

Project Manual
including Specifications
for construction of

**- Shooting Range Expansion -
Great Swamp Management Area
West Kingston, Rhode Island**

State of Rhode Island
Department of Environmental Management
Division of Planning and Development
235 Promenade Street
Providence, Rhode Island

P & D Contract No. 09-17

Date of Issue: July, 2017

SECTION 00002
PROJECT DIRECTORY

OWNER:

State of Rhode Island and Providence Plantations
Department of Administration
One Capitol Hill
Providence, Rhode Island 02908

USER AGENCY:

State of Rhode Island and Providence Plantations
Department of Environmental Management
Division of Fish and Wildlife
277 Great Neck Road
West Kingston, Rhode Island 02891

ENGINEER:

Pare Corporation
8 Blackstone Valley Place
Lincoln, Rhode Island 02865

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 **Document A101™ – 2007**

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

AGREEMENT made as of _____ (Date of issuance of Owner's Purchase Order)

BETWEEN the Owner:

The State of Rhode Island, acting by and through the Department of Administration
Division of Purchases
One Capitol Hill, Second Floor
Providence, Rhode Island 02908-5855
Tel. (401) 574-8100
Fax. (401) 574-8387
www.purchasing.ri.gov

and the Contractor:

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

for the following Project:

(Name, location and detailed description)

Shooting Range Expansion
Great Swamp Management Area
West Kingston, RI

The User Agency:

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

Department of Environmental Management
235 Promenade Street
Providence, Rhode Island 02908
Tel. (401) 222-2776
Fax. (401) 222-2591
www.dem.ri.gov

The Architect:

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

Pare Corporation.
8 Blackstone Valley Place
Lincoln, RI 02865
Tel. 401.334.4100

The Owner and Contractor agree as follows.

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.

AIA Document A201™-2007, 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.

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ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary 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

(Paragraphs deleted)

stipulated by the Purchase Order issued by the Owner to the Contractor. The Contractor will be authorized to commence work only upon the issuance of the Purchase Order by the Owner and an authorization from the User Agency.

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

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than one hundred five (105) working days from the date of commencement, or as follows:

(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

Portion of Work

Substantial Completion Date

Subject to adjustments of this Contract Time as provided in the Contract Documents.

§ 3.4 The Contractor and the Contractor's surety shall be liable for and shall pay the Owner the sums stipulated herein as liquidated damages, and not as penalty, for each calendar day of delay until the Work is substantially complete: eight hundred (\$ 800) Dollars.

§ 3.5 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 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. The Contract Sum shall be (\$), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:

(State the numbers or other identification of accepted alternates)

§ 4.3 Unit

(Paragraphs deleted)

prices are specified in the Bid Form.

§ 4.4 Allowances

(Paragraphs deleted)

are specified in the Bid Form.

ARTICLE 5 PAYMENTS

§ 5.1 PROGRESS PAYMENTS

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect 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 to the Contractor not later than the 30th business day following approval by the Owner.

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor 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 Architect may require. This schedule, unless objected to by the Architect or the Owner, 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 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

- .1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of five percent (5%). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™-2007, General Conditions of the Contract for Construction;
- .2 Add 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), less retainage of five percent (5%);
- .3 Subtract the aggregate of previous payments made by the Owner; and
- .4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201-2007.

§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

- .1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and

(Paragraph deleted)

- .2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201-2007.

§ 5.1.8

(Paragraphs deleted)

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.

(Paragraph deleted)

§ 5.2 FINAL PAYMENT

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, 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 Section 12.2.2 of AIA Document A201-2007, and to satisfy other requirements, if any, which extend beyond final payment;
- .2 a final Certificate for Payment has been issued by the Architect and approved in writing by the Owner;
- .3 the Contractor has submitted its final waiver of lien and final waivers of lien 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 days after the issuance of the Architect's final Certificate for Payment and written approval of the Owner.

§ 5.3 OWNERS RIGHTS

§ 5.3.1 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, and to pay the amount of such deductions to the Controller of the State of Rhode Island.

§ 5.3.2 The owner shall have the right to deduct from any payments due to the Contractor the amount of any claim against the Contractor arising out of this Agreement or on account of any other reason.

