- Dip Galvanized) Coatings on Iron and Steel Products.
 - 5. ASTM A 392 - Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
 - 6. ASTM F 567 - Standard Practice for Installation of Chain Link Fence.
 - 7. ASTM A 824 - Specification for Metallic-Coated Steel Marcellled Tension Wire Use with Chain Link Fence.
 - 8. ASTM F 1043 - Specification for Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework.
 - 9. ASTM F 668 - Specification for Poly (Vinyl Chloride) (PVC) Coated Steel Chain Link Fence Fabric.
 - 10. ASTM F 900 - Specification for Industrial and Commercial Swing Gates.
 - 11. ASTM F 1083 - Specification for Pipe, Steel, Hot-Dipped Zinc Coated (Galvanized) Welded, For Fence Structures.
 - 12. ASTM F 2200 – Specification for gates to be automated.
- B. Underwriter's Laboratories (UL):
 - 1. UL325, Door, Drapery, Gate, Louver, Window Operators, and Systems.
- C. Chain Link Fence Manufacturer's Institute (CLFMI):
 - 1. CLF-PM0610 (July 2011) - Product Manual.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Submit product data for fabric, posts, accessories, fittings, and hardware.
 - 2. Shop Drawings: Include plan layout, grid, spacing of components, accessories, fittings, hardware, anchorage's, and schedule of components.
 - 3. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate certifying that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with CLFMI PM.
- B. Installer Qualifications: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
- C. Manufacturers warranties shall pass to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Materials delivered to the site shall be examined for damage or defects in shipping. Any defects shall be noted and reported to the Owners representative. Replacements, if necessary, shall be immediately reordered, so as to minimize any conflict with the construction schedule. Sound materials shall be stored above ground under protective cover or indoors so as to provide proper protection.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1. Allied Tube & Conduit, Harvey, IL (800) 882-5543.
 - 2. Anchor Fence Division, Master-Halco, Incorporated, Baltimore, MD (800) 229-5615.
 - 3. Merchant's Metals, Houston, TX (800) 254-0080.
 - 4. The Tymetal Corporation, Fort Miller, NY (518) 695-9000.
 - 5. HySecurity, Kent, Washington, (800) 321-9947.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.2 MATERIALS

- A. Conform to CLFMI Product Manual.
- B. Steel Framing:

1. ASTM F 1083 Schedule 40, standard weight hot-dipped galvanized steel pipe having a zinc coating of 1.8 oz/sf on the outside and inside surface, welded construction.
 2. Minimum yield strength of 30,000 psi for all framing except posts; posts shall have a yield strength of 50,000 psi.
 3. PVC Coated Finish shall conform to ASTM F 1043 Group IA. Apply supplemental color coating of 10-15 mils of thermally fused PVC in a color selected from the manufacturer's choices, to match the fabric.
 4. Framing Specifications (8 foot Height)
 - All posts 6.625" OD, ASTM F1083, Schedule 40, Grade 50.
 - Maximum post spaces: 10 ft.
 - Rails & Braces 1.66" OD, 2.27 lbs/ft.
 5. Framing Specifications (5 foot Height)
 - All posts 3.5" OD, ASTM F1083, Schedule 40, Grade 50.
 - Maximum post spaces: 8 ft.
 - Rails & Braces 1.66" OD, 2.27 lbs/ft.
- C.
1. Gates: Chain link double leaf swing gates (5 foot Height)

Fabricate chain link swing gates in accordance with ASTM F900. Gate frame to be of welded construction. Weld areas to be protected with zinc-rich paint per ASTM A780. The gate frame members are to be spaced no greater than 8'-0" apart horizontally or vertically. Exterior members to be 1.900" OD pipe, interior members when required shall be 1.660" OD pipe. Pipe to be Grade 1 ASTM F1083. Chain link fabric to match specification of fence system. Fabric to be stretched tightly and secured to vertical outer frame members using tension bar and tension bands spaced 12" on center and tied to the horizontal and interior members 12" on center using 9 gauge galvanized steel ties.
 2. Hinges: Hot dip galvanized pressed steel or malleable iron, structurally capable of supporting gate leaf and allow opening and closing without binding. Non-lift-off type hinge design shall permit gate to swing 180°.
 3. Latch: Galvanized forked type capable of retaining gate in closed position and have provision for padlock. Latch shall permit operation from either side of gate.
 4. Double gates: Provide galvanized drop rod with center gate stop pipe or receiver to secure inactive leaf in the closed position. Provide galvanized pressed steel locking latch, requiring one padlock for locking both gate leaves, accessible from either side.
 5. Gate holdback: Provide galvanized gate hold back keeper for each gate leaf over 5' wide. Gatekeeper shall consist of mechanical device for securing free end of gate when in full open position.
 6. Gate Posts: 3.5" OD, ASTM F1083, Schedule 40, Grade 50, Max. spacing 8' oc.
- D.
- Fabric: Chain link fence shall be PVC coated (fused). Coated over galvanized wire: ASTM F 668, class 2B, 7 mil (0.18 mm) thermally fused polyvinyl chloride in a color to be selected from the manufacturer's choices. Galvanized steel core wire should meet ASTM A 641, tensile strength 75,000 psi, 11 gauge. Size: Helically wound and woven to a chosen height of 8;. Fabric shall be 2" diamond mesh of 11 gauge (0.120") core wire and a break load of 850 pounds. Fabric should be knuckled at the top and at the bottom.
- E.
- PVC Coated Chain Link Fence Accessories
1. ASTM F 626 Provide items required to complete fence system. Galvanize each ferrous metal item and finish to match framing.
 2. Post Caps: Formed steel, malleable cast iron, or aluminum alloy weathertight closure cap for tubular posts. For each line post, provide tops to permit passage of top rail.
 3. Top Rail and Brace Ends Formed steel or malleable cast iron for connection of rail and brace to terminal posts.
 4. Top Rail Sleeves 5" sleeve allowing for expansion and contraction of top rail.

5. Wire Ties and Clops: 10 gauge (0.135") galvanized steel wire for attachment of fabric to line posts. Double wrap 13 gauge (0.092") for rails, and braces. Hog ring ties of 12-1/2 gauge (0.0985") for attachment of fabric to tension wire.
6. Brace and Tension (Stretcher bar)
Bands: Pressed steel. At square post provide tension bar clips.
Tension (Stretcher) Bars: One-piece lengths, equal to 2" less than full height of fabric with a minimum cross-section of 3/16" x 3/4" or equivalent, fiberglass rod. Provide tension (stretcher) bars where chain link fabric meets terminal posts.
7. Truss Rods: Steel rods with minimum diameter of 3/8".
8. Nuts and Bolts: Nuts and bolts are galvanized but not vinyl coated. Cans of PVC touch up paint are available to color coat nuts and bolts if desired.

F. Setting Materials: Concrete, with a minimum 28-day compressive strength of 3,000 psi.

2.3. MIXES

- A. Footing Concrete: 3,000 psi Portland cement concrete.
- B. Grout: Premixed, factory-packaged, non-staining, non-corrosive grout. Provide type formulated for exterior application.

2.4 COMPONENTS

- A. Couplings: Expansion type, approximately 6 inches long.
- B. Attaching Devices: Means of attaching bottom rail securely to each gate, corner, pull, and end post.
- C. Swinging Gate Hardware:
 1. Hinges: Size and material to suit gate size; offset to permit 180 degree gate opening. Provide 1-1/2 pair of hinges for each leaf over 6 foot 0 inch nominal height.
 2. Latch: Forked type or plunger-bar type to permit operation from both sides of gate, with padlock eye.
 3. Double Gate Hardware: In addition to the above, provide gate stops for double gates, consisting of mushroom type flush plate with anchors set in concrete to engage center drop rod or plunger bar. Configure for use of one padlock to lock both gate leaves.

2.5 ACCESSORIES

- A. Sleeves: Galvanized steel pipe with inside diameter not less than 1/2 inch greater than outside diameter of fence posts. Provide steel plate closure welded to bottom of sleeves of width and length not less than 1 inch greater than outside diameter of sleeve.
 1. Up to 6 Foot Fabric Height: Provide sleeve not less than 12 inches long.
- B. Tension Wire: 7 gage steel, metallic-coated coil spring wire, in accordance with ASTM A 824, located at the top of fence fabric.
- C. Wire Ties: 11 gage galvanized steel.
- D. Post Brace Assembly: Manufacturer's standard adjustable brace at end and gate posts and at both sides of corner and pull posts, with horizontal brace located at mid height of fabric. Use same materials as top rail for brace, and truss to line posts with 0.375 inch diameter rod and adjustable tightener.
- E. Post Tops: Galvanized steel, weather tight closure cap for tubular posts, one cap for each post. Furnish cap with openings to permit passage of top rail.

- F. Stretcher Bars: Galvanized steel, one piece lengths equal to full height of fabric; with minimum cross section of 3/16 inch x 3/4 inch. Provide one stretcher bar for each gate and end post, one for each bottom rail, and two for each corner and pull post.
- G. Stretcher Bar Bands: Manufacturer's standard.
- H. Gate Cross Bracing: 3/8 inch diameter galvanized steel adjustable length truss rods.

2.6 FABRICATION

- A. Fabricate swing gate perimeter frames of 1.90 inch outside diameter galvanized steel pipe. Provide horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware, and accessories. Space frame members maximum 8 feet apart.
- B. Assemble gate frames rigidly by welding or with special fittings and rivets. Use same fabric as for fence. Install fabric with stretcher bars at vertical edges. Bars may also be used at top and bottom edges. Attach stretchers to frame at not more than 15 inches on center. Install diagonal cross bracing on gates as required to ensure frame rigidity without sag or twist.
- G. Attach hardware to provide security against removal or breakage.

2.7 FINISHES

- A. All fence posts, fabric, and accessories shall be galvanized with black-colored Polyvinyl Chloride (PVC) Coating.

Part 3 – EXECUTION

2.8 EXAMINATION

- A. Section 017300 – Execution Requirements: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the University.

2.9 INSTALLATION

- A. Install fence in accordance with ASTM F 567 and manufacturer's published instructions.
 - 1. Locate a terminal post at each fence termination, at each change in horizontal direction of 30 degrees or more, and at each change in height.
 - 2. Space line posts uniformly at a maximum of 10' on center. Posts may be spaced uniformly at a closer distance (for example, 8') for greater strength.
 - 3.

- B. Install gates in accordance with ASTM F 900, ASTM F2200 or ASTM 1184 as applicable and to manufacturer's published instructions.
- C. Space line posts 10 feet 0 inches on center maximum, unless otherwise indicated on Drawings.
- D. Grade-set Posts:
 - 1. Drill or hand excavate in firm, undisturbed or compacted soil..
 - 2. Excavate each post hole to 12 inch diameter, or not less than four times diameter of post.
 - 3. Excavate approximately 6 inches lower than post bottom; set post bottom not less than 36 inches below finish grade. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads.
 - 4. Hold post in position while placing, consolidating, and finishing concrete. Trowel finish around post and slope to direct water away from posts.
- E. Alignment: Check each post for vertical and top alignment, and maintain in position during placement and finishing operations.
- F. Sleeve-set Posts: Anchor posts in concrete by means of pipe sleeves preset and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with grout, mixed and placed to manufacturer's recommendations.
- G. Top Rail: Install full 21' lengths whenever possible. Connect lengths with sleeves for rigid connections under expansion/contraction conditions. Top rail with wedged ends may be joined directly.
- H. Rails: Run rail between post, bending smoothly for curved runs located at the bottom of the fence fabric. Provide expansion couplings as recommended by fencing manufacturer.
- I. Center Rails: Provide center rails where indicated. Install in one piece between posts and flush with post on fabric side, using offset fittings where necessary.
- J. Bottom Rails: Install bottom rails, where specified, between posts with fittings and accessories.
- K. Brace Assemblies: Install horizontal pipe brace at mid-height on each side of terminal posts. Install braces so posts are plumb with rod in tension. Firmly attach with fittings.
- L. Tension Wire: Install tension wires through post cap loops before stretching fabric and tie to each post cap with not less than 6 gage galvanized wire. Fasten fabric to tension wire using 11 gage galvanized steel hog rings spaces 24 inches on center.
- M. Fabric: The fence fabric must be installed within 1 inch between finish grade and bottom selvage. Pull fabric taut and tie to posts, rails, and tension wires. Attach fabric with wire ties to line posts at 15 inch on center and to rails, braces, and tension wire at 24 inch on center. Install fabric on the inside towards the playing area, and anchor to framework so fabric remains in tension after pulling force is released.
- N. Stretcher Bars: Pull fabric taut; thread tension bar through fabric and attach to terminal posts with bands or clips with a maximum space of 15 inches on center.
- O. Tie Wires:
 - 1. Use U-shaped wire conforming with diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted two full turns. Bend wire ends to minimize hazards to persons or clothing.
 - 2. Tie fabric to line posts with wire ties spaced 12 inches on center. Tie fabric to rails and braces with wire ties spaced 24 inches on center. Manufacturer's standard procedure will be accepted if of equal strength and durability.

- P. Fasteners: Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.
- Q. Gates: Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

2.10 CONSTRUCTION

- A. Site Tolerances:
 1. Maximum Variation from Plumb: 1/4 inch.
 2. Maximum Offset from True Position: 1 inch.
 3. Locate fencing components completely within site boundaries. Do not infringe adjacent property lines.
 4. Maximum Fence Distance from Ground: 1 1/2 inches.
 5. Maximum Gate Distance from Ground: 4 inches.

2.11 FIELD QUALITY CONTROL

- A. Test gate operator through ten full cycles and adjust for operation without binding, scraping or uneven motion. Test limit switches for proper "at rest" gate position.

END OF SECTION

SECTION 329200
TURF AND GRASSES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Seed.
 - 2. Water.
 - 3. Erosion Control Material.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.
- C. Related Sections:
 - 1. Section 312000 - Earth Moving: Topsoil material.
 - 2. Section 312500 - Erosion and Sedimentation Controls: Slope and erosion protection materials.

1.2 REFERENCES

- A. American Society For Testing and Materials (ASTM):
 - 1. ASTM C 602 - Specification for Agricultural Liming Materials.
 - 2. ASTM D 977 - Specification for Emulsified Asphalt.
- B. American Sod Producers Association (ASPA):
 - 1. ASPA STSMT - Specification for Turfgrass Sod Materials and Transplanting/Installing.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Assurance/Control Submittals:
 - a. Certificates:
 - 1) Submit certificate from seed supplier for each grass-seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
 - 2) Submit certificate from sod supplier for each seed mixture, identifying sod source, including name and telephone number of supplier.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Operation and Maintenance Data: Include maintenance instructions, cutting method and maximum grass height, types of application frequency, and recommended coverage of fertilizer for one full growing cycle.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Conform to applicable requirements of the Local and State Department of Agriculture Extension Service of the state in which the project is located.

1.5 ENVIRONMENTAL REQUIREMENTS (Not Used)

PART 2 - PRODUCTS

2.1 SEED

- A. Classification:
 - 1. State-Certified of latest season's crop delivered in original sealed packages bearing producer's guaranteed analysis for percentages of mixtures, purity, germination, weedseed content, and inert material.
 - 2. Label in conformance with applicable state seed laws.
 - 3. Wet, moldy, or damaged seed will be rejected.

2.2 STABILIZING MATERIALS

- A. Specified in Section 313200.
- B. Asphalt Adhesive: ASTM D 977, Grade RS-1. Use with straw or hay mulch.
- C. Cellulose Fiber: Use for anchoring straw. Fiber binding shall be applied at a net dry weight of 750 pounds per acre. Cellulose fiber may be mixed with water. Mixture shall contain maximum of 50 pounds of cellulose fiber per 100 gallons of water.
- D. Mulch Netting: Stake light weight plastic netting over the mulch according to manufacturer's recommendations. Stakes shall be driven to ground level.

2.3 WATER

- A. Suitable quality for irrigation.

2.4 EROSION CONTROL MATERIAL

- A. Specified in Section 312500.
- B. Net: Heavy, twisted jute mesh, plastic mesh, biodegradable paper fabric with knitted yarns, or standard weave burlap.

2.5 TOPSOIL

- A. Topsoil:
 - 1. Containing organic matter as needed to support establishment of plants; minimum 5 percent and maximum 20 percent organic matter as determined by soil testing service. Maximum particle size, 3/4 inch, with maximum 3 percent retained on 1/4 inch screen.
 - 2. Component Percentages:

- a. Silt: 25 to 50
- b. Clay: 10 to 30
- c. Sand: 20 to 30
- d. pH: 5.5 to 7.6

2.6 pH ADJUSTERS

- A. Lime:
 - 1. Material: ASTM C 602, Class T, agricultural commercial grade ground limestone containing not less than 50 percent of total oxides.
 - 2. Gradation: Minimum 75 percent passing 100 mesh sieve and 100 percent passing 20 mesh sieve.

2.7 FERTILIZER

- A. Bonemeal: Commercial, raw, finely ground; minimum 4 percent nitrogen and 20 percent phosphoric acid.
- B. Superphosphate: Commercial-Grade complete fertilizer of neutral character consisting of fast-and-slow-release nitrogen, 50 percent derived from natural organic sources of urea-form, phosphorous, and potassium in following composition:

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, and conditions are as required, and ready to receive Work.
- C. Report in writing to Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION OF SUBSOIL

- A. Prepare subsoil to eliminate uneven areas and low spots. Maintain lines, levels, profiles, and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds, and undesirable plants and their roots. Remove contaminated subsoil.
- C. Scarify subsoil to a depth of 3 inches where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.
- D. Place topsoil as specified in Section 312000.

3.3 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's published instructions.
- B. Apply after smooth after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper 2 inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.
- F. No chemical fertilizers.

3.4 SEEDING

- A. Sow one-half of seed in one direction and remainder at right angles to first sowing.
- B. Cover seed to average depth of 1/2 inch by means of spike-tooth harrow, cultipacker, or other recommended device.
- C. Rolling:
 - 1. Immediately after seeding, firm entire area except for slopes in excess of 3 to 1 with a roller not exceeding 90 pounds for each foot of roller width.
 - 2. If seeding is performed with cultipacker-type seeder or hydroseeding, rolling may be eliminated.
- D. Erosion Control Material: Install in accordance with manufacturer's instructions.

3.5 CLEANING AND PROTECTION

- A. Remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto surface of roads, walks, or other paved areas.
- B. Immediately after seeding, sodding or sprigging, protect the area against traffic or other use.
- C. Restore existing lawn and grass areas which have been damaged during execution of this work to original condition.

3.6 ESTABLISHMENT PERIOD

- A. Definitions:
 - 1. Lawns and grasses establishment period will be in effect until lawns and grasses have been mowed 3 times.
 - 2. Stand of lawn and grass is 95 percent ground cover of established species.

3.7 FINAL INSPECTION AND ACCEPTANCE

- A. Final Inspection and Acceptance:

1. Final inspection will be made upon written request from the Contractor at least 10 days prior to last day of lawn and grasses establishment period.
- B. Replanting: Replant areas which do not have a satisfactory stand of lawns and grasses.
- C. Contractor is to maintain lawns and grasses for one year from completion.

END OF SECTION

SECTION 331100

WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Domestic water system pipe and fittings.
 - 2. Connection of domestic water system to municipal water system.
 - 3. Fire protection water system pipe, fittings, valves, and hydrants.
 - 4. Connection of fire protection water system to municipal water system.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. University of Rhode Island Water Distribution Regulations.
- D. Related Sections:
 - 1. Section 312300 - Excavation and Fill: Earthwork for utilities.
 - 2. Section 033000 - Cast-In-Place Concrete: Concrete for thrust blocks.

1.2 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
 - 1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
 - 2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM B 88 - Specification for Seamless Copper water Tube.
 - 2. ASTM D 1785 - Specification for Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120.
 - 3. ASTM D 2241 - Specification for Polyvinyl Chloride (PVC) Pressure Rated Pipe (SDR Series).
 - 4. ASTM D 3034 - Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - 5. ASTM D 3139 - Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.
- C. American Water Works Association (AWWA):
 - 1. AWWA C 110 - Gray-Iron Fittings, 3 inches Through 48 Inches, for Water and Other Liquids.
 - 2. AWWA C 111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - 3. AWWA C 151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
 - 4. AWWA C 504 - Rubber Seated Butterfly Valves.
 - 5. AWWA C 509 - Resilient Seated Gate Valves 3 inch through 12 inch NPS, for Water and Sewage Systems.
 - 6. AWWA C 600 - Installation of Ductile-Iron Water Mains and Appurtenances.
 - 7. AWWA C 900 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 inch through 12 inch, for Water.

1.3 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals
Product Data: Data for each type of pipe, pipe fitting, valve and accessory specified.
- B. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following:
 - a. Locations of piping mains, valves, connections, and top of pipe elevations.
 - b. Identify and describe unexpected variations to subsoil conditions and location of uncharted utilities.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Perform work in accordance with utility company requirements and local authority having jurisdiction requirements.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver and store valves in shipping containers with labeling in place.

PART 2 - PRODUCTS

2.1 PIPE

- A. Pipe sizes less than 3 inch that are installed below grade and outside shall be Seamless Copper Tubing: Type "K" soft copper to comply with ASTM B 88 latest edition and installed with wrought copper (95-5 Tin Antimony solder joint) fittings in accordance with ASME B16.22.
- B. Pipe sizes 3 inch and larger that are installed below grade and outside building shall comply with one of the following:
 - 1. Ductile Iron Water Pipe: In accordance with AWWA C 151, Fittings shall be either mechanical joint or push-on joint complying with AWWA C 110 or AWWA C-111 (CLASS 50).

2.2 GATE VALVES - 2 Inches and Larger

- A. Manufacturers: Mueller Resilient Seat Gate Valves.
- B. AWWA C509, Iron body, bronze mounted double disc, parallel seat type, non-rising stem with square nut, single wedge, resilient seat, flanged or mechanical joint ends, control rod, post indicator where indicated on Drawings, extension box and valve key.

- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.3 BALL VALVES - 2 Inches and Smaller

- A. Manufacturers: Mueller Oriseal.
- B. Brass body, Teflon coated brass ball, rubber seats and stem seals, Tee stem pre-drilled for control rod, AWWA compression inlet end, compression outlet with electrical ground connector, with control rod, extension box and valve key.
- C. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

2.4 BUTTERFLY VALVES - 2 inches to 24 inches

- A. AWWA C504, iron body, bronze disc, resilient replaceable seat, water or lug ends, infinite position lever handle.

2.5 ACCESSORIES

- A. Concrete for Thrust Blocks: Section 033000. Place thrust blocking consisting of 2,500 psi concrete to provide sufficient bearing area to transmit unbalanced thrust from bends, tees, caps, or plugs to undisturbed soil without loading undisturbed soil in excess of 2,500 pounds per square foot when water main pressure is 100 psi.

MINIMUM THRUST BLOCKING BEARING AREAS

Pipe Diameter	Tees Sq. Ft.	90° Bend Sq. Ft.	45° Bend Sq. Ft.	22° Bend Sq. Ft.	11° Bend Sq. Ft.
3"	1.0	1.0	1.0	1.0	1.0
4"	1.0	1.0	1.0	1.0	1.0
6"	1.5	2.0	1.0	1.0	1.0
8"	2.5	3.5	1.8	1.0	1.0

- B. Locked Mechanical Joint fittings shall be installed where vertical changes in direction are required and, if approved by Owner, can be installed in lieu of the above thrust blocking requirements.
- C. Trace Wire: Magnetic detectable conductor, clear brightly colored plastic covered, imprinted with "DOMESTIC WATER SERVICE" in large letters.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 1. Verify trench cut, excavations, dimensions, and elevations are as indicated on Drawings.

- C. Report in writing to Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.
- B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.
- C. Cut pipe ends square, ream pipe and tube ends and remove burrs.
- D. Remove scale and dirt, on inside and outside, before assembly.
- E. Prepare pipe for connections to equipment with flanges or unions.

3.3 BEDDING

- A. Excavate pipe trench and place bedding material in accordance with Section 312300 for work of this Section. Provide trench wall shoring as required.
- B. Form and place concrete for pipe thrust restraints at any change of pipe direction and at fittings as indicated on Drawings. Place concrete to permit full access to pipe and pipe accessories. Provide thrust restraint bearing on subsoil per schedule on Drawings.
- C. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches compacted depth, each layer. Place compacted bedding material to elevation of paving subgrade as indicated on Drawings.
- D. Maintain optimum moisture content of bedding material to attain required compaction density.
- E. Remove excess backfill and excavated material from site.

3.4 INSTALLATION - PIPE AND FITTINGS

- A. Maintain separation of water main from sanitary and storm sewer piping in accordance with state or local code.
- B. Install pipe and fittings in accordance with AWWA C600.
- C. Install pipe to allow for expansion and contraction without stressing pipe or joints or as specified by pipe manufacturer.
- D. Install access fittings in accordance with local codes to permit disinfection of water system performed under this Section.

- E. Connections with Existing Pipelines: Where connections are made between new work and existing piping, make connection using suitable fittings for conditions encountered. Make each connection with existing pipe at time and under conditions which least interfere with operation of existing pipeline and in compliance with the local utility company.
- F. Form and place concrete for thrust blocks or other specified methods of retainage at each change of direction or end of pipe main.
- G. Establish elevations of buried piping in accordance with Section 312300 for work in this Section.
- H. Backfill trench in accordance with Section 312300.
- I. Install trace wire continuous buried 10 inches below finish grade, above pipe line. Trace wire shall be in accordance with local utilities standards.

3.5 INSTALLATION - VALVES AND HYDRANTS

- A. Install gate valves as indicated on Drawings and supported on concrete pads with valve stem vertical and plumb. Install valve boxes in a manner that will not transmit loads, stress, or shock to valve body. Center valve box over operating nut of valve vertical and plumb. Securely fit valve box together leaving cover flush with finished surface.

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Disinfect distribution system with chlorine before acceptance for domestic operation. Amount of chlorine shall be such as to provide dosage of not less than 50 parts/million. Thoroughly flush lines before introduction of chlorinating materials and after contact period of not less than 24 hours, system shall be flushed with clean water until residual chlorine content is not greater than 1.0 part/million. Open and close valves in lines being disinfected several times during contact period. After disinfection, take water sample and bacteriological test in accordance with AWWA specifications. Do not place distribution system in service until approval is obtained from applicable governing authorities.

3.7 SERVICE CONNECTIONS

- A. Provide water service connection in compliance with utility company requirements including reduced pressure backflow preventer if required and water meter with by-pass valves and sand strainer.

3.8 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. Site Tests:
 - 1. Compaction:
 - a. Perform inspections prior to and immediately after placing bedding.
 - b. Perform tests as specified in Section 312300.
 - 2. Piping: Water distribution system pipe installed below grade and outside building shall be tested in accordance with following procedures:
 - a. Perform the testing of pipe materials, joints, and/or other materials incorporated into the construction of water mains and force mains to determine leakage and watertightness. All pressure pipeline shall be tested in accordance with Section 4 of AWWA C600 latest edition.

In the event any state or local code requires a more stringent test, the more stringent shall apply.

- b. Pressure Test: After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing and not less than 1.25 times the working pressure at the highest point along the test section.
- c. Leakage Test: The leakage test shall be conducted concurrently with the pressure test. Leakage is defined as the quantity of water that must be supplied into the newly laid pipeline, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipeline has been filled with water. Leakage shall not be measured by a drop in pressure in a test section over a period of time. No pipeline installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SDP}{133200}$$

L = allowable leakage, (gallons per hour)

S = length of pipe tested, (feet)

D = nominal diameter of pipe, (inches)

P = average test pressure during test, (psig)

- d. Visible Leakage: All visible leaks shall be repaired regardless of the amount of leakage.
- e. Acceptance of Installation: If any test of pipe laid in place discloses leakage greater than that specified, the Contractor shall, at his own expense, locate the leak and make repairs as necessary until the leakage is within the specified allowance. Contractor shall supply all water for testing at no additional cost to Owner.
- f. Provide one copy of results of meter test and hydrostatic pressure test to Owner and utility company upon completion of water distribution backfilling operations.

END OF SECTION

SECTION 334000

STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Site storm sewer drainage piping, fittings and accessories, and bedding.
 - 2. Catch basins, paved area drainage, site surface drainage, and storm water detention facilities.
- B. Related Documents: The Contract Documents, as defined in the General Conditions, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 312300 - Excavation and Fill: Earthwork for utilities.
 - 2. Section 334913- Storm Drainage Manholes, Frames, and Covers: Manholes, manhole lids, frames, and accessories.
 - 3. Section 033000 - Cast-In-Place Concrete: Concrete for catch basins, inlets, and junction boxes.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 760 - Standard Specification for Corrugated Steel Pipe, Metallic Coated for Sewers and Drains.
 - 2. ASTM C 12 - Practice for Installing Vitrified Clay Pipe Lines.
 - 3. ASTM C 76 - Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - 4. ASTM C 443 - Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
 - 5. ASTM D 2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
 - 6. ASTM D 3034 - Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings.
 - 7. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.3 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to start of backfill operations.

1.4 SUBMITTALS

- A. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
 - 1. Project Record Documents: Accurately record the following.
 - a. Actual locations of pipe runs, connections, manholes, catch basins, cleanouts, and invert elevations.
 - b. Identify and describe unexpected variations to subsoil conditions and location of uncharted utilities.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Conform to local Public Works Standard Specifications for materials and installation of the work of this Section.

PART 2 - PRODUCTS

- A. Reinforced Concrete Pipe:
 - 1. Pipe: ASTM C 76, Class III unless indicated otherwise on Drawings.
 - 2. Gaskets: ASTM C 443; rubber compression gaskets installed in accordance with manufacturer's published instructions.
- B. High-Density Polyethylene (HDPE) Pipe: (Perforated and Non-Perforated)
 - 1. Pipe: AASHTO M252, M294 & MP7-97 Type "S" (Corrugated Polyethylene Pipe).
 - a. Pipe shall have a smooth interior and a corrugated annular exterior.
 - b. Continuously mark pipe with manufacturer's name, pipe size and AASHTO classification.
 - c. Pipe shall be installed per manufacturer's recommendations.
 - d. Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
 - 1) Hancor, Findlay, OH (888) 367-7473: Sure-Lok F477.
 - 2) Section 016000 - Product Requirements: Product options and substitutions. Substitutions: permitted.
 - 2. Joints: Pipe shall be joined with a bell and spigot joint incorporating ASTM F477 gasket material insuring a leak resistant performance.
- C. Ductile Iron Pipe:
 - 1. Ductile Iron: In accordance with AWWA C 151, Fittings shall be either mechanical joint or push-on joint complying with AWWA C 110 or AWWA C-111 (CLASS 50).

2.2 INLETS, CATCH BASINS AND JUNCTION BOXES

- A. Lid and Frame: Cast iron as indicated on Drawings.
- B. Structure: As indicated on Drawings.
- C. Concrete: Specified in Section 033000.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that survey benchmark and intended elevations for the Work are as indicated on Drawings.
 - 2. Verify that trench cut and excavation is ready to receive Work and excavations, dimensions, and elevations are as indicated on Drawings.

- C. Report in writing to Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.
- B. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.3 BEDDING

- A. Excavate pipe trench as specified in Section 312300. Hand trim excavation for accurate placement of pipe to elevations indicated.
- B. Place bedding material at trench bottom, level materials in continuous layers not exceeding 6 inches compacted depth, each layer. Place compacted bedding material to elevation of paving subgrade as indicated on Drawings.
- C. Maintain optimum moisture content of bedding material to attain required compaction density.
- D. Remove excess backfill and excavated material from site.

3.4 INSTALLATION - PIPE

- A. Install pipe, fittings, and accessories in accordance with ASTM C 12, ASTM D 2321 or manufacturer's published instructions, and state or local requirements. Seal joints watertight.
- B. Install pipe on minimum 4 inch bedding as specified in Section 312300.
- C. Lay pipe to slope gradients indicated on Drawings.
- D. Install aggregate at sides and over top of pipe. Provide top cover to minimum compacted thickness equal to paving subgrade indicated on Drawings.
- E. Refer to Section 312300 for trenching requirements. Do not displace or damage pipe when compacting.
- F. Refer to Section 334913 for manhole requirements.
- G. Connect to municipal storm sewer systems, manholes, and inlets as indicated on Drawings.

3.5 INSTALLATION - CATCH BASINS, INLETS, AND JUNCTION BOXES

- A. Form bottom of excavation clean and smooth to elevation indicated on Drawings.
- B. Form and place cast-in-place concrete base pad, with provision for storm sewer pipe to be placed at required elevations.

- C. Form and place cast-in-place concrete walls, sleeved at required elevation, to receive storm sewer pipe as indicated on Drawings.
- D. Form and place cast-in-place top of structure as indicated on Drawings.
- E. Mount grate and frame level, in grout, secured to top section at elevation indicated.

3.6 CONSTRUCTION

- A. Interface with Other work: Coordinate the Work with termination of storm sewer connection outside building including connection to municipal storm sewer system.

3.7 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspection and testing.
- B. Site Tests:
 - 1. Perform inspections prior to and immediately after placing bedding.
 - 2. Compaction: Specified in Section 312300.
 - 3. Perform the following tests in accordance with applicable local Public Works Department Standard Specifications and requirements.
 - a. Pressure Test.
 - b. Infiltration Test.

END OF SECTION

SECTION 334913

STORM DRAINAGE MANHOLES, FRAMES, AND COVERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Monolithic concrete manhole section with the option of monolithic concrete or masonry transition to lid frame, covers, anchorage and accessories.
 - 2. Modular precast concrete manhole section with tongue-and-groove joints and with the option of precast concrete or masonry transition to lid frame, covers, anchorage and accessories.
 - 3. Masonry manhole section with masonry transition to lid frame, covers, anchorage and accessories.
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 312300 - Excavation and Fill: Earthwork for utilities.
 - 2. Section 334000 - Storm Drainage Utilities: Site storm drainage system.
 - 3. Section 033000 - Cast-In-Place Concrete: Concrete for utility structure base pads.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C55 - Specification for Concrete Building Brick.
 - 2. ASTM A48 - Specification for Gray Iron Castings.
 - 3. ASTM C478 - Specification for Precast Reinforced Concrete Manhole Sections.
 - 4. ASTM C923 - Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.
- B. International Masonry Industry All-Weather Council (IMIAC): Recommended Practices and Guide Specification for Cold Weather Masonry Construction.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Data for manhole covers, manhole steps, component construction, features, configuration, and dimensions.
 - 2. Shop Drawings: Drawings of manhole locations, elevations, piping with sizes, locations and elevations of penetrations.

1.4 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements:
 - 1. Cold Weather Requirements: IMIAC - Recommended Practices and Specifications for Cold Weather Masonry Construction.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Manhole Section: Reinforced precast concrete. in accordance with ASTM C 478 with gaskets in accordance with ASTM C 923.
 - 1. Construct manholes of precast concrete sections as required by Drawings to size, shape, and depth indicated, but never less than 4 foot 0 inch inside diameter.
- B. Manhole Section: Non-reinforced cast-in-place concrete as specified in Section 033000 -- Cast-In-Place Concrete.
 - 1. Cast-in place Manholes shall be constructed of 3500 psi concrete.
 - 2. Forms shall be made of steel sheets accurately shaped and fabricated of sufficient strength to form dense watertight walls to true dimensions.
 - 3. Concrete shall be deposited in evenly distributed layers of about 18 inches, with each layer vibrated to bond it to the preceding layer.
- C. Concrete Brick Units: ASTM C 55, Grade N Type I- Moisture Controlled, normal weight, of same Grade, Type and weight as block units, nominal modular size of 3 5/8 x 7 5/8 x 2 1/4 inches.
- D. Mortar and Grout: Mortar for finishing and sealing shall be Class "C". Honeycombing less than 2 inches deep shall be repaired using Class "D" mortar.
- E. Brick Transition Reinforcement: Formed steel 8 gage wire with galvanized finish.

2.2 COMPONENTS

- A. Lid and Frame: ASTM A 48, Class 30B Heavy Duty Cast iron construction, machined flat bearing surface, removable lid, closed or open as indicated on Drawings; sealing gasket; manufactured by Neenah Foundry Company.
- B. Manhole Steps: Neenah Foundry Company catalog No. R- 1982-F for precast or catalog No. R-1980-0 for brick/cast-in-place manholes or M.A. Industries PS-1.
- C. Base Pad: Cast-in-place concrete as specified in Section 033000 - Cast-In-Place Concrete.
- D. Section 016000 - Product Requirements: Product requirements and substitutions. Substitutions: Permitted.

2.3 CONFIGURATION

- A. Manhole Section Construction: Concentric with eccentric cone top section.
- B. Shape: Cylindrical.
- C. Clear Inside Dimensions: 48 inch diameter or as indicated on Drawings.
- D. Design Depth: As indicated on Drawings.
- E. Clear Lid Opening: 24 inches minimum.

- F. Pipe Entry: Provide openings as indicated on Drawings.
- G. Main and Lateral Pipes: Neatly cut off main and lateral pipes flush with inside of manhole or inlet where they enter structure walls, and point up irregularities and rough edges with nonshrinking grout.
- H. Inverts: Shape inverts for smooth flow across structure floor as shown on Drawings. Use concrete and mortar to obtain proper grade and contour and finish surface with fine textured wood float.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION

- A. Coordinate placement of inlet and outlet pipe or duct sleeves as indicated on Drawings for drainage system piping specified in Section 334000.

3.3 PLACING PRE-CAST MANHOLE SECTIONS

- A. Place base pad to proper elevation and location and trowel top surface level for placement of manhole section.
- B. Place manhole section plumb and level to correct elevations and anchor to base pad.
 - 1. After completion of slab foundation, the first joint of manhole section shall be lowered into position, grooved end first, and set level and plumb on concrete base. Align and adjust to proper grade prior to placing and forming invert which shall be poured immediately after setting of first section of manhole section.
 - 2. Prior to setting subsequent manhole sections, apply primer to tongue and groove ends and allow to set in accordance with manufacturer recommendations. Place "Ram-nek", or equivalent, plastic rope on tongue end. Lower next section into position, and remove excess material from interior of structure. Add additional material on exterior of joint, if necessary, for completely watertight joint.

3.4 FILLING

- A. Backfill around manholes as specified in Section 312300.

END OF SECTION

334913 - 3

Date: 1/2019

STORM DRAINAGE MANHOLES,
FRAMES, AND COVERS

SECTION 338010
FOOTBALL GOAL POST

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. College Football Goal Post Materials and Installation
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 331100 -Water Distribution System: Fire protection and hydrant connection.
 - 2. Section 033000 -Cast in Place Concrete: Concrete forms
 - 3. Section 312300- Excavation and Fill: Goal post Installation

1.2 REFERENCES

- A. International Association of Athletics Federations (IAAF)
- B. National Collegiate Athletic Association (NCAA)
- C. National Football League (NFL)
- D. American Sports Builders Association (ASBA)
- E. Manufacturer's Data and Recommended Installation Requirements

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Submit product data for selected goal post
 - 2. Shop Drawings: Include drawings of the manufacturers recommended installation and foundation requirements.
 - 3. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
 - 4. Foundation: Design certified by registered professional engineer in the State of Rhode Island

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
- B. Manufacturers warranties shall pass to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Materials delivered to the site shall be examined for damage or defects in shipping. Any defects shall be noted and reported to the Owners representative. Replacements, if necessary, shall be immediately reordered, so as to minimize any conflict with the construction schedule. Sound materials shall be stored above ground under protective cover or indoors so as to provide proper protection.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials shall consist of GP830COL manufactured by Sportsfield Specialties Ground Sleeve Insert College Football Goal Post and Accessories or approved equal.

2.2 COMPONENTS

- A. Single Ground Sleeve Insert Gooseneck Support: Fabricated of 6" Schedule 40 Aluminum Pipe (6.625" O.D.), 5' Radius, 8' Offset.
- B. Ground Sleeve: Fabricated of 8" Schedule 40 Steel Pipe (8" I.D.) Length: 60"
- C. Crossbar: Fabricated of 6" Schedule 40 Aluminum Pipe (6.625" O.D.) Length: 18'-6" – College Includes AdjustRight® feature allowing for installation through the adjustment of an internal locking rotating sleeve at both the gooseneck/crossbar and upright/crossbar connections. This adjustment can be repeated throughout the life of the football goal post ensuring proper alignment of all components.
- D. Uprights: Fabricated of Extruded 6061-T6 Aluminum Tube (4" O.D.) with Rigid Wire Loop Welded to Upper End. Length: 30'
- E. Powder Coated Finish: Yellow
- F. Installation Package consisting of the Following Components:
 - 1. Ground Sleeve
 - 2. Access Frame Kit: 1/8" (0.125") Aluminum Construction with 1" PVC Drain Stub, Includes Two (2) Half Moon Filler Plugs.
- G. Included Accessories:
 - 1. Directional Wind Flags
 - 2. Touch-up Paint (Powder Coat Finish Specific)
 - 3. Model Specific Hardware Kit and Installation Instructions

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Foundation and Ground Sleeve Installation
 - 1. Locate the ground sleeve and follow manufacturers instruction on proper distance and alignment.
 - 2. Excavate for the footing and set concrete forms.
 - 3. Center the ground sleeve in the form securing it in a plumb position. The upper slots of the ground sleeve must run parallel with the end goal line to align bolts.
 - 4. The top of the ground sleeve must be set 4" below finished grade.
 - 5. Fill the form with concrete to 9¾" below finished grade.
- B. Access Frame Kit Installation
 - 1. Pre-install the four 3/8-16 anchor bolts in the bottom aluminum flange of the access frame with the heads down.
 - 2. Face the drain fitting towards the nearest drainage field, the crushed stone under the field shall act as the drainage field. If there is inadequate alignment to reach the drainage field attach a 1" drain

- line to the drain fitting and bed the other end to the nearest drainage field. The box should be installed parallel to the end line. The centerline through any of the riv-nuts should also run parallel with the end line.
3. Install the access frame centered on the foundation by pushing the anchor bolts down into the wet concrete. The bottom face of the flange should be flush with the concrete surface. When complete, the top edge of the access frame should be flush with the top of subgrade material.
 4. Allow the concrete to cure before installing the football goal post.
- C. Covering access Frame Kit and Filler Plugs
1. Once the access frame has been mounted to the concrete foundation and the subgrade material has been compacted, the synthetic infill turf can be cut and secured to the provided infill turf attachment ledge. Use manufacturer recommended synthetic turf attachment adhesive or approved mechanical fastener and nailer board. (The access cover is available pre-covered in synthetic turf).
 2. Repeat (1) for the three remaining sides of the access frame.
 3. To cover the filler plugs spread manufacturer recommended turf adhesive over the entire aluminum surface and adhere to synthetic turf.
 4. Once the adhesive has cured and the synthetic turf is secure turn the filler plug over so the bottom is facing up. Using a sharp punch, perforate the synthetic turf backing through the factory provided 3/8" diameter holes in the aluminum for surface draining purposes.
 5. Turn the filler plug upright and distribute the infill material evenly up to the top edge of the rubber gasket.
 6. Repeat this procedure for the remaining filler plug. (The filler plugs are available pre-covered in synthetic turf).
- D. Installing the Goal Post
1. Install upper and lower centering hardware prior to installing gooseneck into the ground sleeve.
 2. Attach the 2" riser to the gooseneck.
 3. Slide the gooseneck into the ground sleeve and hand tighten upper hardware.
 4. Install the directional flags onto the upright per using the hardware.
 5. Insert the crossbar into the gooseneck rotated to facilitate upright installation. Do not install any hardware to the crossbar until the upright position process is complete. Install both the upright hardware and the AdjustRight hardware. Install the uprights onto the stub using the 1/4" serrated flange hex bolts. Tighten the hardware connecting the upright to the stub.
 6. After assembly of the first upright, rotate the crossbar to the opposite side to install the remaining upright. Follow the previous instruction to install the remaining upright. After both uprights are installed, rotate the assembly to its final position.
 7. Attach the crossbar to the gooseneck with the 5/8" diameter bolts. Use a four foot level to ensure level installation and tighten the hardware.
 8. After verifying that the crossbar is level locate the pre-drilled 7/16" holes at the top and side of the crossbar/gooseneck connection. Tighten the 3/8" serrated flange hex bolts with hand tools or an electrical impact drive set at a maximum of 55 ft-lbs.
 9. Verify that the crossbar is parallel to the end line. Make adjustment at the ground sleeve is necessary. Once properly positioned tighten the hardware.
 10. Position a four foot level vertically on the upright. Move the upright back and forth utilizing the AdjustRight stub adjustment feature until the upright is plumb and tighten the 3/8" serrated flange hex bolts by hand, ensuring upright position. Double check the upright for plumb and tighten the 3/8" serrated flange hex bolts with a hand torque wrench at 55 ft-lbs.

END OF SECTION

SECTION 338020
GOAL POST NETTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. 40' Football Ballstopper System Materials, Installation and Maintenance
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 338010- Football Goal Post: Affiliation
 - 2. Section 033000- Cast in Place Concrete: Concrete forms

1.2 REFERENCES

- A. International Association of Athletics Federations (IAAF)
- B. National Collegiate Athletic Association (NCAA)
- C. National Football League (NFL)
- D. American Sports Builders Association (ASBA)
- E. Manufacturer's Data and Recommended Installation Requirements

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Submit product data for selected goal post netting.
 - 2. Shop Drawings: Include drawings of the manufacturers recommended installation and foundation requirements.
 - 3. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
 - 4. Foundation: Design certified by a registered engineer in the State of Rhode Island.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
- B. Manufacturers warranties shall pass to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Materials delivered to the site shall be examined for damage or defects in shipping. Any defects shall be noted and reported to the Owners representative. Replacements, if necessary, shall be immediately reordered, so as to minimize any conflict with the construction schedule. Sound materials shall be stored above ground under protective cover or indoors so as to provide proper protection.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials shall consist of one 40' Football Ballstopper System manufactured by Aluminum Athletic Equipment Model No. FBS-40 or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Ground Sleeves Installation
 1. Locate proper location for placement of Goal Post Net. It's recommended to place the net 25 to 30' behind the goal post.
 2. Dig 36" diameter holes 50' apart on center and a minimum of 84" deep.
 3. Fill bottom of holes with 6" of crushed stone.
 4. Install 78" ground sleeves so that the top of the ground sleeves are 1/4" below ground level. Ensure they are plumb, level, centered, and that the stop bolt is at the bottom. Pour concrete all around the ground sleeves and do not get any concrete inside the ground sleeves. As the concrete cures ensure that the ground sleeves are plumb and level.
 5. Taper the concrete slightly away to allow any water to drain away from the sleeves.
- B. Left and Right End Post Installation
 1. Lower Collars
 - a. From bottom of pole slide the lower vertical cable collar, lower horizontal collar and the debris ring into position.
 - b. The lower most collar should be 60" from the end of post to allow proper insertion into the ground sleeve.
 - c. Before securing collars into place make sure to rotate the lower vertical collar approximately 40°.
 2. Cleat
 - a. Install cleat so that it is on the back side of the post and opposite of the net.
 - b. Screws will be inserted through the cleat and post and secured on the net side using flat washers, hex nuts and cap nuts.
 3. Mid Collar
 - a. From top of pole slide the open eyebolt collar into position and secure into place.
 4. Eyebolt
 - a. The pulley system comes pre-assembled to the eyebolt.
 - b. Install a washer on the eyebolt then insert the eyebolt with washer through the front side of the hole at the top of the post.
 - c. From the opposite side secure the eyebolt into place using a flat-washer and a self-locking hex nut.
 5. Upper Collar
 - a. From the top of the pole slide the upper vertical cable collar into position. The collar should rest on the eyebolt washers.
 - b. Before securing into place make sure to rotate the collar approximately 40°.

- C. Posts to Ground Sleeve Installation
 1. Ensure the concrete is fully cured before attempting to insert the assembled poles into the ground sleeves.
 2. Slowly lower the posts into the sleeves. Do not drop the post into the sleeve.
 3. Make sure the posts are oriented correctly. The pulley system should be towards the field of play and the cleat should be away from the field of play. All of the lower horizontal cable collars should face the field of play.
 4. Ensure the lower collars are properly oriented and secure them into place.
- D. Lower Horizontal Support Cable installation
 1. Refer to manufacturers collar assembly for further detail on collar and cable assembly
 2. Install crimped cable end to the right end post collar using an anchor shackle.
 3. Route the cable to the left end post. Snap the cable into pear clips of the inner posts along the way.
 4. Before assembling the clamped cable loop end fully open the turnbuckle.
 5. With the anchor shackle and thimble in place, run the cable through the shackle. Pull slack out of the cable and mark vinyl sleeve approximately 4" from the thimble end. Strip the vinyl from the mark location towards the cable loop end
 6. With slack still being pulled out of the cable, install and secure the cable clamps. The first clamp should butt unto the thimble. The second should be spaced approximately 1" on center from the first clamp. Cable clamps must be gripping bare cable to ensure proper seating and grip.
- E. Net Attachment Installation
 1. Lay the net on the ground across the span of the posts. Make sure the net is centered across the span.
 2. Using a pear clip secure the upper net corners to the end post vertical support cables.
 3. Secure the brass rings to the top of the net using cable clamps. One ring and clamp per post and they should be centered as close as possible to its coinciding post.
 4. After the brass rings have been secured to the net, clip the rings into its posts hoist system pear clip.
 5. As the net is being raised make sure to secure the net sides to the vertical support cables using the provided pear clips. The pear clips should be spaced approximately 12" or 9 net squared.
 6. Once the net has been completely raised tie the hoist ropes onto the cleats.

3.2 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.

3.3 PROTECTION

- A. Maintenance
 1. The net should only be raised when needed during games and practices. Do not leave the net up all the time.
 2. The net should be taken in and stored indoors during the off-season or if the system will not be used for an extended period of time.

END OF SECTION

SECTION 338030

INTEGRATED SPORTS TURF GROOMER

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. GreensGroomer® Materials and Installation
 - 2. GreensGroomer® Use and Maintenance
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

1.2 REFERENCES

- A. GreensGroomer®:
 - 1. GreensGroomer® Integrated Sports Turf Groomer specifications
 - 2. GreensGroomer® Integrated Sports Turf Groomer operating instructions

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Submit product data for selected turf groomer
 - 2. Shop Drawings: Include hardware
 - 3. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate certifying that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

1.4 QUALITY ASSURANCE

- A. Manufacturers warranties shall pass to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Materials delivered to the site shall be examined for damage or defects in shipping. Any defects shall be noted and reported to the Owners representative. Replacements, if necessary, shall be immediately reordered, so as to minimize any conflict with the construction schedule. Sound materials shall be stored above ground under protective cover or indoors so as to provide proper protection.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials shall consist of one GreensGroomer® Model #926 Integrated Sports Turf Groomer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set-up

1. Remove unit from crate and remove drawbar and drawbar packaging from the unit.
2. Attach the drawbar to the unit using the supplied hardware. Do not fully tighten the bolts at the frame.
3. Mount the two brushes using the supplied ½" drive lag bolts so the angles meet in the center creating a seamless brush pattern. Grease wheel bushings.

3.2 PREPARATION

A. Attachment

1. To tow with a vehicle, attach the drawbar to the hitch of the tow vehicle (a gas powered vehicle is preferred). Then attach the electric actuator cable to the 12 volt battery of the tow vehicle.
2. Fully retract the Spring Tine Rake and lower the unit completely down so the wheels are off the ground.
3. Loosen the lock nut on the carriage bolt that holds the curved height adjustment piece in place. Make sure that the brush is flat on the ground and tighten the nut.

B. Integrated Spring Tine Rake

1. Raise the unit slightly off the ground.
2. Loosen the three 9/16" hex nuts located below the blue handle and attached to the carriage bolts located in the guide slots.
3. Use the handle to slide the tine tubes to the desired position and then tighten.

C. Rear Brush Attachment

1. The brush adapter tabs go inside of the rear tabs of the unit.
2. Insert the hex bolt and tighten until snug but allow for some rotation.
3. Insert the carriage bolt and lock the washers. Tighten the carriage bolt only when the rear brush is in the desired position.

3.3 CONSTRUCTION

A. Grooming

1. Use the electric actuator to raise the wheels and thus lower the brushes.
2. Pull the brush at the appropriate speed (8-10mph) to agitate the infill material and stand up the turf fibers.

B. Raking

1. Slide the Spring Tine Rake into position before raising the wheels.
2. Pull the unit at the same speed as grooming (8-10mph)

3.4 PROTECTION

A. Maintenance

1. Do not store the unit on its brushes.
2. When not in use set the unit on the jack stand to prevent any weight from being placed on the brushes.
3. Grease wheel bushings at regular intervals. Tire pressure should be maintained at 15 lbs.

END OF SECTION

SECTION 338040

YARD HYDRANT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Hydrant Materials and Installation
 - 2. Hydrant Use and Maintenance
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 331100 -Water Distribution System: Fire protection and hydrant connection.

1.2 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Submit product data for selected yard hydrant
 - 2. Shop Drawings: Include drawings of the manufacturers recommended installation and foundation requirements.
 - 3. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
- B. Manufacturers warranties shall pass to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Materials delivered to the site shall be examined for damage or defects in shipping. Any defects shall be noted and reported to the Owners representative. Replacements, if necessary, shall be immediately reordered, so as to minimize any conflict with the construction schedule. Sound materials shall be stored above ground under protective cover or indoors so as to provide proper protection.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials shall consist of one Woodford® Freezeless IOWA Yard Hydrant with 4' bury depth or equivalent with all furnishings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Hydrant Installation
 1. Dig a hole approximately 2 feet in diameter and deeper than the bury depth.
 2. Flush gravel, debris, etc. out of the supply line before connecting hydrant
 3. Install hydrant with drain hole below frost line. Use wrenches on supply line fitting and brass valve body only.
 4. If supply line to the hydrant will not support the hydrant use rebar, a length of pipe or other suitable support driven in bottom of pit to help support the hydrant. Before backfilling turn on the water to ensure no leakage occurs.
 5. Create hydrant drain field:
 - a. Fill bottom of pit with ½" gravel to a minimum of 3" above the brass drain valve body.
 - b. Saturated ground in the hydrant drain field can prevent the hydrant from fully draining and may result in freezing. If the area is low lying or has a tendency to have standing water, a larger drain field or a pit may be required to provide the hydrant an adequate place to drain.

3.2 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field testing and inspection.
- B. If the handle does not snap closed approximately 3" from the head casting upon turning off the hydrant the hydrant may need a linkage and handle tension adjustment.
 1. Remove the lower link bolt that connects the lower link to the Clevis assembly.
 2. Loosen the set screw in the lower link.
 3. Lift the handle and disengage the Clevis assembly.
 4. Turn out the lower link (counterclockwise) to lengthen the Clevis assembly. Turn in (clockwise) to shorten the Clevis assembly.
 5. Tighten the set screw and install the lower link bolt.

END OF SECTION

SECTION 338045

UNDERGROUND HOSE REEL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Hose Reel Materials and Installation
 - 2. Hose Reel Operation and Maintenance
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Related Sections:
 - 1. Section 331100 -Water Distribution System: Reel Connection

1.2 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data: Submit product data for selected hose reel.
 - 2. Shop Drawings: Include any relevant shop drawings pertaining to the selected hose reel.
 - 3. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
- B. Manufacturers warranties shall pass to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Materials delivered to the site shall be examined for damage or defects in shipping. Any defects shall be noted and reported to the Owners representative. Replacements, if necessary, shall be immediately reordered, so as to minimize any conflict with the construction schedule. Sound materials shall be stored above ground under protective cover or indoors so as to provide proper protection.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials shall consist of one DGM Underground Hose Reel manufactured by Reelcraft Model # DGM 85100 OLP or approved equal.

PART 3 - EXECUTION

3.1 PREPERATION

- A. Hose Reel
 1. Determine location for the underground reel per plan.
 2. Place 12" of drainage stone on the bottom of the hole. The reel will be damaged without proper drainage.
 3. Verify that the U-bolt is located in the correct position, closest to the hose opening in the sheave.

3.2 INSTALLATION

- A. Hose Reel
 1. Place reel in hole and level. Compare the height of the riser opening with the finished grade; the top of the riser should be at grade level. Add or remove stone to adjust height.
 2. Ensure the supply line pressure does not exceed the maximum working pressure of the reel. Apply thread sealant to all pipe threaded connections and do not over tighten the connection. The top cover may be removed for access to the inlet hose of the reel. A hole may be cut in the reel case at any convenient point to route the hose or pipe. Seal the hole with silicon or similar sealant after the hose or pipe has been connected. A shut off valve is recommended in the supply line in case of servicing.
 3. Ensure the reel works properly. Pull out the hose all the way and make sure the reel can be latched and unlatched.
 4. Connect the reel to the water line. Use the supplied connection hose to connect the reel to the water supply. Do not use rigid plumbing for the connection.
 5. Check the system for leaks. If none backfill the hole with drainage stone to the anti-flotation ring located at the center of the case.
 6. Replace the cover and backfill the rest of the hole with loam. Replace landscaping.

3.3 OPERATION

- A. Hose Reel
 1. Turn the cover until the notches in both the cover and riser line up.
 2. Pull up on the cover to remove. Pull hose out any desired length.
 3. After use pull or carry all of the hose back to the reel opening.
 4. Feed the hose into the reel carefully to prevent the hose from piling up in the center of the reel.

3.4 FIELD QUALITY CONTROL

- A. Hose Reel adjustment
 1. Add or remove wraps of hose from spool one wrap at a time until desired tension is obtained.
 2. Manually add wraps to increase tension; remove wraps to decrease tension.

3.5 PROTECTION

- A. Maintenance
 - 1. Hose Replacement
 - a. Shut off inlet water supply and bleed pressure from hose.
 - b. Pull all of the main hose out of the opening, the main hose is connected to the leader hose with a threaded fitting.
 - c. Pull the leader hose out just until the threaded fitting is accessible and engage the latch mechanism.
 - d. Remove the main hose by unthreading the connection.
 - e. Attach the replacement hose to the leader hose.
 - f. Turn on water supply to check for leaks. If leaks are found tighten the threaded connection.
 - 2. Reel Removal
 - a. Shut off the water supply and bleed pressure from the hose.
 - b. Remove landscaping from the cover of the reel vault.
 - c. Remove cover screws and the cover.
 - d. Remove the eight bolts from the cross rails.
 - e. Slide reel to permit access to the inlet hose. Remove the inlet hose.
 - f. Pull reel vertically out of the vault.
 - 3. Reel Replacement
 - a. Remove landscaping and reel cover.
 - b. Lower reel into vault and slide to the side to allow access to the inlet hose.
 - c. Connect the inlet hose using thread sealant.
 - d. Position the reel so it is centered in the vault and the mounting holes align.
 - e. Secure with at least 4 bolts.

END OF SECTION

SECTION 338060

MODULAR BLOCK WALL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Modular block wall
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Rhode Island Department of Transportation (RIDOT), Standard Specifications for Road and Bridge Construction, (amended August 2013, including all subsequently issued supplements, revisions, and addenda), hereinafter referred to as the "RIDOT Standard Specifications.", <http://www.dot.ri.gov/business/bluebook.php>

1.2 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Shop Drawings:
 - a. Modular Block Wall Materials
 - b. Form liner Face Sample
 - c. Design Computations
 - d. Color Sample
 - 2. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
 - c. Wall design computations shall be certified by a Professional Engineer registered in the State of Rhode Island.
 - 3. Special Warranty: Submit written special warranty with forms completed in Owners name and registered with manufacturer.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

- B. Pre-Installation Meetings:
 - 1. Convene a pre-installation meeting one week prior to commencing Work of this Section.
 - 2. Require attendance of parties directly affecting Work of this Section.
 - 3. Review conditions of operations, procedures and coordination with related Work.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products in accordance with manufacturer recommendations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Wall shall be Redi-Rock of Charlexvoix, MI conforming to ASTM C-1776 or approved equal.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- C. Wall shall be designed by Manufacturer assuming a surcharge load of 250 psf behind the wall and shall be based on a soil phi angle of 28 degrees and a bearing capacity of 2000 psf.
- D. Geogrid reinforcing shall be determined by the manufacturer.
- E. Form liner for face of exposed blocks shall be "Kingstone".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION & CONSTRUCTION

- A. Wall shall be installed in accordance with the RIDOT Standard Specifications and manufacturers recommendations.

END OF SECTION

SECTION 338070

EXISTING WALL RESTORATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Restoration of Existing Split Face Concrete Modular Wall (CMU)
 - 2. Restoration of Existing Concrete Retaining Wall
- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- C. Rhode Island Department of Transportation (RIDOT), Standard Specifications for Road and Bridge Construction, (amended August 2013, including all subsequently issued supplements, revisions, and addenda), hereinafter referred to as the "RIDOT Standard Specifications.", <http://www.dot.ri.gov/business/bluebook.php>

1.2 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Shop Drawings:
 - a. Crack and Joint Materials
 - b. Concrete Sealant
 - c. Color Samples for Concrete and CMU Walls
 - 2. Assurance/Control Submittals:
 - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.
 - b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.
 - 3. Special Warranty: Submit written special warranty with forms completed in Owners name and registered with manufacturer.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
- B. Pre-Installation Meetings:
 - 1. Convene a pre-installation meeting one week prior to commencing Work of this Section.

2. Require attendance of parties directly affecting Work of this Section.
3. Review conditions of operations, procedures and coordination with related Work.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products in accordance with manufacturer recommendations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Cleaned existing Concrete and CMU walls shall be sealed with Sherwin Williams H&C Colortop Solvent Based Color Concrete sealer, or equal. Color of concrete wall will be different from CMU wall. Colors shall be submitted for review and approval by owner.
- B. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Owner prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

3.2 PREPARATION & CONSTRUCTION

- A. Existing exposed surfaces of Concrete and CMU walls shall be cleaned in accordance with Section 820.0200 of the RIDOT Standard Specifications, and shall have cracks repaired in accordance with Section 836 of the RIDOT Standard Specifications.
- B. Existing exposed surfaces of Concrete walls shall have spalls repaired using patching mortar in accordance with Section 817 of the RIDOT Standard Specifications.
- C. After structural repairs are made all exposed surfaces shall be sealed with Sherwin Williams H&C Colortop Solvent Based Color Concrete sealer, or equal. Color of concrete wall will be different from CMU wall. Colors shall be determined by owner.

END OF SECTION

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Date: 1/2019

EXISTING WALL RESTORATION

SECTION 260500 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Work that applies to all sections of DIVISION 26
 - 2. Supporting devices for electrical components
 - 3. Electrical services
 - 4. Concrete bases
 - 5. Removals (demolition) and relocations

1.2 RELATED DOCUMENTS

- A. The General Conditions, Supplementary Conditions, and applicable portions of Division 1 of the specification are part of this section which shall consist of all labor, equipment, materials and other costs necessary to complete all **BASIC ELECTRICAL MATERIALS AND METHODS** work indicated on the drawings, herein specified or both.

1.3 RELATED WORK SPECIFIED UNDER OTHER SECTIONS: (Read these DIVISIONS carefully. For purposes of bidding, assume that all work of the DIVISION referenced is to be performed under that DIVISION unless specifically indicated therein to be performed under the ELECTRICAL DIVISION.)

- A. Excavation and backfilling - see DIVISION 31.
- B. Concrete - see DIVISION 03.

1.4 DEFINITIONS

- A. Provide: Furnish and install.
- B. Wiring: Wire, raceways, boxes and fittings.

1.5 SUBMITTALS

- A. Product Data: For each product indicated
- B. Shop Drawings: Wiring and connection diagrams
- C. Manufacturers: Where the drawings or specifications list specific brands or catalog numbers, only these products may be used unless the words: “or approved equal” or “but are not limited to” are included.

- D. Limitations of approval: The Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Engineer's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Engineer in writing of such deviation, in a separate cover letter on Contractor's letterhead, at the time of submittal and the Engineer has given written approval to the specific deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Engineer's approval thereof.
- E. Contractor's responsibility: It is the responsibility of the Contractor to check all dimensions and details on shop drawings, before submission to the Engineer, reject same if necessary and only forward to the Engineer shop drawings which he is reasonably certain fulfill the requirements of the contract documents and the work. The approval of shop drawings by the Engineer shall be general only in character and not mean dimensions on drawings have been checked, and will in no way relieve the Contractor of the responsibility for proper fitting and construction of the work, nor from the necessity of furnishing materials or doing the work required by the drawings and/or specifications, which may not be indicated on the shop drawings when approved. All shop drawings shall be checked by the Contractor, and must bear the Contractor's stamp of approval; drawings submitted without this stamp of approval will not be considered.
- F. Samples: Provide all samples requested by the Engineer.
- G. Tests: Test the complete installation to prove it free from shorts, grounds, opens and faulty connections. Make any corrections necessary before acceptance.
1. Test each function of each system including each device.
- H. Fault Current/Arc Flash/Coordination Study: Provide a "Fault Current", "Arc Flash" and "Coordination Study" for the electrical distribution equipment for this project. Submit as part of the shop drawing review.
- I. Certification: Upon request, provide "Certification" (by a recognized testing agency or a Professional Engineer registered in the state where the project is located) that submitted items of equipment are suitable for their intended use.
- J. Record of Addenda and Change Orders: To avoid overlooking addenda and change order modifications, mark all changes on all copies of drawings and specifications, in a manner acceptable to the Engineer. One method of accomplishing this is to make copies and tape them on the back of the preceding page (tape all edges). Also, circle the changed area and note: see addenda #1, etc. If whole pages or sheets change, either remove the superseded document or put a bold "X" through it.
- K. Record Drawings: Owner's record drawings shall be updated as the project progresses. Maintain documents in a safe, dry location. Indicate clearly and accurately any changes necessitated by field conditions and dimension all raceways built into or under concrete slabs or buried under ground. Contractor to prepare as-built drawings in CAD format at contractor's expense. Contract drawings in CAD format to be furnished to contractor at no cost to contractor. Contractor to provide two compact discs and two hard copies of final as-built drawings.
- L. Operating Instructions and Manuals: Provide the Owner or his representative with complete operating instructions by qualified personnel of all electrical systems. Provide three (3) bound

2. NECA 101-2001 Standard for Installing Steel Conduit (Rigid, EMT)
3. NECA 400-1998 Recommended Practice for Installing and Maintaining Switchboards
4. NECA/IESNA 500-1998 Recommended Practice for Installing Indoor Commercial Lighting Systems

1.7 COORDINATION

- A. Coordinate chases, slots, inserts, sleeves, and openings for electrical supports, raceways, and cable with general construction work.
- B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment that requires positioning before closing in the building.
- C. Coordinate electrical service connections to components furnished by utility companies.

1.8 SCHEDULING AND SHUTDOWNS:

- A. All work must be scheduled to allow the least interference with the normal operation of the existing facility. Schedule must be arranged to meet the approval of the Owner. All shutdowns of services (power, fire alarm, telephone, etc.) must be approved in writing by the Owner.
- B. All "shutdowns" must be done at other than normal working hours without additional compensation.
- C. Pay all power company charges related to "shutdowns", if any.