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 INITIAL DECISION MAKER

(Paragraphs deleted)

The Purchasing Agent appointed pursuant to the provisions of the "State Purchases Act," R.I. Gen. Laws § 37-2-1 et seq., will serve as Initial Decision Maker in accordance with the provisions of the State Purchases Act, State of Rhode Island Procurement Regulations, and Section 15.2 of AIA Document A201-2007.

§ 6.2 BINDING DISPUTE RESOLUTION

For any Claim not resolved by the procedures set forth in § 6.1, the method of binding dispute resolution shall be *(Paragraphs deleted)* determined in accordance with the provisions of the State Purchases Act, R.I. Gen. Laws §§ 37-2-1 et seq., the "Public Works Arbitration Act," R.I. Gen. Laws §§ 37-16-1 et seq., the "Administrative Procedures Act," R.I. Gen. Laws §§ 45-35-1 et seq., and the State of Rhode Island Procurement Regulations.

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 Contractor 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.

§ 7.2 The Work may be suspended by the Owner as provided in the State of Rhode Island Procurement Regulations General Conditions of Purchase and/or 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 that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2

(Paragraphs deleted)

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

§ 8.3 State of Rhode Island Representatives

§ 8.3.1 The Owner's representative:

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

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

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

§ 8.5 Neither the Owner's nor the Contractor's representative shall be changed without ten days written notice to the other party.

§ 8.6 Other provisions.

§ 8.6.1 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 possessed of sufficient working capital to perform their obligations under the Contract Documents.
- .2 The Contractor and its Subcontractors are each able to furnish the materials, equipment, and labor required to complete the Project as required under the Contract Documents.
- .3 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.
- .4 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 such a contractor.

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

§ 8.6.3 Any Change Orders of other Modifications must be approved in writing by the Owner.

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for the Purchase Order and Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A101-2007, Standard Form of Agreement Between Owner and Contractor.

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User Notes:

(1752200550)

§ 9.1.2 The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

Document	State of Rhode Island Procurement Regulations
<i>(Row deleted)</i>	

§ 9.1.4 The Specifications:

(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

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

§ 9.1.5 The Drawings:

(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

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

§ 9.1.6 The

(Paragraphs deleted)

Addenda issued pursuant to the Solicitation are available on the Division of Purchases website at www.purchasing.ri.gov.

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents:

.1

(Paragraphs deleted)

The Solicitation issued (Date), including the Invitation of Bid, the Instructions to Bidders, and the Bid Checklist (with applicable forms).

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

§ 9.1.8 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 incorporated into this Agreement by this reference.

§ 9.1.9 In the event of any conflict between the State of Rhode Island Procurement Regulations or any provision of the Rhode Island General Laws and the Supplementary and other Conditions of the Contract or other Contract Documents, the State of Rhode Island Procurement Regulations and the Rhode Island General Laws will control.

ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in the Solicitation and Article 11 of AIA Document A201–2007.

ARTICLE 11 NO LIENS

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

ARTICLE 12 BENEFITS OF AGREEMENT

§ 12.1 Third-party Beneficiary. The User Agency is a disclosed third-party beneficiary of this Agreement and shall have all of the rights and benefits to which such a party is entitled hereunder.

(Table deleted)

§ 12.2 Assignment. 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 dated as of the day and year first written above; provided, however, that this Agreement shall not become a binding contract until the Owner has issued a Purchase Order pursuant to § 3.1. The person signing for the Contractor below represents that he or she has been duly authorized to execute this Agreement on behalf of the Contractor.

**THE STATE OF RHODE ISLAND, acting
by and through its Department of Administration
Division of Purchases**

OWNER *(Signature)*

CONTRACTOR *(Signature)*

(Printed name and title)

(Printed name and title)

Int.

SECTION 00700

AIA DOCUMENT A201 - 2007

GENERAL CONDITIONS OF THE CONTRACT

FOR CONSTRUCTION

AS MODIFIED

SEE SOLICITATION FILES

SECTION 01010
SUMMARY OF THE WORK

PART 1 - GENERAL:

1.1 DESCRIPTION:

A. Work included:

1. The "Project," of which the "Work" of this Contract is a part, is titled "Shooting Range Expansion, Great Swamp Management Area, West Kingston, RI"
2. The "Work" of this Contract is defined in the Contract Documents to include, but not necessarily to be limited to furnishing all labor, materials and equipment necessary to perform the following work in accordance with the plans and specifications:
 - a. Install and maintain all necessary erosion and sediment control measures.
 - b. Comply with the provisions set forth in the contract to reclaim lead at the earthen berm.
 - c. Contractor to be familiar with typical soil conditions encountered in earthwork projects related to existing shooting ranges.
 - d. All workers are to be lead safety trained per OSHA 29 CFR 1926.62 and respirator qualified per 20 CFR 1910.134.
 - e. Submit an Environmental Health and Safety Plan (per OSHA) which covers all aspects of the work being performed on-site including, but not limited to, methods for dust control, personal air monitoring, decontamination of equipment and clothing, and personal protective equipment (PPE). PPE level D shall be included as the basis of design. The trade contractor shall be responsible for their own worker safety.
 - f. Dust control shall be included and maintained throughout the project/ Dust control is provided on a daily basis, or as needed, with no exceptions.
 - g. Furnish and install hand washing station.
 - h. Perform all necessary demolition, land clearing and grubbing.

SECTION 01010
SUMMARY OF THE WORK

- i. Import soil and shape the earthen berms to the lines and grades shown in the plans.
 - j. Install foundations for the shooting shelter and storage building, as well as the overhead baffles.
 - k. Construct shooting shelter and storage building, including all components shown in the structural plans.
 - l. Install range safety overhead baffles in strict accordance with the plans and specifications.
 - m. Construct parking area expansion including timber guardrail.
 - n. All disturbed areas shall be loam and seeded and stabilized prior to final acceptance.
3. Alternatives:
- a. None

*****END OF SECTION*****

SECTION 01015
CONTRACTOR'S USE OF THE PREMISES

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Work included: this section applies to situations in which the contractor or their representatives including, but not limited to, suppliers, subcontractors, employees, and field engineers, enter upon the Owner's property.

1.2 QUALITY ASSURANCE:

- A. Promptly upon award of the contract, notify all pertinent personnel regarding requirements of this section.
- B. Require that all personnel who will enter upon the Owner's property certify their awareness of and familiarity with the requirements of this section.

1.3 SUBMITTALS:

- A. Maintain an accurate record of the names and identification of all persons entering upon the Owner's property in connection with the Work of this Contract, including times of entering and times of leaving, and submit a copy of the record to the Owner daily.

1.4 STORAGE AND PARKING:

- A. Truck, equipment and contractor's vehicle access:
 - 1. Provide adequate protection for curbs and sidewalks and parking areas over which trucks and equipment pass to reach the job site.
 - 2. Do not permit contractor's vehicles to park in any area of the Owner's property except where the Owner has designated as the "Contractor's Parking Area".
 - 3. Areas to be used by the Contractor for storage of equipment and materials will be designated by the Owner.

*****END OF SECTION*****

SECTION 01045
CUTTING AND PATCHING

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Work included: This section establishes general requirements pertaining to cutting (including excavating), fitting, and patching of the Work required to:
1. Make the several parts fit properly;
 2. Uncover work to provide for installing, inspecting, or both, of ill-timed work;
 3. Remove and replace work not conforming to requirements of the Contract Documents;
 4. Remove and replace defective work;
 5. Fitting of new work to existing work to remain;
- B. Related work:
1. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 2. In addition to other requirements specified, upon the Engineer's request uncover work to provide for inspection by the Engineer of covered work, and remove samples of installed materials for testing.
 3. Do not cut or alter work performed under separate contracts without the Engineer's written permission.

1.2 QUALITY ASSURANCE:

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

1.3 SUBMITTALS:

- A. Request for Engineer's consent:
1. Prior to cutting which effects structural safety, submit written request to the Engineer for permission to proceed with cutting.
 2. Should conditions of the Work, or schedule, indicate a required change of materials or methods for cutting and patching, so notify the Engineer and secure his/her written permission and the required Change Order prior to proceeding.
- B. Notices to the Engineer:
1. Submit written notice to the Engineer designating the time the Work will be uncovered, to provide for the Engineer's observation.

PART 2 - PRODUCTS:

2.1 MATERIALS:

- A. For replacement of items removed, use materials complying with pertinent sections of these specifications.

2.2 PAYMENT FOR COSTS:

- A. Perform cutting and patching needed to comply with the Contract Documents at no additional cost to the Owner.