1.9 CHANGE ORDERS/PROPOSAL REQUESTS:

- A. During the course of construction, changes in the work may occur. When a significant change is to be made, a Proposal Request will be issued.
- B. Provide a complete cost breakdown when responding to each Proposal Request.
- C. Each item of work to be priced separately.
- D. Each line item to be broken down including quantities and listing separately labor and material.
- E. Both credits and extras shall be separately and clearly quantified.
- F. Allowances for overhead and profit shall be as listed in the supplementary conditions.
- G. If you become aware of a field condition, code requirement, error, or omission that you feel should result in a change to the work, please contact the Engineer for discussion. The Engineer may be able to clarify the situation and avoid unnecessary paperwork.

- H. It is recognized that the Owner benefits when the construction process is a cooperative effort instead of an adversarial relationship. Reasonable give-and-take allows the construction process to move smoothly. Your efforts in this regard will be appreciated by all parties.

1.10 INSPECTIONS/SITE OBSERVATIONS

- A. The authority having jurisdiction (usually the Municipal Electrical Inspector) shall be notified at periodic intervals that an inspection is requested. Inspections shall be requested at points of progress, meeting the approval of the inspector.
- B. Do not cover the work before the Engineer has had a chance to observe it in completed form. The electrical foreman shall request a meeting with the Engineer within 10 days after the start of electrical construction to assure that there is agreement on the scope of work and to answer questions.
- C. The electrical foreman shall provide assistance to the Engineer during site observations:
 - 1. Describe the progress of the electrical work in detail.
 - 2. Accompany the Engineer on his tour of the site, upon request.
 - 3. Provide use of a suitable ladder, scaffolding or bucket truck to observe the work, upon request.
 - 4. Provide use of project drawings, specifications and shop drawings.

1.11 GUARANTEES/WARRANTIES:

- A. See other portions of the Project Manual for details on Guarantees and Warranties. However, minimum shall be one year from date of acceptance by the Engineer.
- B. The Owner reserves the right to make appropriate modifications or extensions of systems and equipment furnished under this contract during the guarantee/warranty period without "voiding" or modifying the guarantee/warranty of equipment and wiring installed under this contract. If manufacturer voids guarantee, it shall not relieve this contractor of his responsibilities for guarantee/warranty period.

1.12 MISCELLANEOUS

- A. Provide all systems complete. Drawings and Specifications form complementary requirements; provide work specified and not shown, and work shown and not specified as though explicitly required by both.
- B. Although work is not specifically shown or specified, provide supplementary or miscellaneous items, appurtenances, devices and materials obviously necessary for a sound, secure and complete installation.
- C. All wiring and connections to be done with associated circuit de-energized.

PART 2 - PRODUCTS

2.1 MATERIALS - General:

- A. All materials and equipment to be new unless specifically stated otherwise.
- B. Materials and equipment shall be suitable for their intended use and for the environment in which they are installed. For example, equipment located outside shall be weatherproof and constructed of materials that will not rust. This includes brackets, screws, etc.
- C. Coordinate all dimensions to make sure that boxes, raceways, equipment, fixtures, etc., fit properly in the finished construction. If special provisions, such as shallow boxes, are required, they shall be provided at no increase in contract price, regardless of catalog numbers listed in contract documents or on shop drawings.
- D. As it is not practical to enumerate in these specifications (or show on the drawings) all details of fittings and accessory equipment required for proper operation of the various electrical systems herein described, it is understood that they will be supplied without extra compensation. Provide all fittings, terminations, relays, components of panels and equipment, etc., needed for the best performance possible at the present state-of-the-art.

2.2 SUPPORTING DEVICES

- A. Material: Cold-formed steel, with corrosion-resistant coating.
- B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.
- C. Slotted-Steel Channel: Flange edges turned toward web, and 9/16-inch- (14-mm-) diameter slotted holes at a maximum of 2 inches (50 mm) o.c., in webs. Strength rating to suit structural loading.
- D. Slotted Channel Fittings and Accessories: Recommended by the manufacturer for use with the type and size of channel with which used.
 - 1. Materials: Same as channels and angles, except metal items may be stainless steel.
- E. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.
- F. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.
- G. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for nonarmored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.
- H. Expansion Anchors: Carbon-steel wedge or sleeve type.
- I. Toggle Bolts: All-steel springhead type.

2.3 ELECTRICAL IDENTIFICATION

- A. Identification Device Colors: Use those prescribed by ANSI A13.1, NFPA 70, and these Specifications.
- B. Colored Adhesive Marking Tape for Wires and Cables: Self-adhesive vinyl tape, not less than 1 inch wide by 3 mils thick (25 mm wide by 0.08 mm thick).
- C. Tape Markers for Conductors: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.
- D. Underground Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape compounded for permanent direct-burial service, and with the following features:
 - 1. Not less than 6 inches wide by 4 mils thick (150 mm wide by 0.102 mm thick).
 - 2. Embedded continuous metallic strip or core.
 - 3. Printed legend that indicates type of underground line.
- E. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16-inch (1.6-mm) minimum thickness for signs up to 20 sq. in. (129 sq. cm) and 1/8-inch (3.2-mm) minimum thickness for larger sizes. Engraved legend in black letters on white background, unless otherwise indicated.
- F. Warning and Caution Signs: Preprinted; comply with 29 CFR 1910.145, Chapter XVII. Colors, legend, and size appropriate to each application.
 - 1. Interior Units: Aluminum, baked-enamel-finish, punched or drilled for mechanical fasteners.
 - 2. Exterior Units: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate with 0.0396-inch (1-mm), galvanized-steel backing. 1/4-inch (6-mm) grommets in corners for mounting.
- G. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

2.4 CONCRETE BASES

- A. Concrete Forms and Reinforcement Materials: As specified in Division 03.
- B. Concrete: 3000-psi (20.7-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom.

- B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 LAYOUTS

- A. The electrical system layouts indicated are generally diagrammatic and locations of outlets and equipment are approximate only; govern exact routing of wiring and locations of outlets and equipment by structural conditions and obstructions. This is not to be construed to permit redesigning systems. Interconnect as shown.
- B. Locate all equipment requiring maintenance and operation so that it will be readily accessible. The right is reserved to make any reasonable change in location of outlets and equipment prior to roughing-in without involving additional expense. This may involve slightly longer wiring runs, longer stems, additional mounting provisions, etc. Allow for this in your bid because additional compensation will not be provided. Items not specifically located on the plans shall (for the purposes of bidding) be assumed to be in the farthest, most difficult location. Exact location to be as directed in the field.

3.3 ELECTRICAL SERVICE:

- A. Provide complete electrical service conforming to all requirements of URI Facilities Operations.
- B. Service to be as indicated on the drawings, including meter socket and meter.
- C. Provide connectors for terminations and torque as directed by equipment manufacturers and URI Facilities Operations.

3.4 ELECTRICAL SUPPORTING DEVICE APPLICATION

- A. Damp Locations and Outdoors: Hot-dip galvanized materials, slotted channel system components.
- B. Dry Locations: Steel materials.
- C. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four with, 200-lb (90-kg) minimum design load for each support element.

3.5 SUPPORT INSTALLATION

- A. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.

- B. Size supports for multiple raceway or cable runs so capacity can be increased by a 25 percent minimum in the future.
- C. Support individual horizontal single raceways with separate, malleable-iron pipe hangers or clamps except use spring-steel fasteners for 1-1/2-inch (38-mm) and smaller single raceways above suspended ceilings and for fastening raceways to slotted channel and angle supports.
- D. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.
- E. Secure electrical items and their supports to building structure, using the following methods unless other fastening methods are indicated:
 - 1. Wood: Wood screws or screw-type nails.
 - 2. Gypsum Board: Toggle bolts. Seal around sleeves with joint compound, both sides of wall.
 - 3. Masonry: Toggle bolts on hollow block and expansion bolts on solid block. Seal around sleeves with mortar, both sides of wall.
 - 4. New Concrete: Concrete inserts with machine screws and bolts.
 - 5. Existing Concrete: Expansion bolts.
 - 6. Structural Steel: Welded threaded studs or Spring-tension clamps.
 - a. Comply with AWS D1.1 for field welding.
 - 7. Fasteners for Damp, Wet, or Weather-Exposed Locations: Stainless steel.
 - 8. Light Steel: Sheet-metal screws.
 - 9. Fasteners: Select so load applied to each fastener does not exceed 25 percent of its proof-test load.
 - 10. Light Steel Framing: sheet metal screws.

3.6 IDENTIFICATION MATERIALS AND DEVICES

- A. Provide typewritten directories, not smaller than 5" x 7", mounted under clear plastic affixed to the inside surface of all door-in-trim panels. Information shall include circuit numbers, type of load served and location of load served. For example: #1 Receptacles in rooms 5 & 6.
- B. Label the exterior of switchgear, distribution panels, power and lighting panels, and cabinets with engraved-plastic labels. Provide name of equipment (and use where appropriate). Also, identify each circuit, if a directory is not included. For example: Panel A "Lighting and Power." Provide nameplates called for elsewhere similar to above, unless otherwise noted. Provide a nameplate at each new pilot light. Identification shall include existing panels and equipment modified under this contract and additional existing items, as indicated.
- C. At each pull box, junction box and outlet box, each circuit contained therein shall be identified by panel designation and circuit number. This shall be accomplished by attaching hand written cardboard labels with string to each set of wires or by other agreed upon methods. In addition, where boxes are concealed, covers shall be marked with the same information using magic marker or other agreed upon means.

- D. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
- E. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.
- F. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box.
- G. Install continuous underground plastic marker tape with foil back during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 12 inches above the underground installation. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches (400 mm), overall, use a single line marker.
- H. Install warning, caution, and instruction signs where required to comply with 29 CFR 1910.145, Chapter XVII, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Indoors install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation.

3.7 REMOVALS (DEMOLITION) AND RELOCATIONS:

- A. Do all removal work in a neat and orderly manner so as not to endanger lives nor cause damage. Removal work to include all associated hangers, couplings, supports, raceway and wiring, etc., and shall be complete in every way.
- B. Remove and dispose of, off-site in a legal manner, all raceways and wire indicated to be removed.
- C. Carefully remove and store on-site, where directed by the Owner, all electrical equipment indicated to be REMOVED. After the Owner has examined this equipment, remove and dispose of, off-site in a legal manner, all of this equipment that the Owner does not want. All remaining equipment shall remain the property of the Owner. Relocate the remaining equipment to a permanent storage location on site where directed by the Owner.
- D. The electrical removal (demolition) drawings show the general extent of removals. However it is impractical to show every item; some of which may be concealed. Therefore, assume that you will be required to perform an additional 10% of removal work, without additional compensation. Items not shown to be removed or to remain shall remain or be removed, as directed.

END OF SECTION 260500

SECTION 260519 - CONDUCTORS AND CABLES (copper only)

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.2 RELATED DOCUMENTS:

- A. The General Conditions, Supplementary Conditions, and applicable portions of Division 1 of the specification are part of this section which shall consist of all labor, equipment, materials and other costs necessary to complete all **CONDUCTORS AND CABLES (copper only)** work indicated on the drawings, herein specified or both.
- B. The applicable portions of section 260500 BASIC ELECTRICAL MATERIALS AND METHODS are hereby make a part of this section. It is important that you read that section carefully because it expands upon the requirements herein.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 CONDUCTORS AND CABLES

- A. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.
- B. Conductor Material: Copper complying with NEMA WC 5 solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger.
- C. Conductor Insulation Types: Type THHN-THWN or XHHW complying with NEMA WC 5.

2.3 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR AND INSULATION APPLICATIONS

- A. Branch Circuits: Type THHN-THWN, single conductors in raceway.

3.2 INSTALLATION

- A. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- B. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- C. Install cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- D. Support cables according to Division 26 Section "Basic Electrical Materials and Methods."
- E. Identify and color-code conductors and cables according to Division 26 Section "Basic Electrical Materials and Methods."
- F. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.
- G. Where the number of current-carrying conductors in a raceway or cable exceeds three, the allowable ampacity shall be reduced per NEC table based on no diversity. Consider neutrals to be current carrying conductors.
- H. When branch circuits are combined using a common neutral, oversize the neutral to accommodate possible harmonic currents. On 20 amp (#12) branch circuits, use a #10 neutral.

3.3 CONNECTIONS

- A. Make all final connections required for a complete and fully operational facility.
- B. Wiring connections to equipment shall include connections to all accessories. For example, if a fan has an associated damper, the wiring must be extended from the fan to the damper at no additional charge. Another example is interconnection of equipment. Some items of equipment consist of several pieces, which must be interconnected before connecting to the circuit. No additional compensation will be paid for interconnections.
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486 B.

- D. Avoid splices and taps, where feasible. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- E. Locations of junction boxes and stub-ups are diagrammatic. At the time of design, the exact brand of equipment is usually not known. Therefore, the exact locations of connections are not known. For the purposes of bidding assume the worst, farthest locations. During construction, coordinate connections with final approved shop drawings and coordinate with other trades. Conform to manufactures written installation instructions. Provide working space in compliance with code.

3.4 FIELD QUALITY CONTROL

- A. All cables installed under this contract are to be protected from damage prior to installation, during installation and after installation. Store cable in a dry area protected from physical damage. Before installing cable, raceway to be clear, dry and free from burs or sharp edges. When cables pass through metal partitions provide permanently installed insulating bushings. This applies to all cables installed under this contract. Insulated bushings are to be installed prior to pulling in of cable.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes methods and materials for grounding systems and equipment.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Bonding Conductor: No. 6 AWG, stranded conductor.

2.2 CONNECTORS

- A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad; 3/4 inch by 10 feet (19 mm by 3 m) in diameter.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 4/0 AWG minimum. Bury at least 24 inches (600 mm) below grade.
- C. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors, except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - 1. Feeders and branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.
 - 4. Flexible raceway runs.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade, unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating, if any.
 - 2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Test Wells: Ground rod driven through drilled hole in bottom of manhole. Manholes are specified in Division 26 Section "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches (300 mm) deep, with cover.

1. Test Wells: Install at least one test well for each service, unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
- D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
 3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells.
 - a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
- B. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.

1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.3 SUBMITTALS

- A. Product Data: For steel slotted support systems.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze hangers. Include Product Data for components.
 - 2. Steel slotted channel systems. Include Product Data for components.
 - 3. Equipment supports.
- C. Welding certificates

1.4 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.
 - h. Power Strut
 - 3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - 4. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 - 5. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 - 6. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel and malleable iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

- a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
2. Mechanical-Expansion Anchors: Insert-wedge-type, [zinc-coated] [stainless] steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
- a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 6. Toggle Bolts: All-steel springhead type.
 7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 5 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as scheduled in NECA 1, where its Table 1 lists maximum spacings less than stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity (weight bearing and raceway / cable accommodation) exceeds the current need by 25%.
 - 1. Secure raceways and cables to these supports with conduit clamps listed for the use.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.

6. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts, Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69, or Spring-tension clamps.
 7. To Light Steel: Sheet metal screws.
 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 5 Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

END OF SECTION

SECTION 260533 - RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. See Division 26 Section "Basic Electrical Materials and Methods" for supports, anchors, and identification products.
- C. See Division 26 Section "Seismic Controls for Electrical Work" for seismic restraints and bracing of raceways, boxes, enclosures, and cabinets.
- D. See Division 26 Section "Wiring Devices" for devices installed in boxes and for floor-box service fittings.

1.2 RELATED DOCUMENTS:

- A. The General Conditions, Supplementary Conditions, and applicable portions of Division 1 of the specification are part of this section which shall consist of all labor, equipment, materials and other costs necessary to complete all **RACEWAYS AND BOXES** work indicated on the drawings, herein specified or both.
- B. The applicable portions of section 260500 BASIC ELECTRICAL MATERIALS AND METHODS are hereby make a part of this section. It is important that you read that section carefully because it expands upon the requirements herein.

1.3 SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details of custom enclosures and cabinets.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. Rigid Steel Conduit: ANSI C80.1.

- B. EMT and Fittings: ANSI C80.3.
 - 1. Fittings: Set-screw or compression, steel. (Die-casts are not acceptable).
- C. FMC: Zinc-coated steel.
- D. LFMC: Flexible steel conduit with PVC jacket.
- E. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

2.2 BOXES, ENCLOSURES, AND CABINETS

- A. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- B. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.
- C. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- D. Cast-Metal Pull and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.
- E. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.
 - 1. Indoor Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Outdoor Metal Enclosures: Stainless Steel.

2.3 FACTORY FINISHES

- A. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard prime-coat finish ready for field painting. Color by owner.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors:
 - 1. Exposed: Rigid steel.
 - 2. Concealed: Rigid steel.
 - 3. Underground, Single Run: RNC.
 - 4. Underground, Grouped: RNC.
 - 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 - 6. Boxes and Enclosures: NEMA 250.

- B. Indoors:
 - 1. Exposed: EMT.
 - 2. Concealed: EMT.

3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except use LFMC in damp or wet locations.
4. Damp or Wet Locations: Rigid steel conduit.
5. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
 - a. Damp or Wet Locations: NEMA 250, Type 4.

- C. Minimum Raceway Size: 1/2-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.

3.2 INSTALLATION

- A. Complete raceway installation before starting conductor installation.
- B. Support raceways as specified in Division 26 Section "Basic Electrical Materials and Methods."
- C. Install temporary closures to prevent foreign matter from entering raceways.
- D. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above finished slab.
- E. Make bends and offsets so ID is not reduced. Keep legs of bends in same plane and keep straight legs of offsets parallel, unless otherwise indicated.
- F. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.
 1. Run parallel or banked raceways together on common supports.
 2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
- G. Join raceways with fittings designed and approved for that purpose and make joints tight.
 1. Use insulating bushings to protect conductors.
- H. Tighten set screws of threadless fittings with suitable tools.
- I. Terminations:
 1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
 2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.
- J. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box

with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where otherwise required by NFPA 70.
- K. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches (150 mm) above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.
- L. Flexible Connections: Use maximum of 72 inches (1830 mm) of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor in flexible conduit and in LFMC.
- M. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.
- N. Install hinged-cover enclosures and cabinets plumb. Support at each corner.
- O. Provide a minimum of 2-inch spacing between raceways underground or in concrete.
- P. Provide a minimum of 2-inches of concrete encasement on PVC underground.
- Q. Provide a minimum of 2-iches of concrete encasement on all underground raceways.
- R. Provide colored electrical marker warning tape above all ductbanks. Use marker tape with foil back. Locate a minimum of 12 inches above raceway, cable or concrete.
- S. Expansion fittings shall be provided in all raceways, if and where required.

3.3 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 2. Repair damage to paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 16119 – UNDERGROUND DUCTS AND UTILITY STRUCTURES

PART 1 – GENERAL

1.1 SUMMARY

A. Scope of Specification

1. This Section includes underground conduits and ducts, duct banks, and manholes.
2. Products furnished but not installed under this Section include pulling eyes, cable stanchions, cable arms, and insulators.

B. Related Specifications

1. Drawing and general provisions of the Contract, including general and Supplementary Conditions and Division 1 Specifications Sections, apply to this Section.
2. Related Sections: The following Sections contain requirements that relate to this Section:
 - a Division 31 Section for general requirements for excavation, backfill and related items for ducts, manholes, and handholes.
 - b 03 – “Cast-In-Place Concrete” for cast-in-place concrete requirements.

C. Definitions

1. Duct: Electrical conduit and other raceway, either metallic or nonmetallic, used underground, embedded in earth or concrete.
2. Duct Bank: 2 or more conduits or other raceway installed underground in the same trench or concrete envelope.
3. Manhole: An underground utility structure, large enough for a person to enter, connecting with ducts to afford to facilities for installing and maintaining cables.

D. Applicable Standards

1. NFPA 70 – “National Electric Code”
2. UL 1990 – “Underground Conduit, Non Metallic”
3. ASTM C 858 – “Underground Precast Concrete Utility Structures”
4. ASTM C1037 – “Inspection of Underground Precast Concrete Utility”
5. ASTM C857- “Minimum Structural Design, Loading for Underground Precast Concrete Utility structures”
6. Conduit Standards listing in Section 2.2

E. Submittals

1. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.
2. Product data for metal accessories for manholes, conduit and duct, duct bank materials, and miscellaneous components.

3. Shop drawings showing details and design calculations for precast manholes and handholes, including reinforcing steel. Stamp drawings with seal of registered professional structural engineer.
4. Certificate for concrete and steel used in underground precast concrete utility structures, according to ASTM C 858.
5. Inspection report for factory inspections, according to ASTM C 1037.
6. Coordination drawings showing duct profiles and coordination with other utilities and underground structures. Include plans and sections drawn to accurate scale.
7. Qualification data for firms and persons specified in “Quality Assurance” Article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architect and Owner, and other information specified.
8. Field test reports indicating and interpreting test results relative to compliance with performance requirements of “Field Quality Control” Article in Part 3 of this Section.
9. Record Documents: Show dimensioned locations of underground ducts, handholes, and manholes.

F. Quality Assurance

1. Manufacturer Qualifications: Firm experienced in manufacturing underground precast concrete utility structures of types and sizes required and similar to those indicated for this project. Firm must have a record of successful in-service performance.
2. Comply with NFPA 70 “National Electrical Code” and ANSI C2 “National Electrical Safety Code” for components and installation.
3. Listing and Labeling: Provide products specified in this Section that are listed and labeled.
 - a The Terms “Listed “ and “Labeled”: As defined in the “National Electrical Code,” Article 100.
 - b Listing and Labeling Agency Qualifications: A “Nationally Recognized Testing Laboratory” (NRTL) as defined in OSHA Regulation 1910.7.
4. Coordinate layout and installation of ducts and manholes with final arrangement of other utilities ads determined in the field.
5. Coordinate elevations of duct and duct bank entrances into manholes with final profiles of conduits as determined by coordination with other utilities and underground obstructions. Revise locations and elevations from those indicated as required to suit field conditions and ensure duct runs drain to manholes, and as approved by the Engineer.

G. Delivery, Storage and Handling

1. Deliver ducts to site with ends capped. Store nonmetallic ducts with supports to prevent bending, warping, and deforming.
2. Store precast concrete units at site as recommended by manufacturer to prevent physical damage. Arrange so identification markings are visible.
3. Lift and support precast concrete units only at designated lifting or supporting points.

H. Extra Materials

1. Furnish extra materials matching products installed, packaged with protective covering for storage and with identification labels clearly describing contents.
2. Furnish cable stanchions, support arms, insulators, and associated fasteners each in quantities equal to 5 percent of quantities installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering the specified products that may be incorporated in the Work include, but are not limited to the following:

1. Underground Precast Concrete Utility Structures:
 - a Precast Division; Carder Concrete Products.
 - b Christy Concrete Products, Inc.
 - c Elmhurst-Chicago Stone Co.
 - d Riverton Concrete Products.
 - e Rotondo & Sons, Inc.
 - f Rotondo/Penn-Cast, Inc.
 - g Smith-Midland Corp.
 - h Utility Vault Co.
 - i Wausau Concrete Co.
2. Frames and Covers:
 - a Campbell Foundry Co.
 - b East Jordan Iron Works, Inc.
 - c McKinley Iron Works, Inc.
 - d Neenah Foundry Co.
3. Nonmetallic Ducts:
 - a Arnco Corp.
 - b Breeze-Illinois, Inc.
 - c CANTEX, Inc.
 - d Carlon; Lamson & Sessions Company
 - e Pipe & Plastic Group; Certainteed Products Corp.
 - f Cole-Flex Corp.
 - g Electri-Flex Co.
 - h Spiraduct, Inc.

2.2 CONDUIT AND DUCT

- A. Rigid Steel Conduit: ANSI C80.1, galvanized.
- B. PVC Conduit and Tubing Fittings: NEMA TC 3.
- C. Rigid Plastic Underground Conduit: High-density polyethylene, Schedule 40.

- D. Manufactured Bends: Not less than 36-inch (900 mm) radius.

2.3 UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES

- A. Precast Units: Interlocking, mating sections, complete with accessory items, hardware, and features as indicated. Include concrete knockout panels for conduit entrance and sleeve for ground rod.
- B. Design structure according to ASTM C 858.
- C. Structural Design Loading: ASTM C 857, Class A-16.
- D. Fabricate according to ASTM C 858.
- E. Joint Sealant: Continuous extrusion of asphaltic butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand the maximum hydrostatic pressures at the installation location with the ground water level at grade.
- F. Source Quality Control: Inspect structures according to ASTM C 1037.

2.4 ACCESSORIES

- A. General
 - 1. Furnish removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, for installation under another Contract. For each manhole/handhole furnish 1 stanchion for each 30 linear inches (750 mm) of interior floor perimeter. In addition, furnish 1 arm for each stanchion, 3 insulators for each arm, and a total of 3 pulling eyes. Furnish materials complete with associated fasteners, packaged with protective covering for storage and with identification labels clearly describing contents.
 - 2. Duct Supports: Rigid PVC spacers selected to provide minimum duct spacings and concrete cover depths indicated, while supporting ducts during concreting.
 - 3. Frames and Covers: Cast iron with cast-in legend ELECTRIC. Machine cover-to-frame bearing surfaces.
 - 4. Sump Frame and Grate: Comply with FS RR-F-621, Type VII for frame and Type I for cover.
 - 5. Pulling Eyes in Walls: Eyebolt with reinforcing bar fastening insert. 2-inch (50 mm) diameter eye, 1-inch (25 mm) by 4-inch (100 mm) bolt. Working load embedded in 6-inch (150 mm), 4000 psi (27.6 Mpa) concrete: 13,000 pounds minimum tension.
 - 6. Pulling and Lifting Irons in Floor: 7/8-inch-diameter (21 mm), hot-dipped galvanized, bent steel rod, stress relieved after forming, and fastened to reinforced rod. Exposed triangular opening. Ultimate yield strength: 40,000 pounds shear and 60,000 pounds tension.
 - 7. Bolting Inserts for Cable Stanchions: Flared, threaded inserts of noncorrosive, chemical resistant, nonconductive thermoplastic material; ½-inch (12 mm) internal diameter by 2-3/4 inches (68 mm) deep, flared to 1-1/4 inch (30 mm) minimum at base. Tested ultimate pull-out strength: 12,000 pound minimum.
 - 8. Expansion Anchors for Installation After Concrete is Cast: Zinc-plated carbon steel wedge type with stainless-steel expander clip ½-inch (12 mm) bolt size, 5300-pound rated pull-out strength, and 6800 –pound rated shear strength minimum.

9. Cable Stanchions: Hot-rolled, hot-dipped galvanized “T” section steel, 2-1/4-inch (56 mm) size, punched with 14 holes on 1-1/2-inch (35 mm) centers for cable arm attachment.
10. Cable Arms: 3/16-inch (5 mm) thick hot-rolled, hot-dipped galvanized sheet steel pressed to channel shape, approximately two 12 inches (300 mm) wide by 14 inches (350 mm) long and arranged for secure mounting in horizontal position at any position on cable stanchions.
11. Cable Support Insulators: High glaze, wet-process porcelain arranged for mounting on cable arms.
12. Ground Rods: Solid copper clad steel, 3/4-inch (18 mm) diameter by 10-feet (3 m) length.
13. Ground Wire: Stranded bare copper, No.4/0 AWG minimum.
14. Ladder: UL-listed, heavy-duty wood, specifically designed for electrical manhole use. Minimum length equal to the distance from the deepest manhole floor to grade plus 3 feet (1 m).
15. Duct Sealing Compound: Non-hardening, safe for human skin contact, not deleterious to cable insulation, workable at temperatures as low as 35 deg. F (1 deg C), withstands temperature of 300 deg F (149 deg C) without slump, and adheres to clean surfaces of plastic ducts, metallic conduits, conduit coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and the common metals.

2.5 CONSTRUCTION MATERIALS

- A. Brick: Conform to ASTM C 55, concrete brick Type I, Grade N.
- B. Mortar: Conform to ASTM C 270, Type M, except for quantities less than 2.0 cr. Ft. (60 L), where packaged mix complying with ASTM C 387, Type M may be used.
- C. Concrete: Conform to Division 03 Section “Cast-In-Place Concrete” for concrete and reinforcing.
 1. Strength: 3000 psi (20.7 Mpa) minimum 28-day compressive strength.
 2. Aggregate For Duct Encasement: 3/8-inch (10 mm) maximum size.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Underground Ducts For Electrical Utility Service: Plastic conduit encased in concrete.
- B. Underground Ducts For Electrical Feeders: Plastic conduit encased in concrete.
- C. Manholes: Underground Precast concrete utility structures.

3.2 EXAMINATION

- A. Examine site to receive ducts and manholes for compliance with installation tolerances and other conditions affecting performance of the underground ducts and manholes. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 EARTHWORK

- A. Excavation and Backfill: Conform to Division 31 Section “Earthwork,” but do not use heavy-duty, hydraulic-operated compaction equipment.
- B. Restore surface features at areas disturbed by excavation, and reestablish original grades except as otherwise indicated. Replace removed sod as soon as possible after backfilling is complete. Restore all areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, or mulching. Perform according to Division 2 Section “Landscape Work.”
- C. Restore disturbed paving. Refer to “Cutting and Patching” in Division 1.

3.4 CONDUIT AND DUCT INSTALLATION

- A. Install nonmetallic conduit and duct as indicated according to manufacturer’s written instructions.
- B. Slope: Pitch ducts minimum of 1/8” inches per foot to drain toward manholes and away from buildings and equipment.
- C. Curves and Bends: Use manufactured elbows for stub-ups at equipment.
- D. Make joints in ducts and fittings watertight according to manufacturer’s instructions. Stagger couplings so those of adjacent ducts do not lie in the same plane.
- E. Duct Entrances to Manholes: Space end bells approximately 10 inches (250 mm) on center for 5-high (125 mm) ducts and varied proportionately for other duct sizes. Change from regular spacing to end-bell spacing 10 feet (3 m) from the end bell without reducing duct line slope and without forming a trap in the line. Grout end bells into manhole walls from both sides to provide watertight entrances.
- F. Building Entrances: Transition for underground duct to conduit 10 feet (3 m) minimum outside the building wall. Use fittings manufactured for the purpose. Follow appropriate installation instructions below.
- G. Concrete-Encased Ducts: Install reinforcing in duct banks passing through disturbed earth near buildings and other excavations. Coordinate duct bank with structural design to support duct bank at wall without reducing structural or watertight integrity of building wall.
- H. Waterproofed Wall and Floor Entrances: Install a watertight entrance-sealing device with the sealing gland assembly on the inside. Anchor device into masonry construction with 1 or more integral flanges. Secure membrane waterproofing to the device to make permanently watertight.
- I. Concrete-Encased Nonmetallic Ducts: Support on plastic separators coordinated with duct size and required duct spacing, and install according to the following:
- J. Separator Installation: Space separators close enough to prevent sagging and deforming of ducts, and secure separators to the earth and to ducts to prevent floating during concreting. Do

not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.

- K. Concreting: Spade concrete carefully during pours to prevent voids under and between conduits and at exterior surface of envelope. So not use power-driven agitating equipment unless specifically designed for duct bank application. Pour each run of envelope between manholes or other terminations in 1 continuous operation. When more than one pour is necessary, terminate each pour in a vertical plane and install ¾-inch (18 mm) reinforcing rod dowels extending 18 inches (450 mm) into the concrete on both sides of joint near the corners of the envelope.
- L. Reinforcing: Reinforce duct banks where they cross disturbed earth and where indicated.
- M. Forms: All ductbanks shall be formed. Use the walls of the trench to form the side walls of the duct bank is unacceptable.
- N. Minimum Clearances Between Ducts: 3 inches (75 mm) between ducts and exterior envelope wall and for like services.
- O. Depth: Except as otherwise indicated, install top of duct bank at least 24 inches (600 mm) below finished grade in nontraffic areas and at least 30 inches (750 mm) below finished grade in vehicular traffic areas.
- P. Stub-Ups: Use rigid steel conduit or stub-ups to equipment. For equipment mounted on outdoor concrete pads, extend steel conduit a minimum of 5 feet (1.5 m) from edge of pad. Install insulated grounding bushings on the terminations. Couple steel conduits to the ducts with adapters designed for the purpose and then encase coupling with 3 inches (75 mm) of concrete.
- Q. Sealing: Provide temporary closure at terminations of ducts that are wired under this Project. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15 psi (1.03 Mpa) hydrostatic pressure.
- R. Pulling Cord: Install 100-pound-test nylon cord in ducts, including spares.

3.5 UNDERGROUND UTILITY STRUCTURE INSTALLATION

- A. Elevation: Install manholes with rooftop at least 15 inches (375 mm) below finished grade.
- B. Drainage: Install drains in bottom of units where indicated. Arrange to coordinate with drainage provisions indicated or specified.
- C. Access: Install cast-iron frame and cover. For manholes, use 30-inch (750 mm) cover. Install brick chimney to support frame and cover and to connect cover with roof opening. Provide moisture-tight masonry joints and waterproof grouting for cast-iron frame to chimney. Set frame 1 inch (25 mm) above finished grade.
- D. Waterproofing: Apply waterproofing to exterior surfaces of units after concrete has cured at least 3 day. After ducts have been connected and grouted, and prior to backfilling, waterproof

joints and connections and touch up abrasions and scars. Waterproof exterior of manhole chimney after brick mortar has cured at least 3 days.

- E. Hardware: Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cable and conductors and as indicated.
- F. Field-Installed Bolting Anchors: Do not drill deeper than 3-7/8 inches (96 mm) for anchor bolts installed in the field. Use a minimum of 2 anchors for each cable stanchion.
- G. Grounding: Install ground rod through floor in each structure with top protruding 4 inches (100 mm) above floor. Seal the floor opening against water penetration with waterproof non-shrink grout. Ground exposed metal components and hardware with bare copper ground conductor. Run conductors neatly around corners. Install on walls and roof using cable clamps secured with expansion anchors.
- H. Cast-In-Place Underground Structure installation: Conform to applicable requirements of Division 03 Section "Cast-In-Place Concrete."
- I. Finish interior surfaces with a smooth troweled finish.
- J. Windows for Future Duct Connections: Form and pour concrete knock-out panels 1-1/2 to 2 inches (37 to 50 mm) thick, arranged as indicated.
- K. Precast Concrete Underground Structure Installation: Install as indicated, according to manufacturer's written instructions and ASTM C 891.
- L. Install units plumb and level and with orientation and depth coordinated with arrangement of connecting ducts to minimize bends and deflections required for proper entrances.
- M. Support units on a level bed of crushed stone or gravel, graded from the 1-inch (25 mm) sieve to the No. 4 sieve and compacted to same density as adjacent undisturbed earth.

3.6 FIELD QUALITY CONTROL

- A. Testing: Demonstrate capability and compliance with requirements upon completion of installation of underground duct and utility structures.
- B. Grounding: Test manhole grounding to ensure electrical continuity of bonding and grounding connections. Measure ground resistance at each ground rod and report results. Use an instrument specifically designed for ground-resistance measurements.
- C. Duct Integrity: Rod ducts with a mandrel ¼ inch (6 mm) smaller in diameter than internal diameter of ducts. Where rodding indicated obstructions in ducts, remove the obstructions and retest.
- D. Water Tightness: Make internal inspection of manholes 3 months after completion of construction for indications of water ingress. Where leakage is noted, remove water and seal leak sources. Re-inspect after 2 months and reseal remaining leak sources. Repeat process at 2 month intervals until leaks are corrected.

- E. Correct installation where possible, and retest to demonstrate compliance. Otherwise, remove and replace defective products and retest.

3.7 CLEANING

- A. Pull brush through full length of ducts. Use round bristle brush with a diameter ½ inch (12 mm) greater than internal diameter of duct.
- B. Clean internal surfaces of manholes including sump. Remove foreign material.

END OF SECTION 260543

SECTION 260548 - SEISMIC CONTROLS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes seismic restraints and other earthquake-damage-reduction measures for electrical components. It applies to and complements seismic-restraint requirements in the various electrical component Sections of these Specifications.

1.2 RELATED DOCUMENTS:

- A. The General Conditions, Supplementary Conditions, and applicable portions of Division 1 of the specification are part of this section which shall consist of all labor, equipment, materials and other costs necessary to complete all **SEISMIC CONTROLS FOR ELECTRICAL WORK** indicated on the drawings, herein specified or both.
- B. The applicable portions of section 260500 BASIC ELECTRICAL MATERIALS AND METHODS are hereby make a part of this section. It is important that you read that section carefully because it expands upon the requirements herein.

1.3 DEFINITIONS

- A. Seismic Restraint: A fixed device (a seismic brace, an anchor bolt or stud, or a fastening assembly) used to prevent vertical or horizontal movement, or both vertical and horizontal movement, of an electrical system component during an earthquake.
- B. Mobile Structural Element: A part of the building structure such as a slab, floor structure, roof structure, or wall that may move independently of other structural elements during an earthquake.

1.4 SUBMITTALS

- A. Product Data: Illustrate and indicate types, styles, materials, strength, fastening provisions, and finish for each type and size of seismic-restraint component used. Include documentation of evaluation and approval of components by agencies acceptable to authorities having jurisdiction.
- B. Shop Drawings: For components, physical arrangements, and installation details. Indicate materials and show calculations, design analysis, details, and layouts, signed and sealed by a professional engineer.
- C. Seismic Certification and Analysis:

1. Seismic restraint calculations must be provided for all connections of equipment to the structure.
2. Calculations to support seismic restraint designs stamped by a registered professional engineer licensed in the state where the project is located.
3. Analysis must indicate calculated dead loads, derived loads and materials utilized for connections to equipment and structure. Analysis must detail anchoring methods, bolt diameter, embedment and weld length.
4. A valid seismic design Errors and Omissions insurance certificate must accompany all submittals.

D. Completion certification: Upon completion provide report as described in Part 3.

1.5 QUALITY ASSURANCE

- A. It is a requirement of these specifications that the electrical systems of this facility comply with the requirements of section 1610.0 EARTHQUAKE LOADS of the Rhode Island State Building Code.
- B. Conform to SMACNA guidelines for seismic restraint of mechanical systems.
- C. All vibration isolators shall have calibration markings or some method to determine after installation and adjustment, the actual deflection under the imposed load.
- D. The theoretical vertical natural frequency for each support point based upon load per isolator and isolator stiffness shall not differ from the design objectives for the equipment as a whole by more than +/- 10% and shall be non-resonant with equipment forcing frequencies or support structure natural frequency.
- E. Substitution of internally isolated and restrained equipment in lieu of the isolation and restraints specified in this section, is acceptable provided all conditions of this section are met. The equipment manufacturer shall provide a letter of guarantee stamped and certified stating that the specified noise and vibration levels will be obtained and that the seismic restraints shall be in compliance with these specifications. All costs for converting to the specified external vibration isolation and/or restraints shall be born by the equipment manufacturer should submissions or installations be found to be unacceptable pursuant to the intent of this specification.
- F. All isolators shall operate within the linear portion of their load versus deflection curves. Load versus deflection curves shall be furnished by the manufacturer and must be linear over a deflection range of not less than 50 percent above the design deflection.

1.6 PROJECT CONDITIONS

- A. This enclosure is in SEISMIC HAZARD EXPOSURE GROUP 2 or 3. Therefore, it must fully comply with this section.

1.7 COORDINATION

- A. Coordinate layout and installation of seismic bracing with building structure, architectural features, and mechanical, fire-protection, electrical, and other building systems.
- B. Coordinate concrete bases with building structural system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Mason Industries
 - 2. Korfund Dynamics Corp.
 - 3. Vibration Mounting and Control, Inc.
- B. All vibration isolation and seismic devices shall be the product of a single manufacturer. Mason Industries is the basis of these specifications (W.T. Morgan, Inc., 10 Errant Way, West Greenwich, RI 02817) (401) 392-0706.
- C. Manufacturer of vibration and seismic control equipment shall have the following responsibilities:
 - 1. Determine vibration isolation and seismic restraint sizes and locations.
 - 2. Provide equipment vibration isolation and seismic restraints as scheduled or specified.
 - 3. Guaranteed specified isolation system deflections.
 - 4. Provide installation instructions, drawings, and field supervision to insure proper installation and performance of systems.

2.2 ANCHORAGE REQUIREMENTS

- A. Anchorage of electrical equipment and wiring shall comply with paragraph 1610.6 of the Rhode Island State Building Code. Requirements shall include the following:
 - 1. Conduit
 - a. Raceways shall have lateral supports (type III).
 - 1) Exception: Those less than 2 1/2" trade size.
 - 2) Exception: Those suspended by individual hangers that are 12 inches or less in length from the top of the raceway to the bottom of the support for the hanger.
 - 2. Equipment Supports
 - a. Provide anchorage/lateral supports to prevent lateral motion and to prevent overturning.

- 1) Switchboards and other floor mounted equipment (type III and anchor to floor with non-seismic anchors).
 - 2) Option: If floor anchoring supports of equipment are seismically rated, only Type V is required.
3. Equipment Bracing:
- a. Provide certification from the manufacturer that the following equipment is internally braced to withstand a zone 2 earthquake without damage:
 - 1) Electrical panels
 - 2) Equipment Enclosures
 - 3) Pad Mount Transformer
 - 4) Lighting Poles

2.3 MATERIALS

A. General:

1. All isolation and seismic restraint devices shall be capable of accepting without failure one-half "G" external forces and one "G" for life safety equipment. Shall maintain the equipment in a captive position and not short circuit isolation during normal operating conditions. Isolators shall have provisions for bolting and/or welding to the structure.
 - a. Attachment plates to be cast into housekeeping pads, concrete inserts, beam clamps, etc. that may be required for seismic compliance, shall be provided by this section.
 - b. Housekeeping pad attachment to the structure shall be designed and certified by this section. Materials and labor shall be by the concrete section of these specifications.

B. Type I

1. Shall have the general characteristics of a spring isolator type "A".
 - a. Having a minimum outside diameter to overall height ratio of 0.8:1.
 - 1) Corrosion resistance where exposed to corrosive environment with:
 - a) Springs cadmium plated or electrogalvanized.
 - b) Hardware cadmium plated.
 - c) All other metal parts hot-dip or hot spray galvanized.
 - 2) Reserve deflection (from published load ratings to solid height) of 50% of the rated deflection.
 - 3) Minimum ¼" thick neoprene acoustical base pad or cup on under side; unless designated otherwise.
 - 4) Designed and installed so that ends of springs remain parallel.

b. Shall have the following additional features:

- 1) Incorporate snubbing restraint in all directions and be capable of supporting equipment at fixed elevations during installation and have a one "G" rating. Cast or aluminum housings, except ductile iron, are not acceptable.
- 2) Mason Industries type SSLFH or as approved.

Note: This must be used with Seismic Restraint II.

C. Type II:

1. Each corner or side of equipment base shall incorporate a seismic restraint snubber having a minimum of 5/8" thick all directional resilient pad limit stop. Restraints shall be fabricated of plate, structural members or square metal tubing. Angle bumpers are not acceptable.

D. Type III:

1. Multiple steel cable type with approved fastening devices to equipment and structure. System to be field bolted to deck or overhead structural members using two sided beam clamps or appropriately designed inserts for concrete. All parts of the system, including cables, are to be by this section to assure seismic compliance.
2. Mason Industries Type SCB Seismic Cable Braces and Type SRC Seismic Rod Clamps.

E. Type IV:

1. Neoprene mounted restraint with cadmium plated cap screw and washer.
2. Mason Industries Type RBA, RCA or as approved.

F. Type V:

1. Non-isolated equipment shall be field bolted or welded (power shots not acceptable) to the structure as required to meet seismic forces.

G. Type VI:

1. Combination spring and neoprene vibration isolation hanger.
2. Mason Industries Type 30N or as approved equal.

2.4 FIELD QUALITY CONTROL

- A. Upon completion of installation of all vibration isolation devices, the local representative of the manufacturer shall inspect the completed project and certify in writing to the contractor that all systems are installed properly, or detailing required corrections. The contractor shall submit a

report including the representative's report, certifying correctness of the installation or detailing corrective work to be done.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install seismic restraints according to applicable codes and regulations and as approved by authorities having jurisdiction, unless more stringent requirements are indicated. Isolation and seismic restraint systems must be installed in strict accordance with the manufacturer's written instructions and submittal data. Vibration isolators shall not cause any change of position of equipment resulting in stress on equipment connections.
- B. The minimum operating clearance under bases shall be one inch.
- C. All bases shall be placed in position and supported temporarily by blocks or shims. As appropriate, prior to the installation of the equipment, isolators and restraints.
- D. The isolators shall be installed without raising the equipment.
- E. After the entire installation is complete and under full operating load, the isolators shall be adjusted so that the load is transferred from the blocks to the isolators are properly adjusted, barely free and blocks shall be removed. Remove all debris from beneath the equipment and verify that there are no short circuits of the isolation. The equipment shall be free in all directions.
- F. Electrical connection to be liquid tight flexible conduit.
- G. All floor mounted equipment, whether isolated or not shall be bolted or welded to the structure to allow for required acceleration. Bolt points, diameter or inserts, embedment depth and weld length as shown on the approved submittal drawings shall be followed in all respects.
- H. All suspended equipment shall be two or four point independently braced with type III restraints, installed taut for non-isolated equipment, such as conduit, and slack with ½" cable deflection for isolated equipment.
- I. Where base anchoring of equipment is insufficient to resist seismic forces, restraints such as type III shall be located above the units center gravity to suitably resist "G" forces.
- J. For overhead supported equipment, overstress of the building structure must not occur. Bracing may occur from:
 - 1. Flanges and structural beams
 - 2. Upper or lower truss chords in bar joists.
 - 3. Cast in place inserts or drilled ad shielded inserts in concrete structures.
- K. Pipe risers through cored shafts require no additional seismic bracing. (Core diameters to be a maximum of 2" larger than pipe O.D.)

3.2 FIELD QUALITY CONTROL

- A. Upon completion of installation of all vibration isolation devices, the local representative of the manufacturer shall inspect the completed project and certify in writing to the contractor that all systems are installed properly, or detailing required corrections. The contractor shall submit a report including the representative's report, certifying correctness of the installation or detailing corrective work to be done.

END OF SECTION 260548

SECTION 260553 – IDENTIFICATION FOR ELECTRICAL WORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Identification for conductors.
 2. Warning labels and signs.
 3. Instruction signs.
 4. Equipment identification labels.

1.2 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.

1.3 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

PART 2 - PRODUCTS

2.1 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

2.2 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Baked-Enamel Warning Signs:
1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
 2. 1/4-inch grommets in corners for mounting.

3. Nominal size, 7 by 10 inches.

D. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.2 EQUIPMENT IDENTIFICATION LABELS

- A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.
- B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a black background. Minimum letter height shall be 3/8 inch.

2.3 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 9 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Apply identification devices to surfaces that require finish after completing finish work.
- C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- E. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

3.2 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
1. Optional Standby Power.
 2. Life Safety Power
 3. UPS Power.
 4. Normal Power
- B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for all conductors.
 - a. Color shall be factory applied or field applied for sizes larger than No. 10 AWG.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral: White
 - 5) Ground: Green
 - 6) Isolated Ground: Green with trace ID
 - c. Colors for 480/277-V Circuits
 - 1) Phase A: Brown
 - 2) Phase B: Orange
 - 3) Phase C: Yellow
 - 4) Neutral: Gray
 - 5) Ground: Green
 - d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- C. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power:
1. Comply with 29 CFR 1910.145.
 2. Identify system voltage with black letters on an orange background.
 3. Apply to exterior of door, cover, or other access.
 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.

- D. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- E. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch high letters for emergency instructions at equipment used for power transfer or load shedding.
- F. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 - 1. Labeling Instructions:
 - a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch high letters on 1-1/2-inch high label; where two lines of text are required, use labels 2 inches high.

END OF SECTION

SECTION 261200 – PAD MOUNTED TRANSFORMERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:

1. Pad mounted transformers

1.2 RELATED DOCUMENTS:

- A. The General Conditions, Supplementary Conditions, and applicable portions of Division 1 of the specification are part of this section which shall consist of all labor, equipment, materials and other costs necessary to complete all **PAD MOUNTED TRANSFORMERS** work indicated on the drawings, herein specified or both.
- B. The applicable portions of section 260500 BASIC ELECTRICAL MATERIALS AND METHODS are hereby make a part of this section. It is important that you read that section carefully because it expands upon the requirements herein.

1.3 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Wiring and connection diagrams.
- C. Field quality control reports.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with the “National Electrical Safety Code”.
- C. Comply with applicable sections of NFPA 70.

PART 2 - PRODUCTS

2.1 PAD-MOUNTED TRANSFORMERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed.
1. Cooper / Eaton
 2. ABB
 3. Howard Power Solutions
- B. Rating:
1. kVA rating: 500
 2. Three-phase
 3. Oil-immersed, self-cooled
 4. Envirotemp FR3 Dielectric Fluid
 5. 60 Hertz
 6. 65 C rise
 7. Primary voltage: 4160 volts, 3 phase,
 8. Secondary voltage: 277/480 Volts, 3 Phase
 9. Energy rated: TP1
- C. Taps:
1. Provide two 2-1/2% primary taps below nominal voltage and two 2-1/2% above.
 2. Electrical contractor to field adjust tap for optimum nominal system secondary voltage.
- D. General Construction Features:
1. Construct in accordance with ANSI Standard C57.12.26 (latest revision).
 2. All characteristics, definitions, terminology, and voltage designations and tests, except as otherwise specified herein, shall be in accordance with the following American National Standard Requirements, Terminology, and Test Code for Distribution, Power, and Regulating Transformers:
 - a. General Requirements, C57.12.00 (IEEE Std. 462) (latest revision).
 - b. Terminal Markings and Connections, C57.12.70 (latest revision).
 - c. Terminology, C57.12.80, including Supplement C57.12.80a (latest revision).
 - d. Test Code, C57.12.90 (IEEE Std. 262) (latest revision).
 3. The pad-mounted, compartmental-type transformer shall consist of the transformer tank with high-and low-voltage cable terminating compartment. The transformer tank and compartment shall be assembled as an integral unit for mounting on a pad. There shall be no exposed screws, bolts, or other fastening devices which are externally removable. There shall be no openings through which foreign objects such as sticks, rods, or wires might contact live parts. There shall be means for padlocking the compartment door(s). The construction shall limit the entry of water (other than flood water) into the compartment so as not to impair the operation of the transformer.
 4. Full-height, air-filled incoming and outgoing terminal compartments with hinged doors shall be located side-by-side separated by a steel barrier, with the incoming compartment on the left. The high-voltage (incoming) compartment will be accessible only after the door to the low-voltage (outgoing) compartment has been opened. To facilitate making connections and permit cable pulling, the doors and compartment hood shall be

- removable. Removable door sill on compartments shall be provided to permit rolling or skidding of unit into place over conduit studs in foundation.
5. The compartments will have hinged doors equipped for latching in the open position. The high-voltage compartment door will have a fastening device which is accessible only through the low-voltage compartment.
 6. The hinge assemblies shall be made of corrosion-resistant material. Stainless-steel hinge pins of 3/8-inch minimum diameter will be provided.
 7. Both compartment doors must be capable of being secured with a single padlock having a maximum 1/2-inch diameter shackle.
 8. Lifting provisions in accordance with ANSI Standards shall be provided.
 9. Jacking and rolling provisions shall be provided.
 10. The instruction nameplate is to be located in the low-voltage portion of the compartment and shall be readable with cables in place. Where the nameplate is mounted on a removable part, the manufacturer's name and transformer serial number shall be permanently affixed to a non-removable part.
 11. Transformer tank shall be sealed-tank construction with a welded main cover.
 12. A bolted tamper-resistant handhole shall be provided in the tank cover for access to internal connections.
 13. Provisions for tank grounding shall be supplied in both the high-voltage and low-voltage compartments.
 14. The dielectric coolant shall be listed less-flammable fluid meeting the requirements of National Electrical Code Section 450-23 and the requirements of the National Electrical Safety Code (IEEE Std C2™-2002 standard), Section 15. The dielectric coolant shall be non-toxic*, non-bioaccumulating and be readily and completely biodegradable per EPA OPPTS 835.3100. The base fluid shall be 100% derived from edible seed oils and food grade performance enhancing additives. The fluid shall not require genetically altered seeds for its base oil. The fluid shall result in zero mortality when tested on trout fry *. The fluid shall be certified to comply with the US EPA Environmental Technology Verification (ETV) requirements, and tested for compatibility with transformer components. The fluid shall be Factory Mutual Approved®, UL® Classified Dielectric Medium (UL-EOUV) and UL® Classified Transformer Fluid (UL-EOVK), Envirotemp™ FR3™ fluid.

E. Accessories:

1. One-inch filling provision.
2. One-inch drain valve and sampler.
3. Dial-type thermometer,
4. Liquid-level gauge and
5. Vacuum/pressure gauge.

F. Primary Compartment:

1. Equip the incoming primary section with three 200 ampere loadbreak integrated bushings (combining the function of bushing well and switch module). Provide matching 200 ampere load break molded shield elbows.
2. Provide an internal, oil-immersed, gang-operated, two position (ON/OFF) loadbreak, manually operated switch. The switch must be capable of switching transformer full-load current. The switch handle shall be located in the primary compartment and must be hot-stick operable.

3. Provide three current-limiting fuses in non-loadbreak, dry-well fuse holders. The fuse holder must accept either G.E. or McGraw Edison general-purpose, distribution current limiting fuses with an interrupting capacity of 50,000 amperes. The fuse holders shall be located in the primary compartment and be hot-stick operable for external replacement of the fuses.
 4. Provide three (3) lightning arrestors.
- G. Secondary Compartment:
1. Low-voltage bushings shall be tinned, spade-type with 9/16-inch holes spaced on 1-3/4 inch centers in accordance with the Latest Revisions of ANSI.
- H. Temporary Heating:
1. Apply temporary heat according to manufacturers written instructions within the enclosure, thorough periods during which equipment is not energized and when transformer is not in a space that is continually under normal control of temperature and humidity.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install transformers and accessories according to NEMA and NECA standards.
- B. Temporary Lifting Provisions: After installation, remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from equipment and components.
- C. Re-Torque: Once in final location, carefully re-torque all connections with a torque wrench, to match manufacturers recommendations.

3.2 FIELD QUALITY CONTROL

- A. Perform the following electrical tests and visual and mechanical inspections stated in NEMA ATS. Certify compliance with test parameters. (Exclude optional tests.)
 1. Section 7.2 Liquid-Filled Transformers
 2. Section 7.1 Switchgear and Switchboard Assemblies

END OF SECTION 261200

SECTION 261216 – Low-Voltage Transformers

PART 1 – GENERAL

1.1 SCOPE

- A. The Contractor shall furnish and install general purpose individually mounted dry-type transformers of the two-windings type, self-cooled as specified herein, and as shown on the contract drawings.

1.3 REFERENCES

- A. The transformers and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of ANSI, NEMA and UL.
- B. Transformers shall meet the requirements of federal law 10 CFR Part 431 "Energy Efficiency Program for Certain Commercial and Industrial Equipment" and NEMA Premium® Efficiency Transformer program.

1.4 SUBMITTALS – FOR REVIEW/APPROVAL

- A. The following information shall be submitted to the Engineer:
 - 1. Outline dimensions and weights
 - 2. Transformer ratings including:
 - a. kVA
 - b. Primary and secondary voltage
 - c. Taps
 - d. Design impedance
 - e. Insulation class and temperature rise
 - f. Sound level.
 - 3. Product data sheets

1.5 SUBMITTALS – FOR CONSTRUCTION

- A. The following information shall be submitted for record purposes.
 - 1. Final as-built drawings and information for items listed in Paragraph 1.04, and shall incorporate all changes made during the manufacturing process
 - 2. Connection diagrams
 - 3. Installation information
 - 4. Seismic certification and equipment anchorage details as specified

1.6 QUALIFICATIONS

- A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
- B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.
- C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

1.7 REGULATORY REQUIREMENTS

- A. All transformers shall be UL listed and bear the UL label.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Equipment shall be handled and stored in accordance with manufacturer’s instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

1.9 OPERATION AND MAINTENANCE MANUALS

- A. Equipment operation and maintenance manuals shall be provided with each assembly shipped, and shall include instruction leaflets and instruction bulletins for the complete assembly and each major component.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Eaton Electrical Inc.; Cutler-Hammer Products.
- B. General Electric Company
- C. Siemens Energy & Automation, Inc.
- D. Square D; Schneider Electric

The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer ten (10) days prior to bid date.

2.2 RATINGS

- A. The kVA and voltage ratings shall be as indicated on the drawings.
- B. Transformers shall be designed for continuous operation at rated kVA, for 24 hours a day, 365 days a year operation, with normal life expectancy as defined in ANSI C57.96.
- C. Transformer sound levels shall not exceed the following ANSI and NEMA levels for self-cooled ratings:

0 to	9 kVA	40 dB
10 to	50 kVA	45 dB
51 to	150 kVA	50 dB
151 to	300 kVA	55 dB
301 to	500 kVA	60 dB
501 to	700 kVA	62 dB
701 to	1000 kVA	64 dB
1001 to	1500 kVA	65 dB

- D. Transformers shall meet or exceed the efficiency levels specified in the NEMA Premium® Efficiency Transformers Program. Efficiencies are measured at 35% loading and 75 degrees C.

3-PHASE KVA MINIMUM EFFICIENCY

15	97.90%
30	98.25%
45	98.39%
75	98.60%
112.5	98.74%

150	98.81%
225	98.95%
300	99.02%
500	99.09%
750	99.16%
1000	99.23%

2.3 CONSTRUCTION – NEMA PREMIUM[®] TRANSFORMERS

A. Insulation Systems

1. Transformer insulation system shall be as follows:
 - a. 45 kVA and below: minimum of 200 degree C insulation system with 115 degree C rise, ventilated design.
2. Required performance shall be obtained without exceeding the above indicated temperature rise in a 40 degrees C maximum ambient, and a 24-hour average ambient of 30 degrees C
3. All insulation materials shall be flame-retardant and shall not support combustion as defined in ASTM Standard Test Method D635

B. Core and Coil Assemblies

1. Transformer core shall be constructed with high-grade, non-aging, silicon steel with high magnetic permeability, and low hysteresis and eddy current losses. Maximum magnetic flux densities shall be substantially below the saturation point. The transformer core volume shall allow efficient transformer operation at 10% above the nominal tap voltage. The core laminations shall be tightly clamped and compressed. Coils shall be wound of electrical grade aluminum or copper with continuous wound construction.
2. On three-phase units rated 15 kVA and above the core and coil assembly shall be impregnated with non-hydroscopic, thermosetting varnish and cured to reduce hot spots and seal out moisture. Enameled conductors may also be used. The assembly shall be installed on vibration-absorbing pads that prevent metal-to-metal contact between the core and mounting base.

C. Taps

1. Three-phase transformers rated 15 kVA and larger shall be provided with six 2-1/2% taps, two above and four below rated primary voltage.

D. Electrostatic Shielding

1. Where shown on the drawings, provide shielded isolation transformers with an electrostatic shield consisting of a single turn of aluminum placed between the primary and secondary winding and grounded to the housing of the transformer.
 - a. Electrostatic shield shall provide primary to secondary winding capacitance between 24 and 18 picofarads over the range of 100 Hz to 20 kHz.
 - b. Electrostatic shielding shall provide the following minimum attenuation when tested per MIL-Std-220A, Method of Insertion Loss Measurement, with matched impedance no load technique:
 - c. Common mode noise attenuation: Minus 80 dBA minimum at 0.1 kHz to 1.5 kHz; minus 55 dBA minimum at 1.51 kHz to 100 kHz. Normal mode (Transverse mode) noise attenuation: Minus 35dBA minimum at 1.5 kHz to 10 kHz.

E. Enclosure

1. The enclosure shall be made of heavy-gauge steel. All transformers shall be equipped with a wiring compartment suitable for conduit entry and large enough to allow convenient wiring. The maximum temperature of the enclosure shall not exceed 50 degrees C rise above a 40 degree C maximum ambient (90 degrees C.) The core of the transformer shall be grounded to the enclosure with a flexible copper strap that is fully-rated as a grounding conductor.
 - a. The enclosure construction shall be ventilated, NEMA 2 drip-proof, with lifting provisions. All ventilation openings shall be protected against falling dirt. On outdoor units, provide weathershields over ventilated openings.
 - b. Enclosures shall be finished with ANSI 61 color, weather-resistant enamel.

2.2 ACCESSORIES

- A. On ventilated outdoor units provide suitable weathershields over ventilation openings.
- B. Lug kits shall be provided by the Manufacturer of the transformer

PART 3 - EXECUTION

3.1 FACTORY TESTING

- A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of ANSI and NEMA standards.
 1. Ratio tests at the rated voltage connection and at all tap connections
 2. Polarity and phase relation tests on the rated voltage connection
 3. Applied potential tests
 4. Induced potential test
 5. No-load and excitation current at rated voltage on the rated voltage connection

3.2 INSTALLATION

- A. The Contractors shall install all equipment per the manufacturer's recommendations and the contract drawings.

3.3 FIELD ADJUSTMENTS

- A. Adjust taps to deliver appropriate secondary voltage.

3.4 FIELD TESTING

- A. Measure primary and secondary voltages for proper tap settings.

END OF SECTION

SECTION 261250 – MEDIUM VOLTAGE WIRING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Primary cable
 2. Primary cable splices and terminations
 3. Primary cable tests
 4. Work in manholes

1.2 RELATED DOCUMENTS:

- A. The General Conditions, Supplementary Conditions, and applicable portions of Division 1 of the specification are part of this section which shall consist of all labor, equipment, materials and other costs necessary to complete all **MEDIUM VOLTAGE EQUIPMENT AND WIRING** work indicated on the drawings, herein specified or both.
- B. The applicable portions of section 260500 BASIC ELECTRICAL MATERIALS AND METHODS are hereby make a part of this section. It is important that you read that section carefully because it expands upon the requirements herein.

1.3 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Wiring and connection diagrams.
- C. Field quality control reports.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with the “National Electrical Safety Code”.
- C. Comply with applicable sections of NFPA 70.

PART 2 - PRODUCTS

2.1 PRIMARY CABLE

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work including, but are not limited to, the manufacturers specified.
 - 1. KERITE (Metrowest Electric Sales Inc. (860) 480-2362)
 - 2. OKONITE
- B. Provide 15 KV shielded power cables, single conductor, UL listed as type MV-105, in accordance with UL 1072. The general characteristics shall be as listed below, the conductor size shall be as noted on the contract drawings or as directed. Include 600 volt insulated copper equipment ground.
 - 1. Conductor shall be uncoated copper, Class B stranded per ASTM B-496 compact.
 - 2. Strand screen shall be of the extruded semi-conducting type per electrical and physical requirements of ICEA S-68-516, AEIC CS6 and UL 1072.
 - 3. Insulation shall be an ethylene - propylene rubber (EPR) base, thermosetting compound for 133% insulation level, per electrical and physical requirements of ICEA S-68-516, AEIC CS6 and UL 1072.
 - 4. Insulation screen shall be of the extruded semi-conducting type applied directly over the insulation per electrical and physical requirements of ICEA.
 - 5. Shield shall be uncoated copper tape helically applied with 12.5% normal overlap.
 - 6. Jacket shall be of the polyvinylchloride (PVC) type per electrical and physical requirements of ICEA S-68-518 and UL 1072.
- C. Care shall be used in the handling of all cable so that the sheathing will not become broken, scratched or bruised. No kinks, twists or sharp bends will be permitted to form in the cable during installation. If for any reason the sheath suffers damage, before or during installation, the cable shall be replaced by the Contractor at no cost to the Owner.
- D. The ends of the cable shall be kept moisture-proof sealed at all times except when connections or splices are actually being made during low humid ambient conditions. All cable ends shall be sealed immediately after cutting.

2.2 PRIMARY CABLE SPLICES AND TERMINATIONS

- A. Make all splices and terminations under this contract, but this Contractor shall employ a subcontractor for this part of the work. This work shall be performed by a qualified high voltage cable splicing company. The company employed by this contractor must be approved by the Engineer. The cable splicing firm must have been in this business for at least ten years and must not be more than 1-1/2 hours travel time away from the job site.
- B. The splicing contractor shall maintain dry and dust free conditions while terminations are being made. Make all terminations only on days with low humidity. Make terminations of primary cable 600 amp. 15 kv dead break elbows, as manufactured by Elastimold, or approved equal. Neatly rack all cables and splices and tie with impregnated linen tape.
- C. Provide 15 kv multipoint junctions as indicated on drawings. Manufacturer shall be elastimold or approved equal.

- D. Provide line powered fault indicators with current reset, as indicated on drawings. Manufacturer shall be SEL or approved equal.

2.3 PRIMARY CABLE TESTS

A. General:

- 1. After terminations are complete, disconnect primary cable from equipment, perform a hypotential test and submit written report to Engineer. Do not energize equipment if values are not as described herein.

B. Standards and Safety Precautions:

- 1. National Electrical Testing Association "Acceptance Testing Specifications"
- 2. Occupational Safety & Health Act
- 3. National Safety Council "Accident Prevention Manual for Industrial Operations"
- 4. Applicable State and Local Safety Operating Procedures

C. D.C. Hypotential Test:

- 1. Each conductor shall be individually tested with all other conductors grounded. All shields shall be grounded.
- 2. Terminations shall be properly corona suppressed by guard ring, field reduction sphere, or other suitable methods.
- 3. A D.C. hypotential shall be applied in at least eight (8) equal increments until maximum test voltage is reached. D.C. leakage current shall be recorded at each step after a constant stabilization time consistent with system charging current decay.
- 4. A graphic plot shall be made of leakage current (X axis) versus voltage (Y axis) at each increment.
- 5. The test conductor shall be raised to a maximum test voltage and held for a total of ten (10) minutes. Readings of leakage current (Y axis) versus time (X axis) shall be recorded and plotted on thirty (30) second intervals for the first two (2) minutes and every minute thereafter.
- 6. The applied conductor test potential shall be reduced to zero (0) and grounds applied for a period adequate to drain all insulation stored potential.
- 7. Maximum test voltage shall be 25 KV for 5 KV cable and 55 KV for 15 KV cable.

D. Shield Continuity Test:

- 1. Perform a shield continuity test by ohm meter method and record results.

E. Test Values:

- 1. Step voltage slope should be reasonably linear.
- 2. Absorption slope should be flat or negative. In no case should slope exhibit positive characteristic.
- 3. Maximum leakage current should not exceed I_L corrected to 60 F where $I_L = E_K \log D/d$

K = insulation specific resistance Megohm/MFT at 60 F.

D = diameter over insulation
d = diameter under insulation
E = maximum test voltage

2.4 WORK IN MANHOLES:

A. Existing Manholes:

1. Refurbish or replace all cable racks in existing manholes. Add cable hooks where needed, provide all new insulators. Tie all cables to racks (one cable per insulator). Clean up manhole. Remove all mud and debris. Fill all openings around conduits with concrete. Ground all metal parts (new and existing), if not already grounded to ground rod. Check all connections. Identify each cable in manhole as to feeder number, size, phase and destination. Tags shall be secured to cable with #14 ga. brass wire. Cap all spare ducts and provide duct seal around cables to seal all ducts. Slope all ducts toward manholes. Where this is not possible (or where indicated) provide inflatable duct sealing system equivalent to Rayflate (RDSS), properly sized and installed per manufacturers directions.