PART 3 - EXECUTION:

3.1 SURFACE CONDITIONS:

- A. Inspection:
 - 1. Inspect existing condition, including elements subject to movement or damage during cutting, excavating, patching, and backfilling.
 - 2. After uncovering the work, inspect conditions affecting installation of new work.
- B. Discrepancies:
 - 1. If uncovered conditions are not as anticipated, immediately notify the Engineer and secure needed directions.
 - 2. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION PRIOR TO CUTTING:

- A. Provide required protection including, but not necessarily limited to, shoring, bracing, and support to maintain structural integrity of the Work.

3.3 PERFORMANCE:

- A. Perform required excavating and backfilling as required under pertinent other sections of these Specifications.
 - 1. Perform cutting and demolition by methods which will prevent damage to other portions of the Work and provide proper surfaces to receive installation of repair and new work.
 - 2. Perform fitting and adjusting of products to provide finished installation complying with the specified tolerances and finishes.

*******END OF SECTION*******

SECTION 01050
FIELD ENGINEERING

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Work included: Provide such field engineering services as are required for proper completion of the Work including, but not necessarily limited to:
 - 1. Establishing and maintaining lines and levels;
 - 2. Structural design of forms and similar items provided by the Contractor as part of their means and methods of construction.

- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Additional requirements for field engineering also may be described in other Sections of these specifications.

1.2 QUALITY ASSURANCE:

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

1.3 SUBMITTALS:

- A. Comply with pertinent provisions of Section 01340.

- B. Upon request of the Engineer, submit:
 - 1. Data demonstrating qualifications of persons proposed to be engaged for field engineering services.
 - 2. Documentation verifying accuracy of field engineering work.
 - 3. Certification, signed by the Contractor's retained field engineer, certifying that elevations and locations of improvements are in conformance or non-conformance with requirements of the Contract Documents.

1.4 PROCEDURES:

- A. In addition to procedures directed by the Contractor for proper performance of the Contractor's responsibilities:
 - 1. Locate and protect control points before starting work on the site.
 - 2. Preserve permanent reference points during progress of the work.
 - 3. Do not change or relocate reference points or items of the Work without specific approval from the Engineer.
 - 4. Promptly advise the Engineer when a reference point is lost or destroyed, or requires relocation because of other changes in the Work.
 - a. Upon direction of the Engineer, require the field engineer to replace reference stakes or markers.
 - b. Locate such replacements according to the original survey control.

*******END OF SECTION*******

SECTION 01200
PROJECT MEETINGS

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Work included: To enable orderly review during progress of the Work, and to provide for systematic discussion of problems, the Architect/Engineer will conduct project meetings throughout the construction period.
- B. Related Work:
 - 1. Documents affecting work of this section include, but not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. The Contractor's relations with his subcontractors and materials suppliers, and discussions relative thereto, are the Contractor's responsibility and normally are not part of project meetings content.

1.2 QUALITY ASSURANCE:

- A. For those persons designated by the Contractor to attend and participate in project meetings, provide required authority to commit the Contractor to solutions agreed upon in the project meetings.

1.3 SUBMITTALS:

- A. Agenda items: To the maximum extent practicable, advise the Architect/Engineer at least twenty-four (24) hours in advance of project meetings regarding items to be added to the agenda.
- B. Minutes:
 - 1. The Contractor will compile minutes of each project meeting, and will furnish three copies to the Architect/Engineer and required copies to the Owner.
 - 2. Recipients of copies may make and distribute such other copies as they wish.

PART 2 - PRODUCTS:

(No products are required in this Section)

PART 3 - EXECUTION:

3.1 PROJECT MEETINGS:

- A. Attendance:
 - 1. To the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout progress of the Work.

2. The Owner's Representative and the Architect/Engineer's Representative shall also be in attendance at these meetings.
3. Subcontractors, materials suppliers, and others may be invited to attend those project meetings in which their aspect of the Work is involved.

B. Minimum agenda:

1. Review, revise as necessary, and approve minutes of previous meetings.
2. Review progress of the Work since last meeting, including status of submittals for approval. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule.
3. Identify problems which impede planned progress.
4. Develop corrective measures and procedures to regain planned schedule.
5. Complete other current business.