B. New Manholes:

1. Provide new cable racks with cable hooks and insulators in new manholes. Tie all cables to racks (one cable per insulator). Fill all openings around conduits with concrete. Ground all metal parts to ground rod. Identify each cable in manhole as to feeder number, size, phase and destination. Tags shall be secured to cable with #14 ga. brass wire. Cap all spare ducts and provide duct seal around cables to seal all ducts. Slope all ducts toward manholes. Where this is not possible (or where indicated) provide inflatable duct sealing system equivalent to Rayflate (RDSS), properly sized and installed per manufacturers directions.

END OF SECTION 261250

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes distribution panelboards and lighting and appliance branch-circuit panelboards.

1.2 RELATED DOCUMENTS:

- A. The General Conditions, Supplementary Conditions, and applicable portions of Division 1 of the specification are part of this section which shall consist of all labor, equipment, materials and other costs necessary to complete all PANELBOARDS work indicated on the drawings, herein specified or both.
- B. The applicable portions of section 260500 BASIC ELECTRICAL MATERIALS AND METHODS are hereby make a part of this section. It is important that you read that section carefully because it expands upon the requirements herein.

1.3 SUBMITTALS

- A. Product Data: For each type of panelboard, overcurrent protective device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:
 - a. Enclosure types and details for types other than NEMA 250, Type 1.
 - b. Bus configuration, current, and voltage ratings.
 - c. Short-circuit current rating of panelboards and overcurrent protective devices.
 - d. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 2. Wiring Diagrams: Power, signal, and control wiring.
 - 3. Field quality-control test reports.
 - 4. Operation and maintenance data.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NEMA PB 1.
- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Panelboards, Overcurrent Protective Devices, Controllers, Contactors, and Accessories:
 - a. Square D.
 - b. Eaton Corporation; Cutler-Hammer Products.
 - c. General Electric Co.; Electrical Distribution & Protection Div.
 - d. Siemens Energy & Automation, Inc.

2.2 MANUFACTURED UNITS

- A. Enclosures: NEMA PB 1, Type 1.
 - 1. Rated for environmental conditions at installed location.
 - a. Outdoor Locations: NEMA 250, Type 3.
 - b. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
 - c. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
 - d. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7C.
 - 2. Door-In-Trim: Provide with piano hinge on left side of trim, so that trim (and door) can be swung open for easy access to wiring terminals (rather than removed).
 - 3. Equip door with spring latch and tumbler-lock with all locks keyed alike.
- B. Phase and Ground Buses: Copper.
- C. Conductor Connectors: Suitable for use with conductor material.
- D. Service Equipment Label: UL labeled for use as service equipment for panelboards with main service disconnect breakers.
- E. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices.

- F. Panelboard Short-Circuit Rating:
 - 1. Fully rated to interrupt symmetrical short-circuit current available at terminals.
 - 2. Unless otherwise indicated, a “series-combination system” of interrupting capacity rating shall not be used.
- G. Service Entrance Equipment: When used as service entrance equipment, so rate.
- H. Provide typed circuit directory card mounted in frame with clear plastic covering.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Branch Overcurrent Protective Devices: Bolt-on full size circuit breakers, replaceable without disturbing adjacent units.
- B. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike. See 2.2A2

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Comply with mounting and anchoring requirements specified in Division 16 Section "Seismic Controls for Electrical Work."
- C. Mount plumb and rigid without distortion of box.
 - 1. Set field-adjustable and circuit-breaker trip ranges.
- D. Install filler plates in unused spaces.
- E. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section "Basic Electrical Materials and Methods".
- F. Panelboard Nameplates: Label each panelboard with engraved laminated-plastic nameplate mounted with corrosion-resistant screws.
- G. Ground equipment according to Division 26 Section "Grounding, Bonding and Surge Protection Devices."
- H. Connect wiring according to Division 26 Section "Conductors and Cables."
- I. Re-Torque: Once in final location, carefully re-torque all connections with a torque wrench, to match manufacturers recommendations. If equipment is dismantled, it must be re-inspected and re-certified by a nationally recognized testing laboratory, acceptable to the Engineer and the Authority Having Jurisdiction.

3.2 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- B. Perform the following inspections:
 - 1. Perform each visual and mechanical inspection stated in NETA ATS, section 7.6.
- C. Perform the following field tests and inspections and prepare test reports:
 - 1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Single and duplex receptacles, ground-fault circuit interrupters, and integral surge suppression units.
2. Snap switches and dimmer switches.
3. Device wall plates.

1.2 RELATED DOCUMENTS:

- A. The General Conditions, Supplementary Conditions, and applicable portions of Division 1 of the specification are part of this section which shall consist of all labor, equipment, materials and other costs necessary to complete all **WIRING DEVICES** work indicated on the drawings, herein specified or both.
- B. The applicable portions of section 260500 BASIC ELECTRICAL MATERIALS AND METHODS are hereby make a part of this section. It is important that you read that section carefully because it expands upon the requirements herein.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: Upon request.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Wiring Devices:
 - a. General Electric Company: Wiring Device Division
 - b. Bryant Electric, Inc./Hubbell Subsidiary.
 - c. Hubbell Incorporated; Wiring Device-Kellems.
 - d. Leviton Mfg. Company Inc.

e. Pass & Seymour/Legrand; Wiring Devices Div.

2.2 RECEPTACLES

- A. Provide 20 amp., commercial specification grade, brown grounded, duplex receptacles. Catalog numbers are for General Electric Company.

20A/125V	Duplex Receptacle	GE #GCR-20
20A/125V	GFI Dup. Rec.	GE #GFR 5342

2.3 SWITCHES

- A. Provide 20 amp., toggle type, "Federal Specification Grade" Brown lighting switches. Catalog numbers are for General Electric Company.

Single pole	GE #5951	Three-way	GE #5953
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2.4 WALL PLATES

- A. Single and combination types to match corresponding wiring devices.
1. Plate-Securing Screws: Metal with head color to match plate finish.
 2. Receptacles mounted outdoors or in other wet or damp locations shall be installed in weatherproof enclosures with key lock cover, the integrity of which is not affected when the receptacle is in use (attachment plug cap inserted).
 3. Provide stainless steel receptacle cover plates with brushed finish. (Type 302).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install devices and assemblies level, plumb, and square with building lines.
- B. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical. Group adjacent switches under single, multigang wall plates.

3.2 IDENTIFICATION

- A. Comply with Division 26 Section "Basic Electrical Materials and Methods."
1. Receptacles: Engrave each receptacle plate with panel designation and circuit number. (Brother P-Touch Labeling System is acceptable, in lieu of engraving.)
 2. Outlet boxes: Provide cardboard tags, tied to each wire inside all outlet boxes (receptacles, switches, motors, etc). Include panel designation and circuit number.

3.3 CONNECTIONS

- A. Ground equipment according to Division 26 Section "Grounding and Bonding."

- B. Connect wiring according to Division 26 Section "Conductors and Cables."

3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections:
 - 1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.
 - 2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.
- B. Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION 262726

SECTION 262813 - FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cartridge fuses rated 600-V AC and less for use in control circuits, enclosed switches, switchboards, enclosed controllers, and motor-control centers.
2. Plug fuses rated 125-V AC and less for use in plug-fuse-type enclosed switches, fuseholders, and panelboards.
3. Plug-fuse adapters for use in Edison-base, plug-fuse sockets.
4. Spare-fuse cabinets.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material, dimensions, descriptions of individual components, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:

1. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.
 - a. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
 - b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.
2. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
3. Current-limitation curves for fuses with current-limiting characteristics.
4. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse.
5. Coordination charts and tables and related data.
6. Fuse sizes for elevator feeders and elevator disconnect switches.

- B. Operation and Maintenance Data: To include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Ambient temperature adjustment information.
2. Current-limitation curves for fuses with current-limiting characteristics.
3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse.
4. Coordination charts and tables and related data.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain fuses from a single source from a single manufacturer to the extent possible.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended application.
- C. Comply with NEMA FU 1 for cartridge fuses.
- D. Comply with NFPA 70.
- E. Comply with UL 248-11 for plug fuses.

1.5 PROJECT CONDITIONS

- A. Where ambient temperature to which fuses are directly exposed is less than **40 deg F (5 deg C)** or more than **100 deg F (38 deg C)**, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.6 COORDINATION

- A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

1.7 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: Equal to **10** percent of quantity installed for each size and type, but no fewer than **two** of each size and type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
 - 1. Cooper Bussmann, Inc.
 - 2. Edison Fuse, Inc.
 - 3. Ferraz Shawmut, Inc.
 - 4. Littelfuse, Inc.
 - 5. Gould
 - 6. Equal approved by Engineer.

2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages, at class and current rating indicated.

2.3 PLUG FUSES

- A. Characteristics: UL 248-11, nonrenewable plug fuses; 125-V ac.

2.4 PLUG-FUSE ADAPTERS

- A. Characteristics: Adapters for using Type S, rejection-base plug fuses in Edison-base fuseholders or sockets; ampere ratings matching fuse ratings; irremovable once installed.

2.5 SPARE-FUSE CABINET

- A. Characteristics: Wall-mounted steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.
 - 1. Size: Adequate for storage of spare fuses specified with 20 percent spare capacity minimum.
 - 2. Finish: Gray, baked enamel.
 - 3. Identification: "SPARE FUSES" in 1-1/2-inch- (38-mm-) high letters on exterior of door.
 - 4. Fuse Pullers: For each size of fuse, where applicable and available, from fuse manufacturer.
 - 5. Cabinet: suitably identified, lockable, compartmented, steel.
 - 6. Provide one spare set (3) of each size and type used.
 - 7. Mount where directed.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.
- B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.
- C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
- D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

- A. Cartridge Fuses:
 - 1. Service Entrance: Class L, time delay, Class RK1, time delay, Class J, time delay, as indicated on the drawings or as required by the overcurrent protective device coordination study.

2. Feeders: Class L, time delay, Class RK1, time delay, Class RK5, time delay, Class J, time delay, as indicated on the drawings or as required by the overcurrent protective device coordination study.
3. Motor Branch Circuits: Class RK5, time delay.
4. Other Branch Circuits: Class RK1, time delay for general purpose loads. Class RK5, time delay for inrush loads motors, transformers, etc. Class J, time delay for when higher current limitation is needed.
5. Control Circuits: Class CC, fast acting.

3.3 INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.
- B. Install plug-fuse adapters in Edison-base fuseholders and sockets. Ensure that adapters are irremovable once installed.
- C. Install spare-fuse cabinet(s).

3.4 IDENTIFICATION

- A. Install labels complying with requirements for identification specified in Division 26 Section 260553 "Identification for Electrical Work" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION

SECTION 264313 - SURGE PROTECTIVE DEVICES (SPDs)

PART 1 - GENERAL

1.1 SCOPE

- A. The Contractor shall furnish and install the Surge Protective Device (SPD) equipment having the electrical characteristics, ratings, and modifications as specified herein and as shown on the contract drawings. To maximize performance and reliability and to obtain the lowest possible let-through voltages, the ac surge protection shall be integrated into electrical distribution equipment such as panelboards. Refer to related sections for surge requirements in:

1.2 REFERENCES

- A. SPD units and all components shall be designed, manufactured, and tested in accordance with the latest applicable UL standard (ANSI/UL 1449 3rd Edition).

1.3 SUBMITTALS – FOR REVIEW/APPROVAL

- A. The following information shall be submitted to the Engineer:
 1. Provide verification that the SPD complies with the required ANSI/UL 1449 3rd Edition listing by Underwriters Laboratories (UL) or other Nationally Recognized Testing Laboratory (NRTL). Compliance may be in the form of a file number that can be verified on UL's website or on any other NRTL's website, as long as the website contains the following information at a minimum: model number, SPD Type, system voltage, phases, modes of protection, Voltage Protection Rating (VPR), and Nominal Discharge Current (I_n).
 2. For sidemount mounting applications (SPD mounted external to electrical assembly), electrical/mechanical drawings showing unit dimensions, weights, installation instruction details, and wiring configuration.
- B. Where applicable the following additional information shall be submitted to the engineer:
 1. Descriptive bulletins
 2. Product sheets

1.4 SUBMITTALS – FOR CONSTRUCTION

- A. The following information shall be submitted for record purposes:
 1. Final as-built drawings and information for items listed in Section 1.04 and shall incorporate all changes made during the manufacturing process

1.5 QUALIFICATIONS

- A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
- B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.
- C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of

installations with similar equipment shall be provided demonstrating compliance with this requirement.

- D. The SPD shall be compliant with the Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Equipment shall be handled and stored in accordance with manufacturer’s instructions. One (1) copy of manufacturer’s instructions shall be included with the equipment at time of shipment.

1.7 OPERATION AND MAINTENANCE MANUALS

- A. Operation and maintenance manuals shall be provided with each SPD shipped.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Eaton
- B. Square D
- C. Seimens

The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features, and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer ten (10) days prior to bid date.

2.2 VOLTAGE SURGE SUPPRESSION – GENERAL

- A. Electrical Requirements

1. Unit Operating Voltage – Refer to drawings for operating voltage and unit configuration.
2. Maximum Continuous Operating Voltage (MCOV) – The MCOV shall not be less than 115% of the nominal system operating voltage.
3. The suppression system shall incorporate thermally protected metal-oxide varistors (MOVs) as the core surge suppression component for the service entrance and all other distribution levels. The system shall not utilize silicon avalanche diodes, selenium cells, air gaps, or other components that may crowbar the system voltage leading to system upset or create any environmental hazards.
4. Protection Modes – The SPD must protect all modes of the electrical system being utilized. The required protection modes are indicated by bullets in the following table:

Configuration	Protection Modes			
	L-N	L-G	L-L	N-G
Wye	●	●	●	●
Delta	N/A	●	●	N/A
Single Split Phase	●	●	●	●
High Leg Delta	●	●	●	●

5. Nominal Discharge Current (I_n) – All SPDs applied to the distribution system shall have a 20kA I_n rating regardless of their SPD Type (includes Types 1 and 2) or operating voltage. SPDs having an I_n less than 20kA shall be rejected.
6. ANSI/UL 1449 3rd Edition Voltage Protection Rating (VPR) – The maximum ANSI/UL 1449 3rd Edition VPR for the device shall not exceed the following:

Modes	208Y/120	480Y/277	600Y/347
L-N; L-G; N-G	700	1200	1500
L-L	1200	2000	3000

B. SPD Design

1. Maintenance Free Design – The SPD shall be maintenance free and shall not require any user intervention throughout its life. SPDs containing items such as replaceable modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.
2. Balanced Suppression Platform – The surge current shall be equally distributed to all MOV components to ensure equal stressing and maximum performance. The surge suppression platform must provide equal impedance paths to each matched MOV. Designs incorporating replaceable SPD modules shall not be accepted.
3. Electrical Noise Filter – Each unit shall include a high-performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be up to 50 dB from 10 kHz to 100 MHz using the MIL-STD-220A insertion loss test method. Products unable able to meet this specification shall not be accepted.
4. Internal Connections – No plug-in component modules or printed circuit boards shall be used as surge current conductors. All internal components shall be soldered, hardwired with connections utilizing low impedance conductors.
5. Monitoring Diagnostics – Each SPD shall provide the following integral monitoring options:
 - a. Protection Status Indicators - Each unit shall have a green / red solid-state indicator light that reports the status of the protection on each phase.
 - i. For wye configured units, the indicator lights must report the status of all protection elements and circuitry in the L-N and L-G modes. Wye configured units shall also contain an additional green / red solid-state indicator light that reports the status of the protection elements and circuitry in the N-G mode. SPDs that indicate only the status of the L-N and L-G modes shall not be accepted.
 - ii. For delta configured units, the indicator lights must report the status of all protection elements and circuitry in the L-G and L-L modes.
 - iii. The absence of a green light and the presence of a red light shall indicate that damage has occurred on the respective phase or mode. All protection status indicators must indicate the actual status of the protection on each phase or mode. If power is removed from any one phase, the indicator lights must continue to indicate the status of the protection on all other phases and protection

- modes. Diagnostics packages that simply indicate whether power is present on a particular phase shall not be accepted.
- b. Remote Status Monitor – The SPD must include Form C dry contacts (one NO and one NC) for remote annunciation of its status. Both the NO and NC contacts shall change state under any fault condition.
 - c. Audible Alarm and Silence Button – The SPD shall contain an audible alarm that will be activated under any fault condition. There shall also be an audible alarm silence button used to silence the audible alarm after it has been activated.
 - d. Surge Counter – The SPD shall be equipped with an LCD display that indicates to the user how many surges have occurred at the location. The surge counter shall trigger each time a surge event with a peak current magnitude of a minimum of $50 \pm 20A$ occurs. A reset pushbutton shall also be standard, allowing the surge counter to be zeroed. The reset button shall contain a mechanism to prevent accidental resetting of the counter via a single, short-duration button press. In order to prevent accidental resetting, the surge counter reset button shall be depressed for a minimum of 2 seconds in order to clear the surge count total.
 - i. The ongoing surge count shall be stored in non-volatile memory. If power to the SPD is completely interrupted, the ongoing count indicated on the surge counter's display prior to the interruption shall be stored in non-volatile memory and displayed after power is restored. The surge counter's memory shall not require a backup battery in order to achieve this functionality.
6. Overcurrent Protection
- a. The unit shall contain thermally protected MOVs. These thermally protected MOVs shall have a thermal protection element packaged together with the MOV in order to achieve overcurrent protection of the MOV. The thermal protection element shall disconnect the MOV(s) from the system in a fail-safe manner should a condition occur that would cause them to enter a thermal runaway condition.
7. Fully Integrated Component Design – All of the SPD's components and diagnostics shall be contained within one discrete assembly. SPDs or individual SPD modules that must be ganged together in order to achieve higher surge current ratings or other functionality shall not be accepted.
8. Safety Requirements
- a. The SPD shall minimize potential arc flash hazards by containing no user serviceable / replaceable parts and shall be maintenance free. SPDs containing items such as replaceable modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.
 - b. SPDs designed to interface with the electrical assembly via conductors shall require no user contact with the inside of the unit. Such units shall have any required conductors be factory installed.
 - c. Sidemount SPDs shall be factory sealed in order to prevent access to the inside of the unit. Sidemount SPDs shall have factory installed phase, neutral, ground and remote status contact conductors factory installed and shall have a pigtail of conductors protruding outside of the enclosure for field installation.

2.3 SYSTEM APPLICATION

- A. The SPD applications covered under this section include distribution and branch panel locations, busway, motor control centers (MCC), switchgear, and switchboard assemblies. All SPDs shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category C, B, and A environments.
- B. Surge Current Capacity – The minimum surge current capacity the device is capable of withstanding shall be as shown in the following table:

Minimum surge current capacity based on ANSI / IEEE C62.41 location category			
Category	Application	Per Phase	Per Mode
C	High Exposure: Service Entrance Locations (Switchboards, Switchgear, MCC, Main Entrance, Service Pedestals)	250 kA	125 kA
B	Medium Exposure Distribution Panelboards	160 kA	80 kA
A	Low Exposure: Branch Locations (Panelboards)	80 kA	40 kA

- C. SPD Type – all SPDs installed on the line side of the service entrance disconnect shall be Type 1 SPDs. All SPDs installed on the load side of the service entrance disconnect shall be Type 1 or Type 2 SPDs.

2.4 BRANCH AND DISTRIBUTION PANELBOARD REQUIREMENTS

- A. The SPD application covered under this section includes lighting and distribution panelboards. The SPD units shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category B environments.
 - 1. The SPD shall not limit the use of through-feed lugs, sub-feed lugs, and sub-feed breaker options.
 - 2. SPDs shall be installed immediately following the load side of the main breaker. SPDs installed in main lug only panelboards shall be installed immediately following the incoming main lugs.
 - 3. The panelboard shall be capable of re-energizing upon removal of the SPD.
 - 4. The SPD shall be interfaced to the panelboard via a direct bus bar connection. Alternately, an SPD connected to a circuit breaker for disconnecting purposes may be installed using short lengths of conductors as long as the conductors originate integrally to the SPD.
 - a. SPD shall be connected via 60A-3P circuit breaker and 4#6 + 1#10G. – 1”C, or per manufactures recommendations. The SPD shall be located directly adjacent to the circuit breaker.
 - 5. The SPD shall be included and mounted within the panelboard by the manufacturer of the panelboard.
 - 6. The SPD shall be of the same manufacturer as the panelboard.
 - 7. The complete panelboard including the SPD shall be UL67 listed.
- B. External Mounting Applications Installation

1. Lead length between the breaker and suppressor shall be kept as short as possible to ensure optimum performance. Any excess conductor length shall be trimmed in order to minimize let-through voltage. SPD shall be connected via 60A-3P circuit breaker and 4#6 + 1#10G. – 1”C, or per manufactures recommendations. The installer shall comply with the manufacturer's recommended installation and wiring practices.
- C. Switchgear, Switchboard, MCC, Service Pedestal Panelboards and Busway Requirements
1. The SPD application covered under this section is for switchgear, switchboard, MCC, busway locations and service pedestal panelboards. Service entrance located SPDs shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category C environments.
 2. The SPD shall be of the same manufacturer as the switchgear, switchboard, MCC, busway, and service pedestal panelboards.
 3. The SPD shall be factory installed inside the switchgear, switchboard, MCC, service pedestal panelboard and/or bus plug at the assembly point by the original equipment manufacturer.
 4. Locate the SPD on the load side of the main disconnect device, as close as possible to the phase conductors and the ground/neutral bar.
 5. The SPD shall be connected through a disconnect (circuit breaker). The disconnect shall be located in immediate proximity to the SPD. Connection shall be made via bus, conductors, or other connections originating in the SPD and shall be kept as short as possible.
 6. The SPD shall be integral to switchgear, switchboard, MCC, service pedestal panelboard and/or bus plug as a factory standardized design.
 7. All monitoring and diagnostic features shall be visible from the front of the equipment.

2.5 ENCLOSURES

- A. All enclosed equipment shall have NEMA 1 general purpose enclosures, unless otherwise noted. Provide enclosures suitable for locations as indicated on the drawings and as described below:
1. NEMA 1 – Constructed of a polymer (units integrated within electrical assemblies) or steel (sidemount units only), intended for indoor use to provide a degree of protection to personal access to hazardous parts and provide a degree of protection against the ingress of solid foreign objects (falling dirt).
 2. NEMA 4 – Constructed of steel intended for either indoor or outdoor use to provide a degree of protection against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (dirt and windblown dust); to provide a degree of protection with respect to the harmful effects on the equipment due to the ingress of water (rain, sleet, snow, splashing water, and hose directed water); and that will be undamaged by the external formation of ice on the enclosure. (sidemount units only)
 3. NEMA 4X – Constructed of stainless steel providing the same level of protection as the NEMA 4 enclosure with the addition of corrosion protection. (sidemount units only)

PART 3 - EXECUTION

3.1 EXAMINATION

3.2 FACTORY TESTING

- A. Standard factory tests shall be performed on the equipment under this section. All tests shall be in accordance with the latest version of NEMA and UL standards.

3.3 INSTALLATION

- A. The Contractor shall install all equipment per the manufacturer's recommendations and the contract drawings.

3.4 WARRANTY

- A. The manufacturer shall provide a full ten (10) year warranty from the date of shipment against any SPD part failure when installed in compliance with manufacturer's written instructions and any applicable national or local code.

END OF SECTION

SECTION 26 56 68 – EXTERIOR ATHLETIC LIGHTING

PART 1 – GENERAL

1.1 SUMMARY

- A. Work covered by this section of the specifications shall conform to the contract documents, engineering plans as well as state and local codes.
- B. The purpose of these specifications is to define the lighting system performance and design standards for University of Rhode Island Football using an LED Lighting source. The manufacturer / contractor shall supply lighting equipment to meet or exceed the standards set forth in these specifications.
- C. The sports lighting will be for the following venues:
 - 1. Football
- E. The primary goals of this sports lighting project are:
 - 1. Guaranteed Light Levels: Selection of appropriate light levels impact the safety of the players and the enjoyment of spectators. Therefore light levels are guaranteed to not drop below specified target values for a period of 25 years.
 - 2. Environmental Light Control: It is the primary goal of this project to minimize spill light to adjoining properties and glare to the players, spectators and neighbors. The LED design should provide better control than a good HID design.
 - 3. Life-cycle Cost: In order to reduce the operating budget, the preferred lighting system shall be energy efficient and cost effective to operate. All maintenance costs shall be eliminated for the duration of the warranty.
 - 4. Control and Monitoring: To allow for optimized use of labor resources and avoid unneeded operation of the facility, customer requires a remote on/off control system for the lighting system. Fields should be proactively monitored to detect luminaire outages over a 25-year life cycle. All communication and monitoring costs for 25-year period shall be included in the bid.
- F. All lighting designs shall comply with NCAA Best Lighting Practices for Regional broadcast.

1.2 LIGHTING PERFORMANCE

- A. Illumination Levels and Design Factors: Playing surfaces shall be lit to an average target illumination level and uniformity as specified in the chart below. Lighting calculations shall be developed and field measurements taken on the grid spacing with the minimum number of grid points specified below. Appropriate light loss factors shall be applied and submitted for the basis of design. Average illumination level shall be measured in accordance with the IESNA LM-5-04 (IESNA Guide for Photometric Measurements of Area and Sports Lighting Installations). Illumination levels shall not to drop below desired target values in accordance to IES RP-6-15, Page 2, Maintained Average Illuminance and shall be guaranteed for the full warranty period.

Area of Lighting	Average Target Illumination Levels	Maximum to Minimum Uniformity Ratio	Grid Points	Grid Spacing
Football - Horizontal	75FC	2:1	72	30' x 30'
Main Camera Verticals	75FC	2:1	72	30' x 30'
End Zone Cameras Verticals	45FC	6.0:1	72	30' x 30'
Bleachers	3 FC	3.0:1	88	10' x 10'

- B. Color: The lighting system shall have a minimum color temperature of 5700K and a CRI of 75.
- C. Mounting Heights: To ensure proper aiming angles for reduced glare and to provide better playability, minimum mounting heights shall be as described below. Higher mounting heights may be required based on photometric report and ability to ensure the top of the field angle is a minimum of 10 degrees below horizontal.

# of Poles	Pole Designation	Pole Height
2	FLR1, FLR3	90'
1	FLR2	120'
2	FLR4-FLR5	130'

1.3 ENVIRONMENTAL LIGHT CONTROL

- A. Light Control Luminaires: All luminaires shall utilize spill light and glare control devices including, but not limited to, internal shields, louvers and external shields. No symmetrical beam patterns are accepted.
- B. Lighting Ordinance: In accordance with Kingston, Rhode Island’s lighting ordinance.
- C. The first page of a photometric report for all luminaire types proposed showing horizontal and vertical axial candle power shall be provided to demonstrate the capability of achieving the specified performance. Reports shall be certified by a qualified independent testing laboratory with a minimum of five years experience or by a manufacturer’s laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products. A summary of the horizontal and vertical aiming angles for each luminaire shall be included with the photometric report.

1.4 LIFE-CYCLE COSTS

- A. Manufacturer shall submit a 25-year life cycle cost calculation as outlined in the required submittal information.
- B. Preventative and Spot Maintenance: Manufacturer shall provide all preventative and spot maintenance, including parts and labor for 25 years from the date of equipment shipment. Individual outages shall be repaired when the usage of any field is materially impacted. Owner agrees to check fuses in the event of a luminaire outage.

1.5 PRE-BID SUBMITTAL REQUIREMENTS (Non-Musco)

- A. Design Approval: The owner / engineer will review pre-bid submittals per section 4.0.B from all the manufacturers to ensure compliance to the specification 10 days prior to bid. If the design meets the design requirements of the specifications, a letter and/or addendum will be issued to the manufacturer indicating approval for the specific design submitted.
- B. Approved Product: Musco’s Light-Structure System™ with TLC for LED™ is the approved product. All substitutions must provide a complete submittal package for approval as outlined in Submittal Information at the end of this section at least 10 days prior to bid. Special manufacturing to meet the standards of this specification may be required. An addendum will be issued prior to bid listing any other approved lighting manufacturers and designs.
- C. All listed manufacturers not pre-approved shall submit the information at the end of this section at least 10 days prior to bid. An addendum will be issued prior to bid; listing approved lighting manufacturers and the design method to be used.
- D. Bidders are required to bid only products that have been approved by this specification or addendum by the owner or owner’s representative. Bids received that do not utilize an approved system/design, will be rejected.

REQUIRED SUBMITTAL INFORMATION FOR ALL MANUFACTURERS (NOT PRE-APPROVED) 14 DAYS PRIOR TO BID

All items listed below are mandatory, shall comply with the specification and be submitted according to pre-bid submittal requirements. Complete the Yes/No column to indicate compliance (Y) or noncompliance (N) for each item. Submit checklist below with submittal.

Yes / No	Tab	Item	Description
	A	Letter/ Checklist	Listing of all information being submitted must be included on the table of contents. List the name of the manufacturer’s local representative and his/her phone number. Signed submittal checklist to be included.
	B	Equipment Layout	Drawing(s) showing field layouts with pole locations
	C	On Field Lighting Design	Lighting design drawing(s) showing: <ul style="list-style-type: none"> a. Field Name, date, file number, prepared by b. Outline of field(s) being lighted, as well as pole locations referenced to the center of the field (x & y), Illuminance levels at grid spacing specified c. Pole height, number of fixtures per pole, horizontal and vertical aiming angles, as well as luminaire information including wattage, lumens and optics d. Height of light test meter above field surface. e. Summary table showing the number and spacing of grid points; average, minimum and maximum illuminance levels in foot candles (fc); uniformity including maximum to minimum ratio, coefficient of variance (CV), coefficient of utilization (CU) uniformity gradient; number of luminaries, total kilowatts, average tilt factor; light loss factor.
	D	Off Field Lighting Design	Lighting design drawing showing initial spill light levels along the boundary line (defined on bid drawings) in footcandles. Light levels shall be taken at 30-foot intervals along the boundary line. Readings shall be taken with the meter orientation at both horizontal and aimed towards the most intense bank of lights.

F	Photometric Report	Provide first page of photometric report for all luminaire types being proposed showing candela tabulations as defined by IESNA Publication LM-35-02. Photometric data shall be certified by laboratory with current National Voluntary Laboratory Accreditation Program or an independent testing facility with over 5 years experience.
G	Performance Guarantee	Provide performance guarantee including a written commitment to undertake all corrections required to meet the performance requirements noted in these specifications at no expense to the owner. Light levels must be guaranteed to not fall below target levels for warranty period.
H	Structural Calculations	Pole structural calculations and foundation design showing foundation shape, depth backfill requirements, rebar and anchor bolts (if required). Pole base reaction forces shall be shown on the foundation drawing along with soil bearing pressures. Design must be stamped by a structural engineer in the state of Rhode Island, if required by owner. (May be supplied upon award).
I	Control & Monitoring System	Manufacturer of the control and monitoring system shall provide written definition and schematics for automated control system to include monitoring. They will also provide ten (10) references of customers currently using proposed system in the state of Rhode Island.
J	Electrical Distribution Plans	Manufacturer bidding an alternate product must include a revised electrical distribution plan including changes to service entrance, panels and wire sizing, signed by a licensed Electrical Engineer in the state of Rhode Island.
K	Warranty	Provide written warranty information including all terms and conditions. Provide ten (10) references of customers currently under specified warranty in the state of Rhode Island.
L	Project References	Manufacturer to provide a list of (5) projects where the technology and specific fixture proposed for this project has been installed in the state of Rhode Island. Reference list will include project name, project city, installation date, and if requested, contact name and contact phone number.
M	Product Information	Complete bill of material and current brochures/cut sheets for all product being provided.
N	Delivery	Manufacturer shall supply an expected delivery timeframe from receipt of approved submittals and complete order information.
O	Non-Compliance	Manufacturer shall list all items that do not comply with the specifications. If in full compliance, tab may be omitted.

The information supplied herein shall be used for the purpose of complying with the specifications for University of Rhode Island Football. By signing below I agree that all requirements of the specifications have been met and that the manufacturer will be responsible for any future costs incurred to bring their equipment into compliance for all items not meeting specifications and not listed in the Non-Compliance section.

Manufacturer: _____ Signature: _____

Contact Name: _____ Date: ____/____/____

Contractor: _____ Signature: _____

PART 2 – PRODUCT

2.1 SPORTS LIGHTING SYSTEM CONSTRUCTION

- A. Manufacturing Requirements: All components shall be designed and manufactured as a system. All luminaires, wire harnesses, drivers and other enclosures shall be factory assembled, aimed, wired and tested.
- B. Durability: All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed carbon steel shall be hot dip galvanized per ASTM A123. All exposed aluminum shall be powder coated with high performance polyester or anodized. All exterior reflective inserts shall be anodized, coated, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All exposed hardware and fasteners shall be stainless steel of 18-8 grade or better, passivated and coated with aluminum-based thermosetting epoxy resin for protection against corrosion and stress corrosion cracking. Structural fasteners may be carbon steel and galvanized meeting ASTM A153 and ISO/EN 1461 (for hot dipped galvanizing), or ASTM B695 (for mechanical galvanizing). All wiring shall be enclosed within the cross-arms, pole, or electrical components enclosure.
- C. System Description: Lighting system shall consist of the following:
 - 1. Galvanized steel poles and cross-arm assembly.
 - 2. Alternate: Concrete pole with a minimum of 8,000 psi and installed with concrete backfill will be an acceptable alternative provided building code, wind speed and foundation designs per specifications are adhered to.
 - 3. Non-approved pole technology:
 - a. Square static cast concrete poles will not be accepted.
 - b. Direct bury steel poles which utilize the extended portion of the steel shaft for their foundation will not be accepted due to potential for internal and external corrosive reaction to the soils and long term performance concerns.
 - 4. Lighting systems shall use concrete foundations. See Section 2.3 for details.
 - a. For a foundation using a pre-stressed concrete base embedded in concrete backfill the concrete shall be air-entrained and have a minimum compressive design strength at 28 days of 3,000 PSI. 3,000 PSI concrete specified for early pole erection, actual required minimum allowable concrete strength is 1,000 PSI. All piers and concrete backfill must bear on and against firm undisturbed soil.