C. Revisions to minutes:

1. Unless published minutes are challenged in writing prior to the next regularly scheduled project meeting, they will be accepted as properly stating the activities and decisions of the meeting.
2. Persons challenging published minutes shall reproduce and distribute copies of the challenge to all indicated recipients of the particular set of minutes.
3. Challenge to minutes shall be settled as priority portion of "old business" at the next regularly scheduled meeting.

*****END OF SECTION*****

SECTION 01201
PRECONSTRUCTION CONFERENCE

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Work included: To help clarify construction contract administration procedures, the Architect/Engineer may conduct a Preconstruction Conference prior to start of the Work. Provide attendance by the designated personnel.

- B. Related work:
 - 1. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE:

- A. For those persons designated by the Contractor, his subcontractors, and suppliers to; attend the Preconstruction Conference, provide required authority to commit the entities they represent of solutions agreed upon in the Conference.

1.3 SUBMITTALS:

- A. To the maximum extent practicable, advise the Engineer at least 24 hours in advance of the conference as to items to be added to the agenda.

- B. The Engineer will compile minutes of the Conference, and will furnish three copies of the minutes to the Contractor and required copies to the Owner. The Contractor may make and distribute such other copies as he wishes.

1.4 PRECONSTRUCTION CONFERENCE:

- A. The Conference will be scheduled to be held within 15 working days after the Owner has issued the Notice to Proceed, but prior to actual start of the Work.

- B. Attendance:
 - 1. Provide attendance by authorized representatives of the Contractor and major subcontractors.
 - 2. The Engineer will advise other interested parties, including the Owner, and request their attendance.

- C. Minimum agenda: Data will be distributed and discussed on:
 - 1. Organizational arrangement of the Contractor's forces and personnel, and those of subcontractors, materials suppliers, and the Engineer;
 - 2. Channels and procedures for communication;
 - 3. Construction schedule, including sequence of critical work;
 - 4. Contract Documents, including distribution of required copies of Drawings and revisions;
 - 5. Processing of Shop Drawings and other data submitted to the Engineer for review;
 - 6. Processing of field decisions and Change Orders;
 - 7. Rules and regulations governing performance of the Work; and
 - 8. Procedures for safety and first aid, security, quality control, housekeeping, and related matters.

*****END OF SECTION*****

SECTION 01310
CONSTRUCTION SCHEDULES

PART 1 - GENERAL:

1.1 DESCRIPTION:

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

- B. Related work:
 - 1. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Requirements for progress schedule: General Conditions.
 - 3. Construction period: Form of Agreement.

- C. Definitions:
 - 1. "Day," as used throughout the Contract unless otherwise stated, means "working day."

1.2 QUALITY ASSURANCE:

- A. Employ a scheduler who is thoroughly trained and experienced in compiling construction data, and in preparing and issuing reports as required below.

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

- C. Reliance upon the approved schedule:
 - 1. The construction schedule as approved by the Architect/Engineer will be an integral part of the Contract and will establish interim completion dates for the various activities under the Contract.
 - 2. Should any activity not be completed within 15 days after the stated scheduled date, the Owner shall have the right to require the Contractor to expedite completion of the activity by whatever means the Owner deems appropriate and necessary, without additional compensation to the Contractor.
 - 3. Should any activity be 30 days or more behind schedule, the Owner shall have the right to perform the activity or have the activity performed by whatever method the Owner deems appropriate.
 - 4. Costs incurred by the Owner and by the Architect/Engineer in connection with expediting construction activity under this Article shall be reimbursed by the Contractor.
 - 5. It is expressly understood and agreed that failure by the Owner to exercise the option either to order the Contractor to expedite an activity or to expedite the activity by other means shall not be considered to set a precedent for any other activities.

1.3 SUBMITTALS:

- A. Comply with pertinent provisions of Section 01340.
- B. Preliminary analysis: Within ten calendar days after the Contractor has received the Owner's Notice to Proceed, submit one reproducible copy and four prints of a preliminary construction schedule prepared in accordance with Part 3 of this Section.
- C. Construction schedule: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit one reproducible copy and four prints of a construction schedule prepared in accordance with Part 3 of this Section.
- D. Periodic reports: On the first working day of each month following the submittal described in Paragraph 1.3-C above, submit the construction schedule updated as described in Part 3 of this Section electronically.