- b. For anchor bolt foundations or foundations using a pre-stressed concrete base in a suspended pier or re-inforced pier design pole erection may occur after 7 days. Or after a concrete sample from the same batch achieves a certain strength.
 - 5. Manufacturer will supply all drivers and supporting electrical equipment
 - a. Remote drivers and supporting electrical equipment shall be mounted approximately 10 feet above grade in aluminum enclosures. The enclosures shall be touch-safe and include drivers and fusing with indicator lights on fuses to notify when a fuse is to be replaced for each luminaire. Disconnect per circuit for each pole structure will be located in the enclosure.
 - b. If drivers are located adjacent to the luminaires, manufacturer must provide climbing steps, safety cables and service platforms on each structure.
 - 6. Manufacturer shall provide surge protection at the pole equal to or greater than 40 kA for each line to ground (Common Mode) as recommended by IEEE C62.41.2_2002.
 - 7. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.
 - 8. All luminaires, visors, and cross-arm assemblies shall withstand 150 mph winds and maintain luminaire aiming alignment.
 - 9. Control cabinet to provide remote on-off control and monitoring of the lighting system. See Section 2.4 for further details.
 - 10. Manufacturer shall provide lightning grounding as defined by NFPA 780 and be UL Listed per UL 96 and UL 96A.
 - a. Integrated grounding via concrete encased electrode grounding system.
 - b. If grounding is not integrated into the structure, the manufacturer shall supply grounding electrodes, copper down conductors, and exothermic weld kits. Electrodes and conductors shall be sized as required by NFPA 780. The grounding electrode shall be minimum size of 5/8 inch diameter and 8 feet long, with a minimum of 10 feet embedment. Grounding electrode shall be connected to the structure by a grounding electrode conductor with a minimum size of 2 AWG for poles with 75 feet mounting height or less, and 2/0 AWG for poles with more than 75 feet mounting height.
- D. Safety: All system components shall be UL listed for the appropriate application.

2.2 ELECTRICAL

- A. Electric Power Requirements for the Sports Lighting Equipment:
 - 1. Electric power: 480 Volt, 3 Phase
 - 2. Maximum total voltage drop: Voltage drop to the disconnect switch located on the poles shall not exceed three (3) percent of the rated voltage.
- B. Energy Consumption: The kW consumption for the field lighting system shall be 95 kW, or less

2.3 STRUCTURAL PARAMETERS

- A. Wind Loads: Wind loads shall be based on the 2012 International Building Code. Wind loads to be calculated using ASCE 7-10, an ultimate design wind speed of 140mph and exposure category C.

- B. Pole Structural Design: The stress analysis and safety factor of the poles shall conform to 2009 AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (LTS-5).
- C. Foundation Design: The foundation design shall be based on soil parameters as outlined in the geotechnical report. If no geotechnical report is available, the foundation design shall be based on soils that meet or exceed those of a Class 5 material as defined by 2012 IBC Table 1806.2.
- C. Foundation Drawings: Project specific foundation drawings stamped by a registered engineer in the state where the project is located are required. The foundation drawings must list the moment, shear (horizontal) force, and axial (vertical) force at ground level for each pole. These drawings must be submitted at time of bid to allow for accurate pricing.

2.4 CONTROL

- A. Instant On/Off Capabilities: System shall provide for instant on/off of luminaires with high/med/low dimming.
- B. Lighting contactor cabinet(s) constructed of NEMA Type 4 aluminum, designed for easy installation with contactors, labeled to match field diagrams and electrical design. Manual off-on-auto selector switches shall be provided.
- C. Remote Lighting Control System: System shall allow owner and users with a security code to schedule on/off system operation via a web site, phone, fax or email up to ten years in advance. Manufacturer shall provide and maintain a two-way TCP/IP communication link. Trained staff shall be available 24/7 to provide scheduling support and assist with reporting needs.

The owner may assign various security levels to schedulers by function and/or fields. This function must be flexible to allow a range of privileges such as full scheduling capabilities for all fields to only having permission to execute “early off” commands by phone. Scheduling tool shall be capable of setting curfew limits.

Controller shall accept and store 7-day schedules, be protected against memory loss during power outages, and shall reboot once power is regained and execute any commands that would have occurred during outage.

- D. Remote Monitoring System: System shall monitor lighting performance and notify manufacturer if individual luminaire outage is detected so that appropriate maintenance can be scheduled. The controller shall determine switch position (manual or auto) and contactor status (open or closed).
- E. Management Tools: Manufacturer shall provide a web-based database and dashboard tool of actual field usage and provide reports by facility and user group. Dashboard shall also show current status of luminaire outages, control operation and service. Mobile application will be provided suitable for IOS, Android and Blackberry devices.

Hours of Usage: Manufacturer shall provide a means of tracking actual hours of usage for the field lighting system that is readily accessible to the owner.

1. Cumulative hours: shall be tracked to show the total hours used by the facility
 2. Report hours saved by using early off and push buttons by users.
- F. Communication Costs: Manufacturer shall include communication costs for operating the controls and monitoring system for a period of 25 years.

PART 3 – EXECUTION

3.1 SOIL QUALITY CONTROL

- A. It shall be the Contractor's responsibility to notify the Owner if soil conditions exist other than those on which the foundation design is based, or if the soil cannot be readily excavated. Contractor may issue a change order request / estimate for the Owner's approval / payment for additional costs associated with:
1. Providing engineered foundation embedment design by a registered engineer in the State of Rhode Island for soils other than specified soil conditions;
 2. Additional materials required to achieve alternate foundation;
 3. Excavation and removal of materials other than normal soils, such as rock, caliche, etc.

3.2 DELIVERY TIMING

- A. Delivery Timing Equipment On-Site: The equipment must be on-site 14-16 weeks from receipt of approved submittals and receipt of complete order information.

3.3 FIELD QUALITY CONTROL

- B. Illumination Measurements: Upon substantial completion of the project and in the presence of the Contractor, Project Engineer, Owner's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with IESNA LM-5-04.
- C. Field Light Level Accountability
1. Light levels are guaranteed not to fall below the target maintained light levels for the entire warranty period of 25 Years.
 2. The contractor/manufacturer shall be responsible for an additional inspection one year from the date of commissioning of the lighting system and will utilize the owner's light meter in the presence of the owner.
 3. The contractor/manufacturer will be held responsible for any and all changes needed to bring these fields back to compliance for light levels and uniformities. Contractor/Manufacturer will be held responsible for any damage to the fields during these repairs.
- D. Correcting Non-Conformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including footcandles and uniformity ratios are not in conformance with the requirements of the performance specifications and submitted information, the Manufacturer shall be required to make adjustments to meet specifications and satisfy Owner.

3.4 WARRANTY AND GUARANTEE

- A. 25-Year Warranty: Each manufacturer shall supply a signed warranty covering the entire system for 25 years from the date of shipment. Warranty shall guarantee specified light levels. Manufacturer shall maintain specifically-funded financial reserves to assure fulfillment of the warranty for the full term. Warranty does not cover weather conditions events such as lightning or hail damage, improper installation, vandalism or abuse, unauthorized repairs or alterations, or product made by other manufacturers.
- B. Maintenance: Manufacturer shall monitor the performance of the lighting system, including on/off status, hours of usage and luminaire outage for 25 years from the date of equipment shipment. Parts and labor shall be covered such that individual luminaire outages will be repaired when the usage of any field is materially impacted. Owner agrees to check fuses in the event of a luminaire outage.

Soil Erosion and Sediment Control Plan

For:

Meade Stadium Field Turf Project

University of Rhode Island, Kingston Campus

South Kingstown, Rhode Island

Plat 23-1 Lot 1

Owner:	University of Rhode Island Paul M. DePace, P.E., Director Office of Capital Projects 60 Tootell Road, South Kingstown, RI 02881 (401) 874-4845
Operator:	Company Name Name Address City, State, Zip Code Telephone Number Email Address
	<i>TO BE DETERMINED UPON CONTRACT AWARD</i>
Estimated Project Dates:	Start Date: 2019 (TBD) Completion Date: 2019 (TBD)
SESC Plan Prepared By:	Gordon R. Archibald, Inc. Todd A. Ravenelle, P.E., Senior Vice President 200 Main Street Pawtucket, RI 02860 (401) 726-4084 travenelle@graengs.com Rhode Island P.E. No. 5928
SESC Plan Preparation Date:	October 2018
SESC Plan Revision Date:	

OPERATOR CERTIFICATION

Upon contract award, the OPERATOR must sign this certification statement before construction may begin.

I certify under penalty of law that this document and all attachments were prepared under the direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that it is the responsibility of the owner/operator to implement and amend the Soil Erosion and Sediment Control Plan as appropriate in accordance with the requirements of the RIPDES Construction General Permit.

Operator Signature:

Date

Contractor Representative: Name

Contractor Title: Title

Contractor Company Name: Company Name (if applicable)

Address: Mailing Address

Phone Number: Phone Number

Email Address: Email

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This Table of Contents is structured to be automatically populated by Microsoft Word. Upon final completion of this template, “right-click” anywhere in the Table of Contents, select “Update Field”, and then “Update entire table”. Page numbers will automatically be synced with the changed document.

INTRODUCTION

The purpose of erosion, runoff, and sedimentation control measures is to prevent pollutants from leaving the construction site and entering waterways or environmentally sensitive areas during and after construction. This SESC Plan has been prepared prior to the initiation of construction activities to address anticipated worksite conditions. The control measures depicted on the site plan and described in this narrative should be considered the minimum measures required to control erosion, sedimentation, and stormwater runoff at the site. Since construction is a dynamic process with changing site conditions, it is the operator's responsibility to manage the site during each construction phase so as to prevent pollutants from leaving the site. This may require the operator to revise and amend the SESC Plan during construction to address varying site and/or weather conditions, such as by adding or realigning erosion or sediment controls to ensure the SESC Plan remains compliant with the RIPDES Construction General Permit. Records of these changes must be added to the amendment log attached to the SESC Plan, and to the site plans as "red-lined" drawings. Please Note: **Even if practices are correctly installed on a site according to the approved plan, the site is only in compliance when erosion, runoff, and sedimentation are effectively controlled throughout the entire site.**

It is the responsibility of the site owner and the site operator to maintain the SESC Plan at the site, including all attachments, amendments and inspection records, and to make all records available for inspection by RIDEM during and after construction. (RIPDES CGP - Part III.G)

The site owner, the site operator, and the designated site inspector are required to review the SESC Plan and sign the Party Certification pages (Section 8). The primary contractor (if different) and all subcontractors (if applicable) involved in earthwork or exterior construction activities are also required to review the SESC Plan and sign the certification pages before construction begins.

Any questions regarding the SESC Plan, control measures, inspection requirements, or any other facet of this document may be addressed to the RIDEM Office of Water Resources, at 401-222-4700 or via email: water@dem.ri.gov.

SOIL EROSION AND SEDIMENT CONTROL PLAN GUIDANCE

SECTION 1: SITE DESCRIPTION

1.1 Project/Site Information

Project/Site Name:

- Meade Stadium Field Turf Project
Meade Stadium, 3 Keaney Road, Kingston, Rhode Island
URI Kingston Campus
- The University of Rhode Island (URI) Office of Capital Projects is advancing the reconstruction of the Meade Stadium athletic field, situated along the south side of West Alumni Road at its Kingston Campus. The project will remove the existing grass turf and reconstruct the athletic field as a permeable FieldTurf structure. Work will include the establishment of all construction erosion, sediment, and drainage controls, followed by the demolition of existing facilities and structures and the construction of improvements, including new porous turf, new lighting, fencing, landscaping, and other amenities; and best management practices (BMPs, including the permeable FieldTurf system) for stormwater management.

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Project Street/Location:

- The Meade Stadium is located south of the intersection of West Alumni Avenue and Rhody Ram Way, on the University of Rhode Island's Kingston Campus.
- See Attachment A of this SESC Plan for a General Location Map.

Provide construction site estimates of the total area of the site and the total area of the site that is expected to undergo soil disturbance.

The following are estimates of the construction site area:

- Total Project Area (Lot Area) 161.13 acres
- Total Project Area to be Disturbed (LOD) 2.76 acres

Have the Limits of Disturbance have been marked in the field

Yes No - LOD will be established prior to construction activities.

1.2 Natural Heritage Area Information

RIPDES CGP - Part III.H

Each project authorized under the RIPDES Construction General Permit must determine if the site is within or directly discharges to a Natural Heritage Area (NHA). DEM Natural Heritage Areas include known occurrences of state and federal rare, threatened and endangered species. Review RIDEM NHA maps to determine if there are natural heritage areas on or near the construction site that may be impacted during construction. For more information you may contact the RIDEM Rhode Island Natural Heritage Program <mailto:plan@dem.ri.gov>

Are there any Natural Heritage Areas being disturbed by the construction activity or will discharges be directed to the Natural Heritage Area as a result of the construction activity?

Yes No

If yes, describe or refer to documentation which determines the likelihood of an impact on this area and the steps that will be taken to address any impacts.

- N/A

1.3 Historic Preservation/Cultural Resources

The National Historic Preservation Act, and any state, local, and tribal historic preservation laws apply to construction activities. As with endangered species, some permits may specifically require you to assess the potential impact of your stormwater discharges on historic properties. However, whether or not this is stated as a condition for permit coverage, the National Historic Preservation Act and any applicable state or tribal laws apply to you. Contact the Rhode Island Historic Preservation Officer (<http://www.preservation.ri.gov/>) or your Tribal Historic Preservation Officer (http://grants.cr.nps.gov/THPO_Review/index.cfm) for more information.

Are there any historic properties, historic cemeteries or cultural resources on or near the construction site?

Yes No

Describe how this determination was made and summarize state or tribal review comments:

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- Review of historical aerial photographs (1939-present) and historic feature datasets available through RIGIS; immediate past uses (athletic field).

If yes, describe or refer to documentation which determines the likelihood of an impact on this historic property, historic cemetery or cultural resource and the steps taken to address that impact including any conditions or mitigation measures that were approved by other parties.

- N/A

SECTION 2: EROSION, RUNOFF, AND SEDIMENT CONTROL

RIPDES Construction General Permit – Part III.J.1 – Erosion, Runoff, and Sediment Controls

The purpose of erosion controls is to prevent sediment from being detached and moved by wind or the action of raindrop, sheet, rill, gully, and channel erosion. Properly installed and maintained erosion controls are the primary defense against sediment pollution.

Runoff controls are used to slow the velocity of concentrated water flows. By intercepting and diverting stormwater runoff to a stabilized outlet or treatment practice or by converting concentrated flows to sheet flow erosion and sedimentation are reduced.

Sediment controls are the last line of defense against moving sediment. The purpose is to prevent sediment from leaving the construction site and entering environmentally sensitive areas.

This section describes the set of control measures that will be installed before and during the construction project to avoid, mitigate, and reduce impacts associated with construction activity. Specific control measures and their applicability are contained in Section Four: Erosion Control Measures, Section Five: Runoff Control Measures, and Section Six: Sediment Control Measures of the *RI SESC Handbook*. The *RI SESC Handbook* can be found at the following address:

<http://www.dem.ri.gov/soilerosion2014final.pdf>

2.1 Avoid and Protect Sensitive Areas and Natural Features

Per RI Stormwater Design and Installation Standards Manual 3.3.7.1:

Areas of existing and remaining vegetation and areas that are to be protected as identified in the Section 1.6 of the SESC Plan must be clearly identified on the SESC Site Plans for each Phase of Construction. Prior to any land disturbance activities commencing on the site, the Contractor shall physically mark limits of disturbance (LOD) on the site and any areas to be protected within the site, so that workers can clearly identify the areas to be protected.

*Constraints are identified to ensure a comprehensive understanding of the project and surrounding areas. The first goal in the low impact development (LID) site planning and design process is to avoid disturbance of natural features. This includes identification and preservation of natural areas that can be used in the protection of water resources. It is important to understand that minimizing the hydrologic alteration of a site is just as important as stormwater treatment for resource protection. Therefore, describe all site features and sensitive resources that exist at the site such as, view barriers,, steep slopes (>15%)that if disturbed will require additional erosion controls, areas with the potential to receive run-on from off-site areas, wetlands, surface waters, and their riparian buffers, specimen trees, natural vegetation, forest areas, stream crossings, historic properties, historic cemeteries or cultural resources that are to be preserved. **This includes those site features that should be avoided within the designated limits of disturbance.** These areas are often identified on a constraints map or in a separate constraints report. For additional discussion on this topic refer to Appendix F. Site Constraint Map of the *RI SESC Handbook*.*

Describe and illustrate on SESC Site Plans Sensitive Areas and Natural Features and how each will be protected during construction activity. Examples of areas to be protected include vegetated buffers, forests,

Soil Erosion and Sediment Control Plan
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stands of trees on the perimeter and within the site, large diameter trees, areas designated for infiltration (QPAs), bioretention, rain gardens, and OWTS leachfields. Protection for stands of trees and individual trees to be preserved must be specified and such protection must comply with the RI SESC Handbook and extend to the drip line.

*Describe and illustrate on SESC Site Plans based on Constraints Map, the areas that will be disturbed with each phase of construction and the control measures (signs, fences, etc.) that will be used to protect those areas that should not be disturbed. **This includes marking for limits of disturbance at the perimeter and areas within the limits of disturbance.** Acceptable measures include but are not limited to construction fencing (plastic mesh, snow fence, chain link fence etc.) appropriate for the site, boundary markers using construction tape, flagged stakes, etc. for low density use, sediment barriers such as silt fence, compost socks with flagging where also required for sediment control, and signage. The narrative portion of the plan and SESC Site Plans must highlight measures to prevent soil compaction in areas designated as Qualified Pervious Areas (QPAs) and infiltration practices to protect infiltration capacity.*

Feature Requiring Protection	Construction Phase #	Method of Protection	Sheet #
Adjacent downgradient surface including White Horn Brook		Staking of LOD, perimeter compost filter sock	General Plan
Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text

2.2 Minimize Area of Disturbance

Per RI Stormwater Design and Installation Standards Manual 3.3.7.2:

Will >5 acres be disturbed in order to complete this project?

Yes No

If yes, phasing must be utilized at this site.

Will <5 acres be disturbed or will disturbance activities be completed within a six (6) month window?

Yes No

If yes, phasing is not required as long as all other performance criteria will be met and phasing is not necessary to protect sensitive or highly vulnerable areas.

Based on the answers to the above questions, will phasing be required for this project?

Yes No

If yes, and phasing is required, describe phasing plan as prompted below.

If No, provide substantive reasons why this was determined to be infeasible.

Total disturbed area is less than 5 acres.

For each phase of the construction project, provide site estimates of the total area of the project phase, and the total area of the project phase that is expected to undergo soil disturbance.

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The following are estimates of each phase of the construction project:

(Copy and paste this section for projects with multiple phases)

Phase No. or Identifier	n/a
Total Area of Phase	2.76 acres
Area to be Disturbed	2.76 acres

Description of Construction Sequencing for Phase 1

Proper sequencing of construction activities is essential to maximize the effectiveness of erosion, runoff, and sediment control measures. Construction sequencing of construction activities for each phase must address the following elements:

- 1. Installation of control measures identifying limits of disturbance and areas internal to the site that require protection before start of land disturbance.*
- 2. Installation of all erosion, runoff, and sediment controls and temporary pollution prevention measures that are required to be in place and functional before any earthwork begins. This shall be done in accordance with the RI SESC Handbook and/or the RI Department of Transportation Standard Specifications for Road and Bridge Construction (as amended). Upon acceptable completion of site preparation and installation of erosion, runoff, and sediment controls and temporary pollution prevention measures, site construction activities may commence.*
- 3. The phasing plan shall address the use of phasing to manage and limit increases in runoff rates and volumes during construction. Designated phases and timing of construction should also address the impacts to important or sensitive habitats.*
- 4. Upon commencement of site construction activities, the operator shall initiate appropriate stabilization practices on all disturbed areas as soon as possible, but not more than fourteen (14) days after the construction activity in that area has temporarily or permanently ceased. Such temporary or permanent soil stabilization measures must be installed prior to initiating land disturbance in subsequent phases.*
- 5. Routine inspection and maintenance and/or modification of erosion, runoff, and sediment controls and temporary pollution prevention measures while earthwork is ongoing is required.*
- 6. Final site stabilization of any disturbed areas after earthwork has been completed and removal of temporary erosion, runoff, and sediment controls and temporary pollution prevention measures.*
- 7. Activation of post-construction stormwater treatment conveyances and practices.*

The anticipated sequence of construction is as follows:

- Mobilize and establish construction site.
- Conduct survey and layout.
- Install perimeter erosion controls (compost filter sock), crushed stone construction entrances, shrub protection devices and other construction best management practices as shown on the Site Plans.
- Clear and excavate the areas to be constructed under the phase to desired subgrade.
- Install subdrain bedding course and perforated piping. Complete backfill of area in accordance with the proposed turf structure as shown on the plans.
- Place FieldTurf

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- Loam and seed designated areas.
- Remove and dispose temporary erosion controls.
- Conduct final site cleanup, including sweeping of all pervious surfaces.
- Demobilize and open facility for operation.

2.3 Minimize the Disturbance of Steep Slopes

Per RI Stormwater Design and Installation Standards Manual 3.3.7.3:

Are steep slopes (>15%) present within the proposed project area?

Yes No

If yes, steep slopes must be identified on SESC Site Plans.

If yes, also list the specific control measures that will be used to control surface runoff and reduce erosion potential on steep slopes during construction including references to SESC Site Plans where the locations of such control measures are shown. Examples include limiting the number of steep slopes that are disturbed at one time, implementing land grading techniques such as reverse slope benches, diversions, stair steps, and terraced landforms, installation of retaining walls for stabilization of challenging slopes, prevention of soil movement, and slope protection, applying materials for temporary and permanent protection of slopes to prevent erosion such as stone aggregates, rip-rap, erosion control blankets, appropriate spacing of sediment barriers as a function of barrier size, slope, and slope length, geotextile, cellular confinement systems, mattresses (gabions and others), and articulating blocks.

There are no steep slopes within the project limits of disturbance.

2.4 Preserve Topsoil

Per RI Stormwater Design and Installation Standards Manual 3.3.7.4:

Site owners and operators must preserve existing topsoil on the construction site to the maximum extent feasible and as necessary to support healthy vegetation, promote soil stabilization, and increase stormwater infiltration rates in the post-construction phase of the project.

Will existing topsoil be preserved at the site?

Yes No

If Yes, describe how topsoil will be preserved at the site by describing the techniques that will be implemented to achieve appropriate depths of topsoil (4 inch minimum) and identify the locations where topsoil will be restored on SESC Site Plans.

Within the project limits, existing topsoil will be stripped, and stockpiled at the Owners direction for reuse within the campus.

If No, provide substantive reasons why this was determined to be infeasible.

N/A

Soil compaction must be minimized by maintaining limits of disturbance throughout construction. In areas where infiltrating stormwater treatment practices are located compacted soils must be amended such that they will comply the design infiltration rates.

Identify the methods that will be used to restore and amend topsoil at the site. Include references to plan notes and SESC Site Plan sheet numbers where this information is made available for the site operator.

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During construction, construction staking and other appropriate measures will be employed to ensure that the native soils underlying stormwater infiltration systems are protected from compaction by equipment, to the maximum extent practicable.

2.5 Stabilize Soils

Per RI Stormwater Design and Installation Standards Manual 3.3.7.5:

Upon completion and acceptance of site preparation and initial installation of erosion, runoff, and sediment controls and temporary pollution prevention measures, the operator shall initiate appropriate temporary or permanent stabilization practices during all phases of construction on all disturbed areas as soon as possible, but not more than fourteen (14) days after the construction activity in that area has temporarily or permanently ceased.

Any disturbed areas that will not have active construction activity occurring within 14 days must be stabilized using the control measures depicted in the SESC Site Plans, in accordance with the *RI SESC Handbook*, and per manufacturer product specifications.

Only areas that can be reasonably expected to have active construction work being performed within 14 days of disturbance will be cleared/grubbed at any one time. It is NOT acceptable to clear and grub the entire construction site if portions will not be active within the 14-day time frame. Proper phasing of clearing and grubbing activities shall include temporary stabilization techniques for areas cleared and grubbed that will not be active within the 14-day time frame.

All disturbed soils exposed prior to October 15 of any calendar year shall be seeded by that date if vegetative measures are the intended soil stabilization method. Any such areas that do not have adequate vegetative stabilization, as determined by the site operator or designated inspector, by November 15, must be stabilized through the use of non-vegetative erosion control measures. If work continues within any of these areas during the period from October 15 through April 15, care must be taken to ensure that only the area required for that day's work is exposed, and all erodible soil must be restabilized within 5 working days. In limited circumstances, stabilization may not be required if the intended function of a specific area of the site necessitates that it remain disturbed (i.e. construction of a motocross track).

Describe controls (i.e., temporary seeding with native vegetation, hydroseeding, mulching, application of rolled erosion control products, etc.) including design specifications and details that will be implemented to stabilize exposed soils where construction activities have temporarily or permanently ceased.

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Temporary Vegetative Control Measures

- Temporary vegetative controls are not applicable given the location and nature of the work. Earth disturbance will be limited to only those areas necessary to excavate and construct the project.

Temporary Non-Vegetative Control Measures

- Jute mesh or other biodegradable fabric will be applied to stabilize sloped areas until vegetation is sufficiently established.
- There are no areas of steep slopes on the project that would require more intensive measures other than the vegetated area to the northwest of the project, in the location of the reconstructed retaining wall.

Permanent Vegetative Control Measures

- Vegetation will be re-established in the areas as called out on the plans and at the direction of the University.

Permanent Non-Vegetative Control Measures

- No permanent control measures, other than the permeable FieldTurf structure and underlying subdrain, is proposed as part of the project.

2.6 Protect Storm Drain Outlets

Per RI Stormwater Design and Installation Standards Manual 3.3.7.7:

Temporary or permanent outlet protection must be used to prevent scour and erosion at discharge points through the protection of the soil surface, reduction in discharge velocities, and through the promotion of infiltration. Outlets often have high velocity, high volume flows, and require strong materials that will withstand the forces of stormwater. Storm drain outlet control measures also offer a last line of protection against sediment entering environmentally sensitive areas.

All stormwater outlets that may discharge sediment-laden stormwater flow from the construction site must be protected using the control practices depicted on the approved plan set and in accordance with the *RI SESC Handbook*.

Describe controls, including design specifications and details, which will be implemented to protect outlets discharging stormwater from the project.

Will temporary or permanent point source discharges be generated at the site as the result of construction of sediment traps or basins, diversions, and conveyance channels?

Yes No

If Yes, describe the method(s) of outlet protection specified for each instance where a point source discharge will be generated. In addition, specifically reference SESC Site Plan Sheet Numbers which identify where the outlets will be constructed at the site and the corresponding control measures that will be utilized for their protection including any associated specifications required for their installation and maintenance.

N/A

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If No, discuss rationale for not including these elements in the SESC Plan.

The relatively flat topography of the site is such that runoff velocities are (and will be) minimal, and there are no existing concentrated points of discharge. Runoff from the development will be discharged by exfiltration to the underlying soil column and aquifer.

There are no stormwater outlets existing or proposed within the project area.

2.7 Establish Temporary Controls for the Protection of Post-Construction Stormwater Treatment Practices

Per RI Stormwater Design and Installation Standards Manual 3.3.7.8:

Temporary measures shall be installed to protect permanent or long-term stormwater control and treatment measures as they are installed and throughout the construction phase of the project so that they will function properly when they are brought online.

Examples of temporary control measures that can be used to protect permanent stormwater control measures include: establishing temporary sediment barriers around infiltrating practices, ensuring proper material staging areas and equipment routing (i.e. do not allow construction equipment to compact areas where infiltrating practices will be installed), and by conducting final cleaning of structural long term practices after construction is completed.

List and describe all post-construction stormwater treatment practices that will be installed during the construction process. Next, outline how these measures will be protected during the construction phase of the project to ensure that they will function appropriately once they are brought online.

Will long-term stormwater treatment practices be installed at the site?

Yes No

If Yes, describe the specific long-term stormwater treatment practices that will require protection from sedimentation and compaction. In addition, specifically reference SESC Site Plan Sheet Numbers which identify the location of these practices and the corresponding control measures that will be utilized for their protection including any associated specifications required for their installation and maintenance.

The contractor will be required to protect those areas where stormwater will be discharge by exfiltration from compaction by staking the limits of these facilities. Excavations for the construction of the facilities shall be performed in a manner that does not compact or otherwise compromise the infiltration capacity of the underlying subsoils.

If No, discuss rationale for not including these elements in the SESC Plan.

N/A

Soil Erosion and Sediment Control Plan
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2.8 Divert or Manage Run-on from Up-gradient Areas

Per RI Stormwater Design and Installation Standards Manual 3.3.7.10:

Is stormwater from off-site areas anticipated to flow onto the project area or onto areas where soils will be disturbed?

Yes No

If Yes, describe the specific runoff control measures (i.e., check dams, water bars, diversions, perimeter dikes, lined waterways, vegetated waterways, temporary line channels, sediment barriers, pipe slope drains, etc.) that will be utilized at the site including references to the SESC Site Plan Sheet Numbers, design specifications and details. See the RI SESC Handbook, Section Five: Runoff Control Measures for additional guidance.

Pre-Construction and Construction sub-watershed maps are included for each phase in this SESC Plan submittal.

Structural control measures will be used to limit stormwater flow from coming onto the project area, and to divert and slow on-site stormwater flow that is expected to impact exposed soils for the purpose of minimizing erosion, runoff, and the discharge of pollutants from the site.

Control measures shall be installed as depicted on the approved plan set and in accordance with the RI SESC Handbook or the RI Department of Transportation Standard Specifications for Road and Bridge Construction. Run-on and Run-off Management				
Construction Phase #	On-site or Off-site Run-on?	Control measure	Identified on Sheet #	Detail(s) is/are on Sheet #
Insert Text	Insert Text	Insert Text		Insert Text
Insert Text	Insert Text	Insert Text		Insert Text
Insert Text	Insert Text	Insert Text		Insert Text

If No, discuss rationale for not including these elements in the SESC Plan.

There are no areas up-gradient of the project site that contribute runoff to the area. The surrounding area typically discharges to the White Horn Brook.

2.9 Retain Sediment Onsite through Structural and Non-Structural Practices

Per RI Stormwater Design and Installation Standards Manual 3.3.7.12:

Once the erosion control measures and the run-on diversions are identified and located on the plans, the next step to site planning is sediment control and sediment management. Sediment barriers, inlet protection, construction entrances, stockpile containment, temporary sediment traps, and temporary sediment basins must be integrated into the SESC Plan if applicable. Refer to the RI SESC Handbook Section Six: Sediment Control Measures for additional guidance.

Per RI Stormwater Design and Installation Standards Manual 3.3.7.9:

SEDIMENT BARRIERS must be installed along the perimeter areas of the site that will receive stormwater from disturbed areas. This also may include the use of sediment barriers along the contour of disturbed slopes to maintain sheet flow and minimize rill and gully erosion during construction. Installation and

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maintenance of sediment barriers must be completed in accordance with the maintenance requirements specified by the product manufacturer or the *RI SESC Handbook*.

Will sediment barriers be utilized at the toe of slopes and other downgradient areas subject to stormwater impacts and erosion during construction?

Yes No

If Yes, Describe the rationale for selecting control measures to serve as sediment barriers at the toe of slopes and other down gradient areas subject to stormwater impacts during construction. Describe the specific sediment barriers that will be used at the site in the table provided.

Compost filter sock will be installed at the areas shown on the plan and as determined in the field to eliminate off-site erosion and ensure sediment remains within the project limits.

If No, discuss rationale for not including these elements in the SESC Plan.

N/A

Describe rationale for whether or sediment barriers are required at regular intervals along slopes in order to minimize the creation of concentrated flow paths (i.e. rilling, gully erosion) and to encourage sheet flow. Keep in mind that sediment barriers can be placed at the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow. The description of the selected control measures must focus on sediment barrier spacing as a function of slope length and steepness. Refer to the RI SESC Handbook, Section Six: Sediment Control Measure, Straw Wattles, Compost Tubes, and Fiber Rolls Control Measure for additional information on acceptable spacing distances.

Will sediment barriers be utilized along the contour of slopes to maintain sheet flow and minimize rill and gully erosion during construction?

Yes No

If Yes, list the specific sediment barriers that will be used at the site in the table provided. Describe the rationale for the locations and spacing frequency selected by the designer based on slope length and steepness. For additional guidance refer to the RI SESC Handbook or sediment barrier manufacturer's specifications.

SEDIMENT BARRIERS			
Construction Phase #	Sediment Barrier Type	Sediment Barrier is Labeled on Sheet #	Detail is on Sheet #
	RIDOT-standard compost filter sock – 12" dia	Grading and Drainage Plan	Details sheet
Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text

If No, discuss rationale for not including these elements in the SESC Plan.

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Per RI Stormwater Design and Installation Standards Manual 3.3.7.6:

INLET PROTECTION will be utilized to prevent soil and debris from entering storm drain inlets. These measures are usually temporary and are implemented before a site is disturbed. ALL stormwater inlets &/or catch basins that are operational during construction and have the potential to receive sediment-laden stormwater flow from the construction site must be protected using control measures outlined in the *RI SESC Handbook*.

For more information on inlet protection refer to the *RI SESC Handbook*, Inlet Protection control measure.

Maintenance

The operator must clean, or remove and replace the inlet protection measures as sediment accumulates, the filter becomes clogged, and/or as performance is compromised. Accumulated sediment adjacent to the inlet protection measures should be removed by the end of the same work day in which it is found or by the end of the following work day if removal by the same work day is not feasible.

Describe controls, including design specifications and details, which will be implemented to protect all inlets receiving stormwater from the project during the entire duration of the project. For more information on inlet protection refer to the RI SESC Handbook Inlet Protection control measure.

Do inlets exist adjacent to or within the project area that require temporary protection?

Yes No

If Yes, describe the method(s) of inlet protection, including maintenance requirements and complete the table provided.

The following lists the proposed storm drain inlet types selected from Section Six of the *RI SESC Handbook*. Each row is unique for each phase and inlet protection type.

INLET PROTECTION			
Construction Phase #	Inlet Protection Type	Inlet Protection is labeled on Sheet #	Detail(s) is/are on Sheet #
Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text

If No, discuss rationale for not including these elements in the SESC Plan.

There are no storm drain inlets within the limits of either construction phase.

CONSTRUCTION ENTRANCES will be used in conjunction with the stabilization of construction roads to reduce the amount of sediment tracking off the project. This project has avoided placing construction entrances on poorly drained soils where possible. Where poorly drained soils could not be eliminated, the detail includes subsurface drainage.

Any construction site access point must employ the control measures on the approved SESC site plans and in accordance with the *RI SESC Handbook*. Construction entrances shall be used in conjunction with the stabilization of construction roads to reduce the amount of mud picked up by construction vehicles. All construction access roads shall be constructed prior to any roadway accepting construction traffic.

The site owner and operator must:

1. Restrict vehicle use to properly designated exit points.

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2. Use properly designed and constructed construction entrances at all points that exit onto paved roads so that sediment removal occurs prior to vehicle exit.
3. When and where necessary, use additional controls to remove sediment from vehicle tires prior to exit (i.e. wheel washing racks, rumble strips, and rattle plates).
4. Where sediment has been tracked out from the construction site onto the surface of off-site streets, other paved areas, and sidewalks, the deposited sediment must be removed by the end of the same work day in which the track out occurs. Track-out must be removed by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal.

Will construction entrances be utilized at the proposed construction site?

Yes No

If Yes, indicate location(s) of vehicle entrance(s) and exit(s), and stabilization practices used to prevent sediment from being tracked off-site in the table provided. See also RI SESC Handbook, Section Six, Construction Entrances Measure.

CONSTRUCTION ENTRANCE			
Construction Phase #	Soil Type at the Entrance	Entrance is located on Sheet #	Detail is on Sheet #
	UD	Grading and Drainage Plan	Details sheet (R.I. Std. 9.9.0)
Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text

If No, discuss rationale.

N/A

STOCKPILE CONTAINMENT will be used onsite to minimize or eliminate the discharge of soil, topsoil, base material or rubble, from entering drainage systems or surface waters. All stockpiles must be located within the limit of disturbance, protected from run-on with the use of temporary sediment barriers and provided with cover or stabilization to avoid contact with precipitation and wind where and when practical.

Stock pile management consists of procedures and practices designed to minimize or eliminate the discharge of stockpiled material (soil, topsoil, base material, rubble) from entering drainage systems or surface waters.

For any stockpiles or land clearing debris composed, in whole or in part, of sediment or soil, you must comply with the following requirements:

1. Locate piles within the designated limits of disturbance.
2. Protect from contact with stormwater (including run-on) using a temporary perimeter sediment barrier.
3. Where practicable, provide cover or appropriate temporary vegetative or structural stabilization to avoid direct contact with precipitation or to minimize sediment discharge.

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4. **NEVER** hose down or sweep soil or sediment accumulated on pavement or other impervious surfaces into any stormwater conveyance, storm drain inlet, or surface water.
5. To the maximum extent practicable, contain and securely protect from wind.

Describe materials expected to be stockpiled or stored on-site and procedures for storage of materials to minimize exposure of the materials to stormwater and to eliminate the discharge of stockpiled material from entering drainage systems and surface waters. Refer to the RI SESC Handbook, Stockpile and Staging Area Management Control Measure for additional guidance. Complete the table provided.

STOCKPILE CONTAINMENT				
Construction Phase #	Run-on measures necessary? (yes/no)	Stabilization or Cover Type	Stockpile Containment Measure	Sheet #
	Determined during construction	Temporary seeding, tarp or other measures as applicable to contain dust and sediment	RIDOT-standard compost filter sock – 12" dia	Details
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text

The construction will require the temporary stockpiling of materials excavated (e.g., topsoil and underlying soils) along with the sand and store aggregates and other materials used in the construction of the proposed project. All stockpiles will be contained to the area/limits of the phase under construction and be contained by a perimeter of RIDOT-standard compost filter sock (CFS).

CONSTRUCTED SEDIMENT STRUCTURES

If each common drainage location receives water from an area with less than one (1) acre disturbed at a time, this section can be deleted and no sediment traps or basins are required. However, it is important to remember that there is still a requirement to retain sediment on-site. Therefore, if it is in the best professional judgment of the designer, that there is a condition or circumstance which may require structural controls (per Section 3.3.7.13 of the RI Stormwater Design and Installation Standards Manual), this section can be used.

TEMPORARY SEDIMENT TRAPS will be utilized onsite. There will be no disturbed drainage areas greater than one acre that will be exposed for longer than six months. Design and sizing calculations in accordance with the *RI SESC Handbook*, Section Six are found in __Insert Text__ of this SESC Plan. A summary of the calculations are provided below:

For Disturbed Areas 1 to 5 Acres – Those areas with a common drainage location that serves an area between one (1) and five (5) acres disturbed at one time, a temporary sediment trap must be provided where attainable and where the sediment trap is only intended to be used for a period of six (6) months or less. For longer term projects with a common drainage location that serves between one (1) and five (5) acres disturbed at one time, a temporary sediment basin must be provided where attainable. Temporary sediment trapping practices must be designed in accordance with the RI SESC Handbook and must be sized to have a total storage volume capable of storing one (1) inch of runoff from the contributing area or one hundred and thirty four (134) cubic yards per acre of drainage area. A minimum of fifty percent (50%) of the total volume shall be storage below the outlet (wet storage). See RISDISM 3.3.7.12 for requirements and RI SESC Handbook, Section Six: Temporary Sediment Traps Measure for design details.

Are temporary sediment traps required at the site?

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Yes No

If Yes, complete the table provided. If an area greater than one acre will be exposed for longer than 6 months and a sediment trap is proposed, explain why the sediment basin was not attainable.

SEDIMENT TRAPS				
Construction Phase #	Exposed Area (acres)	Trap #	Sheet #	Detail found on Sheet#
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text

Trap #	Wet Storage Volume (cu.ft)	Dry Storage Volume (cu.ft.)	Cleanout Depth (ft)	Provide Reference to Location of Supporting Design and Sizing Calculations
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text

All traps will be functional and installed prior to disturbance in the contributing drainage area. Access for sediment removal is provided on the plans with cleanout depth requirements. The removed sediment will be utilized onsite or disposed of properly off-site.

If No, discuss rationale.

Temporary sediment traps are required by the 1-5-acre criterion listed above.

The extremely flat topography of the site ensures that the construction of the 3'+ foot depth permeable pavement structure will be effectively contained to a 'borrow pit' type cut, from which there is no potential for the migration of sediments off-site. During construction, the cut for installation of the structure will effectively serve as the trap for sediments. The installation and maintenance of perimeter compost filter socks along the limits of disturbance will provide additional protection of downgradient areas.

TEMPORARY SEDIMENT BASIN(S) will be utilized onsite. Every effort must be made to prevent erosion and control it near the source.

If the following criterion does not apply to your proposed construction project, then this section may be eliminated from the plan.

For Disturbed Areas of 1 to 5 Acres – Those areas with a common drainage location that serves an area between one (1) and five (5) acres disturbed at one time for longer than six (6) months.

For Disturbed Areas > 5 Acres – Those areas with a common drainage location that serves an area with greater than five (5) acres disturbed at one time, a temporary (or permanent) sediment basin must be provided where attainable until final stabilization of the site is complete. Temporary sediment basins must be designed in accordance with the RI SESC Handbook. The volume of wet storage shall be at least twice the sediment storage volume and shall have a minimum depth of two (2) feet. Sediment storage volume must accommodate a minimum of one year of predicted sediment load as calculated using the sediment volume formula in the RI SESC Handbook. In addition to sediment storage volume and wet storage volume,

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the sediment basin shall provide adequate residence storage volume to provide a minimum 10 hours residence time for a ten (10) -year frequency, twenty four (24) hour duration, Type III distribution storm. To the maximum extent practicable, outlet structures must be utilized that withdraw water from the surface of temporary sedimentation basins for the purpose of minimizing the discharge of pollutants. Exceptions may include periods of extended cold weather, where alternative outlets are required during frozen periods. If such a device is infeasible for portions of or the entire construction period justification must be made in the SESC Plan. Describe the reasons sediment basins are required for this project. They may include physical conditions, land ownership, construction operations etc. For design details see RI SESC Handbook Section Six: Temporary Sediment Basins Measure.

Are temporary sediment basins required at the site?

Yes No

If No, discuss rationale.

The project will not involve an area of soil disturbance greater than five acres, nor will the project involve areas remaining disturbed for greater than six months. The actual extents and durations of disturbance at a given time will be well below these thresholds.

If Yes, complete the table provided.

Modeling, Design and Sizing calculations in accordance with the *RI SESC Handbook*, Section Six are found in Insert Text of this SESC Plan. The designs were also prepared to satisfy Section 3.3.7.13 of the Stormwater Manual and will control Temporary Increases in Stormwater Velocity, Volume, and Peak Flows. A summary of the assumptions and calculations are provided below:

TEMPORARY SEDIMENT BASINS				
Construction Phase #	Exposed Area (acres)	Basin #	Sheet #	Detail found on Sheet#
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text

Provide the following tables for each temporary sediment basin. Each basin shall be designed to contain sediment and runoff from the 10-year Type III distribution storm.

SEDIMENT BASIN #1					
Pre-Development					
Pre-Construction Cover Type	Contributing Area (acres)	Soil Type	Curve Number	Tc (minutes)	10- Year Type III (cfs, at time t, acre feet)
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Total Pre-Construction Volume (cft):					Insert Text
During Construction					
Construction Cover Type	Contributing Area	Erosion Rates	Curve Number	Tc (minutes)	10-Year Type III (cfs, at time t, acre feet)

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Insert Text	Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text	Insert Text
Total Runoff Volume During Construction (cuft):					Insert Text
Basin #1					
Pre-Construction Peak Discharge (cfs)	Wet Storage Volume (cuft)	Sediment Storage Volume (cuft)	Residence Storage Volume (cuft)	Outlet Max Discharge Rate (cfs)	Emergency Spillway Discharge Capacity (cfs)
Insert Text	Insert Text	Insert Text	Insert Text	Insert Text	Insert Text

Discuss if baffles will be required in order to create effective flow length. The details should contain sediment storage markers.

Describe the surface outlets. Identify whether or not these devices will be infeasible to use during periods of extended cold weather. If periods of extended cold weather are anticipated to be an issue, provide the operator with instructions for discharging from the basin using an alternate method during this period of time. In addition, instruct the operator to document the justification for not using a surface outlet device during frozen periods in the inspection reports associated with these instances.

2.10 Properly Design Constructed Stormwater Conveyance Channels

Conveyances are required to be designed for inlets to temporary sediment basins. The construction site planner must use best professional judgment to determine if additional conveyance design is required for run-on control or in any other location where velocity control is required.

Are temporary stormwater conveyance practices required in order to properly manage runoff within the proposed construction project?

Yes No

If Yes, describe the specific control measures that will be used at the site. Provide or attach design calculations associated with each proposed conveyance measure, demonstrating that each one is designed and sized to handle the peak flow from a 10-year, 24-hour, Type III design storm. Note where within the site plans each specified conveyance is depicted, including specifications and construction details.

N/A

The conveyance will be maintained as depicted on Site Plans and in accordance with the *RI SESC Handbook* and if applicable.

If No, discuss rationale for not including conveyance measures in the SESC Plan.

The project site is flat, largely pervious, and well drained under proposed conditions, and as such there are no locations where there are existing (pre-construction) conveyances for channeled flow. Given the nature of the work, open-cut methods of construction, and post-construction controls for stormwater management (by exfiltration), there are no locations within the site requiring construction phase channels or conveyances.

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2.11 Erosion, Runoff, and Sediment Control Measure List

Complete the following table for each Phase of construction where Erosion, Runoff, and Sediment Control Measures are located. This table is to be used as part of the SESC Plan Inspection Report – please fill out accordingly.

It is expected that this table and corresponding Inspection Reports will be amended as needed throughout the construction project as control measures are added or modified.

Phase Nos. 1 and 2		
Location/Station	Control Measure Description/Reference	Maintenance Requirement
Construction Site Entrances/Exit	<i>RIDOT Standard Specifications</i> <i>RI Soil Erosion and Sediment Control Handbook</i>	The entrances shall be maintained in a condition which will prevent tracking or flowing of sediment onto public right-of-ways. This will require periodic top dressing with additional stone or additional length as conditions demand and repair and/or cleanout of any measures used to trap sediment. All sediment spilled, dropped, washed or tracked onto public right-of-ways must be removed immediately.
Project-wide, including material stockpiles	Perimeter Barriers – Compost Filter Socks (CFS) <i>RIDOT Standard Specifications</i> Sections 206, 212 <i>RI Soil Erosion and Sediment Control Handbook</i>	Inspection should be made after each storm event and repair or replacement should be made promptly as needed. Section 212 – Cleanout of accumulated sediment behind the barrier is necessary if ½ of the original height of CFS becomes filled in with sediment.
Project-wide, including material stockpiles	Water for Dust Control <i>RIDOT Standard Specifications</i> <i>RI Soil Erosion and Sediment Control Handbook</i>	To be applied as need / as directed when weather conditions dictate (e.g., high wind, low moisture conditions)
Adjacent Roads	Public roads adjacent to a construction site shall be clean at the end of each day	Contractor to conduct street sweeping if construction site sediment is visible
Project-wide	Pick up of construction trash and debris	All loose trash and debris must be disposed of properly at the end of each working day
Project-wide	Spill prevention / spill containment measures	Ensure that all equipment maintenance and other activities with the potential for release of prohibited discharges are conducted in designated staging/storage areas. Maintain spill kits and adequate quantities of materials (e.g. absorbents) at readily accessible locations.

SECTION 3: CONSTRUCTION ACTIVITY POLLUTION PREVENTION

Per RI Stormwater Design and Installation Standards Manual 3.3.7.14:

The purpose of construction activity pollution prevention is to prevent day to day construction activities from causing pollution.

This section describes the key pollution prevention measures that must be implemented to avoid and reduce the discharge of pollutants in stormwater. Example control measures include the proper management of waste, material handling and storage, and equipment/vehicle fueling/washing/maintenance operations.

Where applicable, include *RI SESC Handbook* or the *RI Department of Transportation Standard Specifications for Road and Bridge Construction* (as amended) specifications.

3.1 Existing Data of Known Discharges from Site

Per RIPDES Construction General Permit – Part III.I:

List and provide existing data (if available) on the quality of any known discharges from the site. Examples include discharges from existing stormwater collection systems, discharges from industrial areas of the site, etc.

Are there known discharges from the project area?

Yes No

Describe how this determination was made:

- Existing low intensity uses (athletic field); flat topography with no concentrated flow paths

If yes, list discharges and locations:

- N/A

Is there existing data on the quality of the known discharges?

Yes No

If yes, provide data:

- N/A

3.2 Prohibited Discharges

Per RI SESC Handbook – Part D

The following discharges are prohibited at the construction site:

- Contaminated groundwater, unless specifically authorized by the DEM. These types of discharges may only be authorized under a separate DEM RIPDES permit.
- Wastewater from washout of concrete, unless the discharge is contained and managed by appropriate control measures.
- Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds, and other construction materials.
- Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance. Proper storage and spill prevention practices must be utilized at all construction sites.
- Soaps or solvents used in vehicle and equipment washing.

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- Toxic or hazardous substances from a spill or other release.

All types of waste generated at the site shall be disposed of in a manner consistent with State Law and/or regulations.

Will any of the above listed prohibited discharges be generated at the site?

Yes No

If Yes, provide a list of those that will be generated at the site and provide a discussion of how they will be managed, including references to the specific SESC Site Plans where such control measures are specified.

N/A

If No, discuss rationale.

The site is located within a wellhead protection area (URI drinking supply wells) and there are no known sources of groundwater contamination at or near the site. The contractor will not be permitted to discharge washout wastewater, conduct vehicle/equipment refueling or maintenance activities, or use soaps or solvents for vehicle washing at the site.

3.3 Proper Waste Disposal

Per RI SESC Handbook – Part D

Building materials and other construction site wastes must be properly managed and disposed of in a manner consistent with State Law and/or regulations.

- A waste collection area shall be designated on the site that does not receive a substantial amount of runoff from upland areas and does not drain directly to a waterbody or storm drain.
- All waste containers shall be covered to avoid contact with wind and precipitation.
- Waste collection shall be scheduled frequently enough to prevent containers from overflowing.
- All construction site wastes shall be collected, removed, and disposed of in accordance with applicable regulatory requirements and only at authorized disposal sites.
- Equipment and containers shall be checked for leaks, corrosion, support or foundation failure, or other signs of deterioration. Those that are found to be defective shall be immediately repaired or replaced.

Is waste disposal a significant element of the proposed project?

Yes No

If Yes, identify potential building materials and other construction wastes and document how these wastes will be properly managed and disposed of at the construction site (i.e., trash disposal, sanitary wastes, recycling, and proper material handling). Include references to the specific SESC Site Plans where such control measures are specified.

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N/A

If No, discuss rationale.

Construction the facilities will not generate significant quantities of waste materials requiring conventional (e.g. landfill) disposal. The volumes of excess excavated materials (borrow, topsoil, soils) that are generated are considered suitable for use as fill.

3.4 Spill Prevention and Control

Per RI SESC Handbook – Part D

All chemicals and/or hazardous waste material must be stored properly and legally in covered areas, with containment systems constructed in or around the storage areas. Areas must be designated for materials delivery and storage. All areas where potential spills can occur and their accompanying drainage points must be described. The owner and operator must establish spill prevention and control measures to reduce the chance of spills, stop the source of spills, contain and clean-up spills, and dispose of materials contaminated by spills. The operator must establish and make highly visible location(s) for the storage of spill prevention and control equipment and provide training for personnel responsible for spill prevention and control on the construction site.

Are spill prevention and control measures required for this particular project?

Yes

No

If Yes, describe all areas where potential spills can occur, and their accompanying drainage points, and describe the spill prevention and control plan to reduce the chance of spills, stop the source of spills, contain and clean up spills, dispose of materials contaminated by spills, and train personnel responsible for spill prevention and control. Provide the method of establishing and making highly visible the location(s) for the storage of spill prevention equipment. Refer to the RI SESC Handbook, Spill Prevention and Control Plan for guidance.

- Given the nature of the work, the potential for spills arising from construction operations is negligible and generally limited to equipment fuels/oils. The contractor shall be responsible for providing spill kits, including absorbents, physical barriers, etc. to prevent contaminants from being mobilized.
- On-site construction vehicles shall be inspected for oil and fuel leaks daily and provided regular preventive maintenance. Any discharge petroleum product shall be cleaned immediately. No petroleum products shall be discharged to any drainage practices. Logs should be also provided for this activity.

If No, discuss rationale.

By its nature, construction of the project does not require the use of chemicals and will not generate hazardous waste materials of any significant quantity to constitute a spill risk. The contractor shall be responsible for providing spill prevention/control measures for potential releases arising from construction equipment use as described above.

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3.5 Control of Allowable Non-Stormwater Discharges

Per RIPDES Construction General Permit – Part III.J.2.e:

Discharges not comprised of stormwater are allowed under the RIPDES Construction General Permit but are limited to the following: discharges which result from the washdown of vehicles where no detergents are used; external building wash-down where no detergents are used; the use of water to control dust; firefighting activities; fire hydrant flushing; natural springs; uncontaminated groundwater; lawn watering; potable water sources including waterline flushing; irrigation drainage; pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled materials have been removed) and where detergents are not used; and foundation or footing drains where flows are not contaminated with process materials such as solvents, or contaminated by contact with soils where spills or leaks of toxic or hazardous materials has occurred. If any of these discharges may reasonably be expected to be present and to be mixed with stormwater discharges, they must be specifically listed here.

Are there allowable non-Stormwater discharges present on or near the project area?

Yes No

If yes, list the sources of allowable non-Stormwater discharge(s) associated with construction activity. For each of the allowable non-stormwater discharge(s) identified, describe the controls and measures that will be implemented at those locations to minimize pollutant contamination of these discharges and to separate them from temporary discharges of stormwater during construction.

List of allowable non-stormwater discharge(s) and the associated control measure(s):

- The contractor will be permitted to use uncontaminated water for washdown of vehicles at construction accesses prior to exiting the site (no detergents or additives permitted) and for dust control. The contractor will be required to adhere to best practices to ensure that these measures are effective in preventing the migration of sediments and dust.

If any existing or proposed discharges consist of contaminated groundwater, such discharges are not authorized under the RIPDES Construction General Permit. These discharges must be permitted separately by seeking coverage to treat and discharge under a separate RIPDES individual permit or under the RIPDES Remediation General Permit. Contact the RIDEM Office of Water Resources RIPDES Permitting Program at 401-222-4700 for application requirements and additional information.

Are there any known or proposed contaminated discharges, including anticipated contaminated dewatering operations, planned on or near the project area?

Yes No

If yes, list the discharge types and the RIPDES individual permit number(s) or RIPDES Remediation General Permit Authorization number(s) associated with these discharges.

- Discharge Type and RIPDES Individual Permit number : N/A
- Discharge Type and RIPDES Remediation General Permit Authorization number: N/A

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3.6 Control Dewatering Practices

Per RI SESC Handbook – Part D

Site owners and operators are prohibited from discharging groundwater or accumulated stormwater that is removed from excavations, trenches, foundations, vaults, or other similar points of accumulation, unless such waters are first effectively managed by appropriate control measures.

Examples of appropriate control measures include, but are not limited to, temporary sediment basins or sediment traps, sediment socks, dewatering tanks and bags, or filtration systems (e.g. bag or sand filters) that are designed to remove sediment. Uncontaminated, non-turbid dewatering water can be discharged without being routed to a control.

At a minimum the following discharge requirements must be met for dewatering activities:

1. Do not discharge visible floating solids or foam.
2. To the extent feasible, utilize vegetated, upland areas of the site to infiltrate dewatering water before discharge. In no case will surface waters be considered part of the treatment area.
3. At all points where dewatering water is discharged, utilize velocity dissipation devices.
4. With filter backwash water, either haul it away for disposal or return it to the beginning of the treatment process.
5. Replace and clean the filter media used in dewatering devices when the pressure differential equals or exceeds the manufacturer's specifications.
6. Dewatering practices must involve the implementation of appropriate control measures as applicable (i.e. containment areas for dewatering earth materials, portable sediment tanks and bags, pumping settling basins, and pump intake protection.)

Is it at all likely that the site operator will need to implement construction dewatering in order to complete the proposed project?

Yes No

If Yes, describe all areas where construction dewatering may be required and the proposed control measures that will be used to treat and manage dewatering fluids including all proposed discharge points. Proposed control measures must comply with the RI SESC Handbook. Include references to all relevant SESC Site Plans.

- N/A

If No, discuss rationale.

The prevailing groundwater table in the area of the project is well below the depth to which the permeable structure will be installed.

3.7 Establish Proper Building Material Staging Areas

Per RI SESC Handbook – Part D

All construction materials that have the potential to contaminate stormwater must be stored properly and legally in covered areas, with containment systems constructed in or around the storage areas. Areas must be designated for materials delivery and storage. Designated areas shall be approved by the site owner/engineer. Minimization of exposure is not required in cases where the exposure to precipitation and to stormwater will not result in the discharge of pollutants, or where exposure of a specific material or product poses little risk of stormwater contamination (such as final products and materials intended for outdoor use).

Describe construction materials expected to be stored on-site and procedures for storage of materials to minimize exposure of the materials to stormwater. Include references to all relevant SESC Site Plans.

Construction materials that are expected to be temporarily stored on site consist of the aggregates (sand, stone) and other materials used in the construction of the parking facilities, none of which have the potential to contaminate stormwater beyond sedimentation. Construction equipment and maintenance materials will be stored in a designated area. A watertight shipping container shall be used to store hand tools, small parts and other construction equipment. Storage areas will be inspected weekly and after storm events.

3.8 Minimize Dust

Per RI SESC Handbook – Part D

Dust control procedures and practices shall be used to suppress dust on a construction site during the construction process, as applicable. Precipitation, temperature, humidity, wind velocity and direction will determine amount and frequency of applications. However, the best method of controlling dust is to prevent dust production. This can best be accomplished by limiting the amount of bare soil exposed at one time. Dust Control measures outlined in the *RI SESC Handbook* shall be followed. Other dust control methods include watering, chemical application, surface roughening, wind barriers, walls, and covers.

Describe dust control practices that will be used to suppress dust and limit its generation (i.e. applying water, limiting the amount of bare soil exposed at one time etc.).

The contractor will be required to provide and utilize potable water for dust control in accordance with the *Rhode Island Soil Erosion and Sediment Control Handbook* (as amended).

3.9 Designate Washout Areas

Per RI SESC Handbook – Part D

At no time shall any material (concrete, paint, chemicals) be washed into storm drains, open ditches, streets, streams, wetlands, or any environmentally sensitive area. The site operator must ensure that construction waste is properly disposed of, to avoid exposure to precipitation, at the end of each working day.

Will washout areas be required for the proposed project?

Yes

No

If Yes, describe location(s) and control measures that will be used to minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, washout areas for concrete mixers, paint, stucco, etc. The recommended location(s) of washout areas should be identified, or at a minimum the locations where these washout areas should not be sited should be called out.

N/A

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If No, discuss rationale.

No concrete, or other materials shall be discharged on site. If concrete trucks are to discharge surplus concrete or drum wash water on site, the contractor must provide a plan to the engineer for approval, indicating the location of the wash-out area, method of containment and disposal. This plan shall be incorporated into the SESC Plan as a modification. No release to nearby surface waters will be permitted.

3.10 Establish Proper Equipment/Vehicle Fueling and Maintenance Practices

Per RI SESC Handbook – Part D

Vehicle fueling shall not take place within regulated wetlands or buffer zone areas, or within 50-feet of the storm drain system. Designated areas shall be depicted on the SESC Site Plans, or shall be approved by the site owner.

Vehicle maintenance and washing shall occur off-site, or in designated areas depicted on the SESC Site Plans or approved of by the site owner. Maintenance or washing areas shall not be within regulated wetlands or buffer zone areas, or within 50-feet of the storm drain system. Maintenance areas shall be clearly designated, and barriers shall be used around the perimeter of the maintenance area to prevent stormwater contamination.

Construction vehicles shall be inspected frequently for leaks. Repairs shall take place immediately. Disposal of all used oil, antifreeze, solvents and other automotive-related chemicals shall be according to applicable regulations; at no time shall any material be washed down the storm drain or in to any environmentally sensitive area.

Describe equipment/vehicle fueling and maintenance practices that will be implemented to prevent pollutants from mixing with stormwater (e.g., secondary containment, drip pans, spill kits, etc.) Provide recommended location(s) of fueling/maintenance areas, or, at minimum, locations where fueling/maintenance should be avoided.

Several types of vehicles and equipment will be used on-site throughout the project, including, excavators, rollers, trucks, and backhoes. All major equipment/vehicle maintenance shall be performed off-site. When vehicle fueling must occur on-site, the fueling activity shall occur in designated equipment storage areas. Only minor equipment maintenance shall occur on-site. Spill kits, including absorbents and other cleanup materials) will be provided by the contractor and kept at the combined equipment and materials storage area. Drip pans will be placed under all equipment receiving maintenance and vehicles and equipment parked overnight.

3.11 Chemical Treatment for Erosion and Sediment Control

Per RI SESC Handbook – Appendix J

Chemical stabilizers, polymers, and flocculants are readily available on the market and can be easily applied to construction sites for the purposes of enhancing the control of erosion, runoff, and sedimentation. The following guidelines should be adhered to for construction sites that plan to use treatment chemicals as part of their overall erosion, runoff, and sedimentation control strategy.

The U.S. Environmental Protection Agency has conducted research into the relative toxicity of chemicals commonly used for the treatment of construction stormwater discharges. The research conducted by the EPA focused on different formulations of chitosan, a cationic compound, and both cationic and anionic polyacrylamide (PAM). In summary, the studies found significant toxicity resulting from the use of chitosan and cationic PAM in laboratory conditions, and significantly less toxicity associated with using anionic PAM. EPA's research has led to the conclusion that the use of treatment chemicals for erosion, runoff, and

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sedimentation control requires proper operator training and appropriate usage to avoid risk to aquatic species. In the case of cationic treatment chemicals additional safeguards may be necessary.

Application/Installation Minimum Requirements

If a site operator plans to use polymers, flocculants, or other treatment chemicals during construction the SESC plan must address the following:

1. Treatment chemicals shall not be applied directly to or within 100 feet of any surface water body, wetland, or storm drain inlet.
2. Use conventional erosion, runoff, and sedimentation controls prior to and after the application of treatment chemicals. Use conventional erosion, runoff, and sedimentation controls prior to chemical addition to ensure effective treatment. Chemicals may only be applied where treated stormwater is directed to a sediment control (e.g. temporary sediment basin, temporary sediment trap or sediment barrier) prior to discharge.
3. Sites shall be stabilized as soon as possible using conventional measures to minimize the need to use chemical treatment.
4. Select appropriate treatment chemicals. Chemicals must be selected that are appropriately suited to the types of soils likely to be exposed during construction and to the expected turbidity, pH, and flow rate of stormwater flowing into the chemical treatment system or treatment area. **Soil testing is essential. Using the wrong form of chemical treatment will result in some form of performance failure and unnecessary environmental risk.**
5. Minimize discharge risk from stored chemicals. Store all treatment chemicals in leak-proof containers that are kept under storm-resistant cover and surrounded by secondary containment structures (e.g., spill berms, decks, spill containment pallets), or provide equivalent measures, designed and maintained to minimize the potential discharge of treatment chemicals in stormwater or by any other means (e.g., storing chemicals in covered areas or having a spill kit available on site).
6. Use chemicals in accordance with good engineering practices and specifications of the chemical provider/supplier. You must also use treatment chemicals and chemical treatment systems in accordance with good engineering practices, and with dosing specifications and sediment removal design specifications provided by the supplier of the applicable chemicals, or document specific departures from these practices or specifications and how they reflect good engineering practice.

Will chemical stabilizers, polymers, flocculants or other treatment chemicals be utilized on the proposed construction project?

Yes No

If Yes, create a Treatment Chemical Application Plan and describe how the owner or SESC Plan preparer/designer intends to educate the designated operator prior to the application of such treatment chemicals.

Treatment Chemical Application Plan Required Elements

Insert information listed below:

1. *List Manufacturer's name and product name for each treatment chemical proposed for use at the site.*
2. *Attach a copy of applicable Material Safety Data Sheets (MSDSs) or Safety Data Sheets (SDS) for each proposed treatment chemical.*

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3. *Provide the results of third party toxicity testing of the materials proposed for use at the site.*
4. *Provide a certification from the site owner and operator that all proposed treatment chemicals are the same as those used in the toxicity tests and will not be altered in any way.*
5. *Provide an explanation as to why conventional erosion, runoff, and sediment control measures, alone or in combination, will not be sufficient to prevent turbidity impacts and sedimentation in downstream receptors.*
6. *Provide a plan prepared in consultation with the chemical treatment manufacturer(s) or authorized manufacturer's representative which includes the following:*
 - a. *Identification of the areas of the site where treatment chemicals will be applied and the name, location, and distance to all downstream receptors that have the potential to be impacted from the discharges from the treatment areas.*
 - b. *List the expected start and end dates or specific phases of the project during which each treatment chemical will be applied.*
 - c. *Provide test results for representative soils from the site, and any recommendations from the manufacturer based on the soil tests, indicating the type of treatment chemical and the recommended application rate.*
 - d. *List the frequency, method, and rates of application which are designed to ensure that treatment chemical concentrations will not exceed 50% of the IC25 or NOEC toxicity values, whichever is less, for each treatment chemical proposed.*
 - e. *Provide the frequency of inspection and maintenance of the treatment chemical application system.*
 - f. *List the method proposed for the collection, removal, and disposal or stabilization of settled particles to prevent re-suspension.*
 - g. *Describe the training that will be provided to all persons who will handle and use treatment chemicals at the construction site. Training must include appropriate, product-specific training and proper dosing requirements for each product.*

Treatment Chemical SESC Plan Weekly Inspection Report Documentation Requirements

1. Document the type and quantity of treatment chemicals applied.
2. List the date, duration of discharge, and estimated discharge rate.
3. Provide an estimate of the volume of water treated.
4. Provide an estimate of the concentration of treatment chemicals in the discharge, with supporting calculations.

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3.12 Construction Activity Pollution Prevention Control Measure List

Complete the following table for each Phase of construction where Pollution Prevention Control Measures will be implemented. This table is to be used as part of the SESC Plan Inspection Report – please fill out accordingly.