PART 2 - PRODUCTS:

2.1 CONSTRUCTION ANALYSIS:

- A. Graphically show by bar-chart the order and interdependence of all activities necessary to complete the Work, and the sequence in which each activity is to be accomplished, as planned by the Contractor and his project field superintendent in coordination with all subcontractors whose work is shown on the diagram.
- B. Include, but not necessarily limit indicated activities to:
 - 1. Project mobilization;
 - 2. Submittal and approval of Shop Drawings and Samples;
 - 3. Procurement of equipment and critical materials;
 - 4. Fabrication of special material and equipment, and its installation and testing.
 - 5. Final cleanup;
 - 6. Final inspecting and testing; and
 - 7. All activities by the Architect/Engineer that effect progress, required dates for completion, or both, for all and each part of the Work.

PART 3 - EXECUTION:

3.1 PRELIMINARY ANALYSIS:

- A. Contents:
 - 1. Show all activities of the Contractor under this Work for the period between receipt of the Notice to Proceed and submittal of construction schedule required under Paragraph 1.3-C above;
 - 2. Show the Contractor's general approach to remainder of the Work;
 - 3. Show cost of all activities scheduled for performance before submittal and approval of the construction schedule.
- B. Submit in accordance with Paragraph 1.3-B above.

3.2 CONSTRUCTION SCHEDULE:

- A. As soon as practicable after receipt of Notice to Proceed, complete the construction analysis in preliminary form, meet with the Architect/Engineer, review contents of the proposed construction schedule, and make all revisions agreed upon.
- B. Submit in accordance with Paragraph 1.3-C above.

3.3 PERIODIC REPORTS:

- A. As required under Paragraph 1.3-D above, update the approved construction schedule.
 - 1. Indicate "actual" progress in percent completion for each activity;
 - 2. Provide written narrative summary of revisions causing delay in the program, and as explanation of corrective actions taken or proposed.

3.4 REVISIONS:

- A. Make only those revisions to approved construction schedule as are approved in advance by the Architect/Engineer.

*******END OF SECTION*******

SECTION 01340
SUBMITTALS AND SUBSTITUTIONS

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Work included: Make submittals required by the Contract Documents, and revise and resubmit as necessary to establish compliance with the specified requirements.
- B. Related Work:
 - 1. Documents affecting work of this section include, but not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Individual requirements for submittals also may be described in pertinent Sections of these Specifications.
- C. Work not included:
 - 1. Non-required submittals will not be reviewed by the Architect/Engineer.
 - 2. The Contractor may require her/his subcontractors to provide drawings, setting diagrams, and similar information to help coordinate the Work, but such data shall remain between the Contractor and her/his subcontractors and will not be reviewed by the Architect/Engineer.

1.2 QUALITY ASSURANCE:

- A. Coordination of submittals:
 - 1. Prior to each submittal, carefully review and coordinate all aspects of each item being submitted.
 - 2. Verify that each item and the submittal for it conform in all respects with the specified requirements.
 - 3. By affixing the Contractor's signature to each submittal, certify that her/his coordination has been performed.
- B. Substitutions:
 - 1. See "Division of Purchases Instruction to Bidders, Public Works Construction."
- C. "Or equal":
 - 1. Where the phrase "or equal," or "or equal as approved by the Architect/Engineer," occurs in the Contract Documents, do not assume that the materials, equipment, or methods will be approved as equal unless the item has been specifically so approved for this Work by the Architect/Engineer.
 - 2. The decision of the Architect/Engineer on the technical merits of a submittal or substitution shall be final.

1.3 SUBMITTALS:

- A. Make submittals of Shop Drawings, Samples, substitution requests, and other items in accordance with the provisions of this Section.

PART 2 - PRODUCTS:

2.1 SHOP DRAWINGS:

- A. Scale and measurements: Make Shop Drawings accurately to a scale sufficiently large to show all pertinent aspects of the item and its method of connection to the Work.
- B. Submit electronic copies in PDF format.
 - 1. Shop drawings may be blue-line or black-line
 - 2. Blueprints will not be acceptable.
- C. Review comments of the Architect/Engineer will be shown on the shop drawing when it is returned to the Contractor. The Contractor may make and distribute such copies as are required for her/his purposes.