It is expected that this table will be amended as needed throughout the construction project.

Phase Nos. 1 and 2		
Location/Station	Control Measure Description/Reference	Maintenance Requirement
Construction Site Entrances/Exit	<i>RIDOT Standard Specifications</i> <i>RI Soil Erosion and Sediment Control Handbook</i>	The entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto public right-of-ways. This will require periodic top dressing with additional stone or additional length as conditions demand and repair and/or cleanout of any measures used to trap sediment. All sediment spilled, dropped, washed or tracked onto public right-of-ways must be removed immediately.
Adjacent Roads	Public roads adjacent to a construction site shall be clean at the end of each day	Contractor to conduct street sweeping if construction site sediment is visible
Project-wide	Pick up of construction trash and debris	All loose trash and debris must be disposed of properly at the end of each working day
Project-wide	Spill prevention / spill containment measures	Ensure that all equipment maintenance and other activities with the potential for release of prohibited discharges are conducted in designated staging/storage areas. Maintain spill kits and adequate quantities of materials (e.g. absorbents) at readily accessible locations.
CFS locations as indicated on Site Plans and as Material Stockpile Perimeter Barriers	<i>RIDOT Standard Specifications</i> Sections 206, 212 <i>RI Soil Erosion and Sediment Control Handbook</i>	Inspection should be made after each storm event and repair or replacement should be made promptly as needed. Cleanout of accumulated sediment behind the barrier is necessary if ½ of the original height of CFS becomes filled in with sediment.

Insert a new table for each additional construction phase.

SECTION 4: CONTROL MEASURE INSTALLATION, INSPECTION, and MAINTENANCE

4.1 Installation

Per RI SESC Handbook – Part D:

Complete the installation of temporary erosion, runoff, sediment, and pollution prevention control measures at the beginning of the project activities. All stormwater control measures must be installed in accordance with good judgment, including applicable design and manufacturer specifications. Installation techniques and maintenance requirements may be found in manufacturer specifications and/or the *RI SESC Handbook*.

Include references to SESC Site Plans where installation requirements are located.

Control measures shall be installed in accordance with the Contract Plans and Specifications, RIDOT Standard Specifications where applicable, the *Rhode Island Soil Erosion and Sediment Control Handbook*, and manufacturer's recommendations – see Site Plans (Erosion & Sediment Control Plan, Drainage & Utility Plan, and Details sheets) and notes thereon.

4.2 Monitoring Weather Conditions

Per RI SESC Handbook – Part D:

Anticipating Weather Events - Care will be taken to the best of the operator's ability to avoid disturbing large areas prior to anticipated precipitation events. Weather forecasts must be routinely checked, and in the case of an expected precipitation event of over 0.25-inches over a 24-hour period, it is highly recommended that all control measures should be evaluated and maintained as necessary, prior to the weather event. In the case of an extreme weather forecast (greater than one-inch of rain over a 24-hour period), additional erosion/sediment controls may need to be installed.

Storm Event Monitoring For Inspections - At a minimum, storm events must be monitored and tracked in order to determine when post-storm event inspections must be conducted. Inspections must be conducted and documented at least once every seven (7) calendar days and within twenty-four (24) hours after any storm event, which generates at least 0.25 inches of rainfall per twenty-four (24) hour period and/or after a significant amount of runoff or snowmelt.

In order for an operator to successfully satisfy this requirement list the weather gauge station that will be utilized to monitor weather conditions on the construction site. See www.wunderground.com or www.weather.gov for available stations.

The weather gauge station and website that will be utilized to monitor weather conditions on the construction site is as follows:

Wakefield, RI, Mantunuck Hills Station
https://www.wunderground.com/weather/us/ri/wakefield?cm_ven=localwx_today

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4.3 Inspections

Per RI SESC Handbook – Part D:

Minimum Frequency - Each of the following areas must be inspected by or under the supervision of the owner and operator at least once every seven (7) calendar days and within twenty-four (24) hours after any storm event, which generates at least 0.25 inches of rainfall per twenty-four (24) hour period and/or after a significant amount of runoff or snowmelt:

- a. All areas that have been cleared, graded, or excavated and where permanent stabilization has not been achieved;
- b. All stormwater erosion, runoff, and sediment control measures (including pollution prevention control measures) installed at the site;
- c. Construction material, un-stabilized soil stockpiles, waste, borrow, or equipment storage, and maintenance areas that are covered by this permit and are exposed to precipitation;
- d. All areas where stormwater typically flows within the site, including temporary drainage ways designed to divert, convey, and/or treat stormwater;
- e. All points of discharge from the site;
- f. All locations where temporary soil stabilization measures have been implemented;
- g. All locations where vehicles enter or exit the site.

Reductions in Inspection Frequency - If earth disturbing activities are suspended due to frozen conditions, inspections may be reduced to a frequency of once per month. The owner and operator must document the beginning and ending dates of these periods in an inspection report.

Qualified Personnel – The site owner and operator are responsible for designating personnel to conduct inspections and for ensuring that the personnel who are responsible for conducting the inspections are “qualified” to do so. A “qualified person” is a person knowledgeable in the principles and practices of erosion, runoff, sediment, and pollution prevention controls, who possesses the skills to assess conditions at the construction site that could impact stormwater quality, and the skills to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of the permit.

Recordkeeping Requirements - All records of inspections, including records of maintenance and corrective actions must be maintained with the SESC Plan. Inspection records must include the date and time of the inspection, and the inspector’s name, signature, and contact information.

General Notes

- A separate inspection report will be prepared for each inspection.
- The Inspection Reference Number shall be a combination of the RIPDES Construction General Permit No - consecutively numbered inspections. ex/ Inspection reference number for the 4th inspection of a project would be: RIR10####-4
- Each report will be signed and dated by the Inspector and must be kept onsite.
- Each report will be signed and dated by the Site Operator.

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- The corrective action log contained in each inspection report must be completed, signed, and dated by the site operator once all necessary repairs have been completed.
- It is the responsibility of the site operator to maintain a copy of the SESC Plan, copies of all completed inspection reports, and amendments as part of the SESC Plan documentation at the site during construction.

Failure to make and provide documentation of inspections and corrective actions under this part constitutes a violation of your permit and enforcement actions under 46-12 of R.I. General Laws may result.

4.4 Maintenance

Per RI SESC Handbook – Part D:

Maintenance procedures for erosion and sedimentation controls and stormwater management structures/facilities are described on the SESC Site Plans and in the *RI SESC Handbook*.

Site owners and operators must ensure that all erosion, runoff, sediment, and pollution prevention controls remain in effective operating condition and are protected from activities that would reduce their effectiveness. Erosion, runoff, sedimentation, and pollution prevention control measures must be maintained throughout the course of the project.

Note: It is recommended that the site operator designates a full-time, on-site contact person responsible for working with the site owner to resolve SESC Plan-related issues.

4.5 Corrective Actions

Per RI SESC Handbook – Part D:

If, in the opinion of the designated site inspector, corrective action is required, the inspector shall note it on the inspection report and shall inform the site operator that corrective action is necessary. The site operator must make all necessary repairs whenever maintenance of any of the control measures instituted at the site is required.

In accordance with the *RI SESC Handbook*, the site operator shall initiate work to fix the problem immediately after its discovery, and complete such work by the close of the next work day, if the problem does not require significant repair or replacement, or if the problem can be corrected through routine maintenance.

When installation of a new control or a significant repair is needed, site owners and operators must ensure that the new or modified control measure is installed and made operational by no later than seven (7) calendar days from the time of discovery where feasible. If it is infeasible to complete the installation or repair within seven (7) calendar days, the reasons why it is infeasible must be documented in the SESC Plan along with the schedule for installing the control measures and making it operational as soon as practicable after the 7-day timeframe. Such documentation of these maintenance procedures and timeframes should be described in the inspection report in which the issue was first documented. If these actions result in changes to any of the control measures outlined in the SESC Plan, site owners and operators must also modify the SESC Plan accordingly within seven (7) calendar days of completing this work.

SECTION 5: AMENDMENTS

Per RIPDES Construction General Permit – Part III.F:

This SESC Plan is intended to be a working document. It is expected that amendments will be required throughout the active construction phase of the project. **Even if practices are installed on a site according to the approved plan, the site is only in compliance when erosion, runoff, and sedimentation are effectively controlled throughout the entire site for the entire duration of the project.**

The SESC Plan shall be amended within seven (7) days whenever there is a change in design, construction, operation, maintenance or other procedure which has a significant effect on the potential for the discharge of pollutants, or if the SESC Plan proves to be ineffective in achieving its objectives (i.e. the selected control measures are not effective in controlling erosion or sedimentation).

In addition, the SESC Plan shall be amended to identify any new operator that will implement a component of the SESC Plan.

All revisions must be recorded in the Record of Amendments Log Sheet, which is contained in Attachment G of this SESC Plan, and dated red-lined drawings and/or a detailed written description must be appended to the SESC Plan. Inspection Forms must be revised to reflect all amendments. Update the Revision Date and the Version # in the footer of the Report to reflect amendments made.

All SESC Plan Amendments, except minor non-technical revisions, must be approved by the site owner and operator. Any amendments to control measures that involve the practice of engineering must be reviewed, signed, and stamped by a Professional Engineer registered in the State of RI.

The amended SESC plan must be kept on file at the site while construction is ongoing and any modifications must be documented.

Attach a copy of the Amendment Log.

Reference RI Model SESC Plan ATTACHMENT G

SECTION 6: RECORDKEEPING

RIPDES Construction General Permit – Parts III.D, III.G, III.J.3.b.iii, & V.O

It is the site owner and site operator's responsibility to have the following documents available at the construction site and immediately available for RIDEM review upon request:

- A copy of the fully signed and dated SESC Plan, which includes:
 - A copy of the General Location Map
INCLUDED AS ATTACHMENT A
 - A copy of all SESC Site Plans
INCLUDED AS ATTACHMENT B
 - Refer to the Site Plans submitted with the Application for Stormwater Construction Permit and Water Quality Certification; RIDEM-OWR reviewed/approved plans to be bound with SESC Plan to be maintained by the contractor***
 - A copy of the RIPDES Construction General Permit *(To save paper and file space, do not include in DEM/CRMC submittal, for operator copy only)*
INCLUDED AS ATTACHMENT C
 - A copy of any regulatory permits (RIDEM Freshwater Wetlands Permit, CRMC Assent, RIDEM Water Quality Certification, RIDEM Groundwater Discharge Permit, RIDEM RIPDES Construction General Permit authorization letter, etc.)
INCLUDED AS ATTACHMENT D
 - All RIDEM-OWR authorizations to be inserted upon receipt***
 - The signed and certified NOI form or permit application form *(if required as part of the application, see RIPDES Construction General Permit for applicability)*
INCLUDED AS ATTACHMENT E
 - Completed Inspection Reports w/Completed Corrective Action Logs
INCLUDED AS ATTACHMENT F
 - SESC Plan Amendment Log
INCLUDED AS ATTACHMENT G

SECTION 7: PARTY CERTIFICATIONS

RIPDES Construction General Permit – Part V.G

All parties working at the project site are required to comply with the Soil Erosion and Sediment Control Plan (SESC Plan including SESC Site Plans) for any work that is performed on-site. The site owner, site operator, contractors and sub-contractors are encouraged to advise all employees working on this project of the requirements of the SESC Plan. A copy of the SESC Plan is available for your review at the following location: Insert Onsite Location Here, or may be obtained by contacting the site owner or site operator.

The site owner and site operator and each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement.

I acknowledge that I have read and understand the terms and conditions of the Soil Erosion and Sediment Control (SESC) Plan for the above designated project and agree to follow the control measures described in the SESC Plan and SESC Site Plans.

Site Owner:

University of Rhode Island

Paul M. DePace, P.E., Director

Office of Capital Projects

60 Tootell Road, South Kingstown, RI 02881

(401) 874-4845

signature/date

Site Operator:

Insert Company or Organization Name

Insert Name & Title

Insert Address

Insert City, State, Zip Code

Insert Telephone Number, Insert Fax/Email

signature/date

Designated Site Inspector:

Insert Company or Organization Name

Insert Name & Title

Insert Address

Insert City, State, Zip Code

Insert Telephone Number, Insert Fax/Email

signature/date

SubContractor SESC Plan Contact:

Insert Company or Organization Name

Insert Name & Title

Insert Address

Insert City, State, Zip Code

Insert Telephone Number, Insert Fax/Email

signature/date

Insert more contact/signature lines as necessary

LIST OF ATTACHMENTS

*** See Section 6 of SESC Plan ***

Attachment A - General Location Map

Attachment B - SESC Site Plans

Attachment C - Copy of RIPDES Construction General Permit and Authorization to Discharge *(To save paper and file space, do not include in DEM/CRMC submittal, for operator copy only)*

Attachment D - Copy of Other Regulatory Permits

Attachment E - Copy of RIPDES NOI *(if required as part of application, see RIPDES Construction General Permit for applicability)*

Attachment F - Inspection Reports w/ Corrective Action Log

Attachment G - SESC Plan Amendment Log



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
Part A - Soil Profile Description Application Number _____

Property Owner: University of Rhode Island
 Property Location: Meade Stadium, West Alumni Avenue, Kingston, RI
 Date of Test Hole: 01-14-11
 Soil Evaluator: Steven Cadorette License Number: _____
 Weather: Sunny 35°F Shaded: Yes No Time: 12:00 PM

TH <u>1</u> Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
F1	15"			7.5YR 4/6	None	—			sil	1f sbk	fr	3
F2	19"	a	S	10YR 6/6	None	—			S	of sg	l	1
A	34"	a	S	10YR 3/1	None	—			sil	1f sbk	fr	3
B	48"	a	S	10YR 5/6	None	—			gs	OMsg	l	1
C	96"	c	W	10YR 6/4	None	—			gs	OMsg	l	1
TH <u>2</u> Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
F1	8"			7.5YR 4/6	None	—			sil	1f sbk	fr	3
F2	16"	a	S	10YR 4/6	None	—			fst	1f sbk	fr	4
F3	60"	a	S	2.5Y 4/4	None	—			sil	1f sbk	fr	7
C1	108"	g	i	2.5Y 4/4	2.5YR 6/8			m c p @ 102"	sil	1f sbk	fr	7
C2	120"	a	S	10YR 6/4	None	—			gs	OMsg	l	1




Soil Class: _____ Total Depth of each Test Hole: TH-1 96" / TH-2 120"
 Depth to Groundwater Seepage: TH-1 90" TH-2 108" Depth to Impervious or Limiting Layer: None
 Estimated Seasonal High Water Table: TH-1 80" TH-2 102" Comments: _____
Brick, pieces of clay pipe, & other debris 0-60" @ TH-2
Distinct mottling in TP-2 @ 102" below grade

Part B

Site Evaluation - to be completed by Class II or III Designer or Soil Evaluator

Please use the area below to locate:

1. Test holes
2. Approximate direction of due north
3. Offsets from test holes to fixed points such as street, utility pole, or other permanent, marked object

Key:	
	Approximate location of test holes
	Estimated gradient and direction of slope
	Approximate direction of due north

See attached aerial photograph

1. Relief and Slope: Flat / Slight slope to the south
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes: YES NO If yes, locate on above sketch. 130'
3. Presence of existing or proposed private drinking water wells within 200 feet of test holes: YES NO If yes, locate on above sketch.
4. Public drinking water wells within 500 feet of test holes: YES NO If yes, locate on above sketch.
5. Is site within the watershed of a public drinking water reservoir or other critical area defined in SD 19.00? YES NO
6. Has soil been excavated from or fill deposited on site? YES NO If yes, locate on above sketch. e TP-2
7. Site's potential for flooding or ponding: NONE SLIGHT MODERATE SEVERE
8. Landscape position: Plain
9. Vegetation: Grass Football Field
10. Indicate approximate location of property lines and roadways. see aerial photograph
11. Additional comments, site constraints or additional information regarding site: _____

Certification

The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: _____ Part B prepared by: _____

Signature _____ License # _____ Signature _____ License # _____

FOR OFFICE USE ONLY	
Decision: Approved <input type="checkbox"/> Disclaimed <input type="checkbox"/>	
Comments: _____	

Signature Authorized Agent _____	Date _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Environmental Management
 Office of Water Resources



Site Evaluation Form
 Part A - Soil Profile Description

Application Number _____

Property Owner: University of Rhode Island

Property Location: Meade Stadium, West Alumni Avenue, Kingston, RI

Date of Test Hole: 01-20-11

Soil Evaluator: Steven Cadorette License Number: _____

Weather: Sunny 32°F Shaded: Yes No Time: 08:30

TH GP-1 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
F ₁	15"			10 YR 3/2	None	—			sil	1 f s bk	fr	3
F ₂	17"	a	S	10 YR 6/8	None	—			S	o f s g	l	1
A	29"	a	S	10 YR 2/1	None	—			sil	1 f s bk	fr	3
B	48"	a	S	10 YR 6/8	None	—			gs	o m s g	l	1
C	144"	a	S	10 YR 6/4	None	—			vgs	o m s g	l	1
TH GP-2 Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
F ₁	16"			10 YR 3/2	None	—			sil	1 f s bk	fr	3
F ₂	13"	a	S	10 YR 6/8	None	—			S	o f s g	l	1
A	32"	a	S	10 YR 2/1	None	—			sil	1 f s bk	fr	3
B	56"	a	S	10 YR 5/8	None	—			gs	o m s g	l	1
C	120"	a	S	10 YR 6/4	None	—			vgs	o m s g	l	1




Soil Class: _____ Total Depth of each Test Hole: GP-1 144" / GP-2 120"
 Depth to Groundwater Seepage: GP-1 96" / GP-2 96" Depth to Impervious or Limiting Layer: Not observed
 Estimated Seasonal High Water Table: _____ Comments: _____
These soil logs are based on Geoprobe sample collection
Monitoring well installed in GP-1 well construction 5' screen 10' riser
w/ sand pack Bottom of well 120" bg

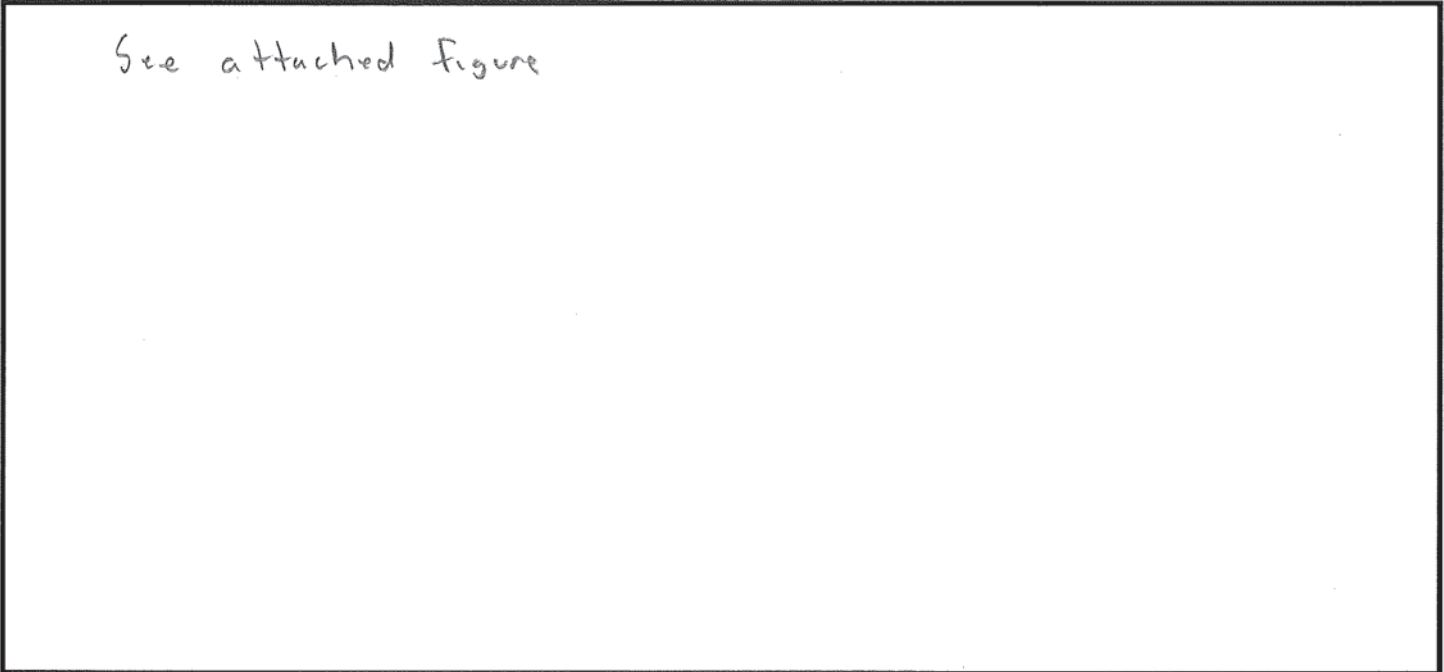
Part B

Site Evaluation - to be completed by Class II or III Designer or Soil Evaluator

Please use the area below to locate:

1. Test holes
2. Approximate direction of due north
3. Offsets from test holes to fixed points such as street, utility pole, or other permanent, marked object

Key:	
	Approximate location of test holes
	Estimated gradient and direction of slope
	Approximate direction of due north



1. Relief and Slope: Flat / on Football Field
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes: YES NO If yes, locate on above sketch.
3. Presence of existing or proposed private drinking water wells within 200 feet of test holes: YES NO If yes, locate on above sketch.
4. Public drinking water wells within 500 feet of test holes: YES NO If yes, locate on above sketch.
5. Is site within the watershed of a public drinking water reservoir or other critical area defined in SD 19.00? YES NO
6. Has soil been excavated from or fill deposited on site? YES NO If yes, locate on above sketch.
7. Site's potential for flooding or ponding: NONE SLIGHT MODERATE SEVERE
8. Landscape position: Plain
9. Vegetation: Grass Football Field
10. Indicate approximate location of property lines and roadways. See aerial photograph
11. Additional comments, site constraints or additional information regarding site: _____

Certification

The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: _____ Part B prepared by: _____
 Signature License # Signature License #

FOR OFFICE USE ONLY	
Decision: Approved <input type="checkbox"/>	Disclaimed <input type="checkbox"/>
Comments: _____	

Signature Authorized Agent	Date



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management
Office of Water Resources



Site Evaluation Form

Part A - Soil Profile Description

Application Number

Property Owner: University of Rhode Island

Property Location: Meade Stadium, West Alumni Avenue, Kingston, RI

Date of Test Hole: 01-20-11

Soil Evaluator: Steven Cadorette

License Number:

Weather: Sunny 32° F

Shaded: Yes [] No [x]

Time: 10:30

Table with 12 columns: TH GP-3/4, Horizon, Depth, Horizon Boundaries (Dist, Topo), Soil Colors (Matrix, Re-Dox Features), Re-Dox Description (Ab., S., Con.), Texture, Structure, Consistence, Soil Category. Contains data for two soil profiles (GP-3 and GP-4) with horizons F1, F2, A, B, and C.

Soil Class:
Depth to Groundwater Seepage: GP-3 96" / GP-4 96"
Estimated Seasonal High Water Table: GP-3 7' / GP-4 7'

Total Depth of each Test Hole: GP-3 144" / GP-4 120"
Depth to Impervious or Limiting Layer: Not observed
Comments:




These soil logs are based on GeoProbe sample collection
Monitoring well installed in GP-3 Well construction 5' screen 10' riser w/ sand pack Bottom of well 120" by

Part B

Site Evaluation - to be completed by Class II or III Designer or Soil Evaluator

Please use the area below to locate:

1. Test holes
2. Approximate direction of due north
3. Offsets from test holes to fixed points such as street, utility pole, or other permanent, marked object

Key:	
	Approximate location of test holes
	Estimated gradient and direction of slope
	Approximate direction of due north

See attached figure

1. Relief and Slope: Flat on football field
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes: YES NO If yes, locate on above sketch.
3. Presence of existing or proposed private drinking water wells within 200 feet of test holes: YES NO If yes, locate on above sketch.
4. Public drinking water wells within 500 feet of test holes: YES NO If yes, locate on above sketch.
5. Is site within the watershed of a public drinking water reservoir or other critical area defined in SD 19.00? YES NO
6. Has soil been excavated from or fill deposited on site? YES NO If yes, locate on above sketch.
7. Site's potential for flooding or ponding: NONE SLIGHT MODERATE SEVERE
8. Landscape position: Plain
9. Vegetation: Grass football field
10. Indicate approximate location of property lines and roadways. See aerial photograph
11. Additional comments, site constraints or additional information regarding site: _____

Certification

The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: _____

Part B prepared by: _____

Signature	License #	Signature	License #
FOR OFFICE USE ONLY			
Decision: Approved <input type="checkbox"/> Disclaimed <input type="checkbox"/>			
Comments: _____			

Signature Authorized Agent		Date	



RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF WATER RESOURCES
235 Promenade Street
Providence, Rhode Island 02908

December 13, 2018

URI - Office of Capital Projects
Attn: Paul DePace
Sherman Building
60 Tootell Road
Kingston, RI 02881

Insignificant Alteration – Permit

Re: Application No. 18-0278 | RIPDES No. RIR101817 in reference to the location below:

Approximately 100 feet south of West Alumni Avenue, Utility Pole No. 56, approximately 150 ft. south of its intersection with Rhode Ram Way, at the URI “Meade Stadium”, Assessor's Plat 23-1, Lot 1, South Kingstown, RI

Dear Mr. DePace:

Kindly be advised that the Department of Environmental Management's ("DEM") Freshwater Wetlands Program ("Program") has completed its review of your **Request for Preliminary Determination** application. This review included a site inspection of the above referenced property ("subject property") and an evaluation of the proposed grading and resurfacing of the Meade Stadium football field with artificial turf as illustrated and detailed on site plans submitted with your application. The most recently revised site plans were received by the DEM on November 21, 2018.

Our observations of the subject property, review of the site plans and evaluation of the proposed project reveals that alterations of freshwater wetlands are proposed. However, pursuant to Rule 9.00 of the Rules and Regulations Governing the Administration and Enforcement of the Fresh Water Wetlands Act (Rules), this project may be permitted as an **insignificant alteration** to freshwater wetlands under the following terms and conditions:

Terms and Conditions for Application No: 18-0278 & RIPDES No.: RIR101817

1. This letter is the DEM's permit for this project under the R.I. Fresh Water Wetlands Act, Rhode Island General Laws (RIGL) Section 2-1-18 et seq. This application review has also included review related to the RIPDES “General Permit for Storm Water Discharge Associated with Construction Activity”.
2. This permit is specifically limited to the project, site alterations and limits of disturbance as detailed on the site plans submitted with your most recent revised application and received by the DEM on November 21, 2018. A copy of the most recent revised site plans stamped approved by the DEM is enclosed. Changes or revisions to the project that would alter freshwater wetlands are not authorized without a permit from the DEM.
3. Where the terms and conditions of the permit conflict with the approved site plans, these terms and conditions shall be deemed to supersede the site plans.
4. You must notify this Program in writing immediately prior to the commencement of site alterations and again upon completion of the project.

5. A copy of the stamped approved site plans and a copy of this permit must be kept at the site at all times during site preparation, construction, and final stabilization. Copies of this permit and the stamped approved plans must be made available for review by any DEM or Town representative upon request.
6. Within ten (10) days of the receipt of this permit, you must record this permit in the land evidence records of the Town of South Kingstown and supply this Program with written documentation obtained from the Town showing this permit was recorded.
7. The effective date of this permit is the date this letter was issued. This permit expires four (4) years from the date of issue.
8. Any material utilized in this project must be clean and free of matter that could pollute any freshwater wetland.
9. Prior to commencement of site alterations, you shall erect or post a sign resistant to the weather and at least twelve (12) inches wide and eighteen (18) inches long, which boldly identifies the initials "DEM" and the application number of this permit. This sign must be maintained at the site in a conspicuous location until such time that the project is complete.
10. Temporary erosion and sediment controls detailed or described on the approved site plans shall be properly installed at the site prior to or commensurate with site alterations. Such controls shall be properly maintained, replaced, supplemented, or modified as necessary throughout the life of this project to minimize soil erosion and to prevent sediment from being deposited in any wetlands not subject to disturbance under this permit.
11. Upon permanent stabilization of all disturbed soils, temporary erosion and/or sediment controls must be removed.
12. You are responsible for the proper installation, operation, maintenance and stability of any mitigative features, stormwater treatment facilities, and systems of treatment and control that are installed or used in compliance with this permit to prevent harm to adjacent wetlands. Long-term operation and maintenance shall be as described in the plan entitled "Stormwater Management Plan Part 3, Long Term Operation and Maintenance Plan for Stormwater Management Facilities Serving the Meade Stadium Field Turf Project, University of Rhode Island Campus, Town of South Kingstown, Rhode Island; Prepared for the: University of Rhode Island Office of Capital Projects...", dated October 2018, as prepared by Gordon R. Archibald, Inc.
13. You are obligated to install, utilize and follow all best management practices detailed or described on the approved site plans in the construction of the project to minimize or prevent adverse impacts to any adjacent freshwater wetlands and the functions and values provided by such wetlands.
14. You must provide written certification from a registered land surveyor or registered professional engineer that the stormwater drainage system including any and all basins, piping systems, catch basins, culverts, swales and any other stormwater management control features have been constructed/installed in accordance with the site plans approved by this permit. This written certification must be submitted to this Program within twenty (20) days of its request or upon completion of the project.

Pursuant to the provisions in Rule 7.09 and Rule 11.04, as applicable, any properly recorded and valid permit is automatically transferred to the new owner upon sale of the property.

Additionally, the Program has reviewed this project in accordance with the standards of the RIPDES General Permit for Storm Water Discharge Associated with Construction Activity ("CGP"). Construction Activities which disturb one (1) or more acres of land and where storm water runoff is directed, via a point source, into a separate storm sewer system or into the waters of the State, are required to seek coverage under the Rhode Island Pollutant Discharge Elimination System (RIPDES) storm water permit. Our review

has determined that the project has been designed to meet the requirements of the 2013 GP. This determination therefore includes your final authorization to discharge storm water associated with construction activity under the CGP. For future references and inquiry, your permit authorization number is **RIPDES No. RIR101817**.

Both the owner and the contractor retained to undertake the construction activity are required to comply with all terms and conditions of the CGP. This includes maintaining the Soil Erosion and Sediment Control (SESC) Plan, performing the required inspections and maintenance of the selected Best Management Practices (BMPs), and retaining inspection records. Further information on the requirements of the CGP is available at:

<http://www.dem.ri.gov/pubs/regs/regs/water/ripdesca.pdf>.

Please be aware that the RIDEM's Rules and Regulations Governing the Establishment of Various Fees require that RIPDES CGP permit holders to pay an Annual Fee of \$100.00. An invoice will be sent to the owner on record in May/June of each year if the construction was still active as of December 31st of the previous year. The owner will be responsible for the Annual Fee until the construction activity has been completed, the site has been properly stabilized, and a completed Notice of Termination (NOT) has been received by the RIPDES Program. A copy of the NOT can be found attached to the CGP on the web page referenced above.

You are required to comply with the terms and conditions of this permit and to carry out this project in compliance with the Rules at all times. Failure to do so may result in an enforcement action by this Department.

In permitting the proposed alterations, the DEM assumes no responsibility for damages resulting from faulty design or construction.

Kindly be advised that this permit is not equivalent to a verification of the type or extent of freshwater wetlands on site. Should you wish to have the types and extent of freshwater wetlands verified, you may submit the appropriate application in accordance with the Rules.

This permit does not remove your obligation to obtain any local, state, or federal approvals or permits required by ordinance or law and does not relieve you from any duties owed to adjacent landowners with specific reference to any changes in drainage.

Please contact Rene Legault of this office (telephone: 401-222-4700 x7732) should you have any questions regarding this letter.

Sincerely,



Charles A. Horbert, Program Supervisor
Office of Water Resources
Freshwater Wetlands Program
CAH/RJL/rjl

Enclosure: Approved site plans

cc: Wayne Pimental, South Kingstown Building Official
Todd Ravenelle, Gordon R. Archibald, Inc.

THE STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
 Department of Business Regulation
BUILDING CODE COMMISSION
 560 Jefferson Blvd., Warwick, Rhode Island 02886



January 24, 2019

Project Approval Letter

**RISBC Project
Number and Name**

Location: West Alumni Avenue

DESIGNER

Name: TODD A RAVENELLE
 Company: GORDON R. ARCHIBALD INC.
 PROFESSIONAL ENGINEERS
 Address: 76 AUSTIN AVENUE GREENVILLE RI 02828
 Agency Contact Name: Robert Schultz
 Agency/Department Name: URI Office of Capital Projects
 Agency Address: 60 Tootell Road; South Kingstown,
 Rhode Island 02881

DESCRIPTION

Installation of artificial field turf and stadium lighting at the **AGENCY**
 University of Rhode Island Meade Football Stadium

Dear Sirs/Madams:

Plans and Specifications submitted for the above-referenced project have been reviewed and approved. Please be advised that permits will be issued upon application and payment of fees by the select Contractor.

The approval letter does not constitute permission to proceed to reproduce documents required by the agency or purchasing division for bidding purposes. Such authorization can only be granted by the User Agency or Department, who you should contact for authorization to proceed.

The User, Department, or Agency, is advised by copy of this notice that documents required for bidding purposes must be in a format designated by the Division of Purchasing. The contract recipient will submit a copy of this document and a copy of an approval requisition for the project to proceed to permitting, along with any conditions of this approval to be accepted by the Building Code Commission.

Very truly yours,

John P. Leyden, CBO
 State Building Commissioner

To learn more, scan this barcode or visit rhodeisland.viewpointcloud.com/#/records/28819