2.2 MANUFACTURERS' LITERATURE:

- A. Where contents of submitted literature from manufacturers includes data not pertinent to the submittal, clearly show which portions of the contents are being submitted for review.
- B. Submit the number of copies which are required to be returned, plus one copy which will be retained by the Architect/Engineer.

2.3 SAMPLES:

- A. Provide Sample or Samples identical to the precise article proposed to be provided. Identify as described under "Identification of submittals" below.
- B. Number of Samples required:
 - 1. Unless otherwise specified, submit Samples in the quantity which is required to be returned, plus one which will be retained by the Architect/Engineer.
 - 2. By prearrangement in specified cases, a single Sample may be submitted for review and, when approved, be installed in the Work at a location agreed upon by the Architect/Engineer.

PART 3 - EXECUTION:

3.1 IDENTIFICATION OF SUBMITTALS:

- A. Consecutively number all submittals.
 - 1. When material is resubmitted for any reason, transmit under a new letter of transmittal and with a new submittal number.
 - 2. On resubmittals, cite the original submittal number for reference.
- B. Accompany each submittal with a letter of transmittal showing all information required for identification and checking.

- C. On at least the first page of each submittal, and elsewhere as required for positive identification, show the submittal number in which the item was included.
- D. Maintain an accurate submittal log for the duration of the Work, showing current status of all submittals at all times. Make the submittal log available to the Architect/Engineer for her/his review upon request.

3.2 GROUPING OF SUBMITTALS:

- A. Unless otherwise specified, make submittals in groups containing all associated items to assure that information is available for checking each item when it is received.
 - 1. Partial submittals may be rejected as not complying with the provisions of the Contract.
 - 2. The Contractor may be held liable for delays so occasioned.

3.3 TIMING OF SUBMITTALS:

- A. Make submittals far enough in advance for scheduled dates for installation to provide time required for reviews, for securing necessary approvals, for possible revisions and re submittals, and for placing orders and securing delivery.
- B. In scheduling, allow at least ten (10) working days for review by the Architect/Engineer following her/his receipt of the submittal.

3.4 ARCHITECT/ENGINEER'S REVIEW:

- A. Review by the Architect/Engineer does not relieve the Contractor from responsibility for errors which may exist in the submitted data.
- B. Revisions:
 - 1. Make revisions required by the Architect/Engineer.
 - 2. If the Contractor considers any required revision to be a change, they shall so notify the Architect/Engineer as provided for in Paragraph 12.3 of the General Conditions.
 - 3. Make only those revisions directed or approved by the Architect/Engineer.

*****END OF SECTION *****

SECTION 01370
SCHEDULE OF VALUES

1.1 DESCRIPTION:

- A. Work included: Provide a detailed breakdown of the agreed contract sum showing values allocated to each of the various parts of the Work, as specified herein and in other provisions of the Contract Documents.
- B. Related work:
 - 1. Documents affecting work of the Section include, but are not necessarily limited to General Conditions, Supplementary Conditions, and Section in Division 1 of these Specifications.
 - 2. Schedule of values is required under Paragraph 4.8 of the General Conditions.
 - 3. Schedule of values is required to be compatible with the "continuation sheet" accompanying applications for payment, as described in Section 01152.

1.2 QUALITY ASSURANCE:

- A. Use required means to assure arithmetical accuracy of the sums described.
- B. When so required by the Architect/Engineer, provide copies of the subcontracts or other data acceptable to the Architect/Engineer.

1.3 SUBMITTALS:

- A. Prior to first application for payment, submit a proposed schedule of values to the Architect/Engineer.
 - 1. Meet with the Architect/Engineer and determine additional data, if any, required to be submitted.
 - 2. Secure the Architect/Engineer's approval of the schedule of values prior to submitting first application for payment.

*****END OF SECTION*****

SECTION 01453**CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES****PART 1 - GENERAL****1.1 GENERAL PROVISIONS:**

- A. The Latest Rhode Island State Building Code, under which this project is designed and will be built, requires the structural engineer of record (SER) to provide a program of structural tests and special inspections for this project in accordance with Chapter 17, 2012 International Building Code. The SER is the structural engineer who is in responsible charge of the preparation of the structural drawings and structural specifications for this project and whose Rhode Island professional engineering seal appears on said structural drawings.
- B. The SER has prepared a document entitled Statement of Special Inspection, which has been or will be submitted to the building official who has jurisdiction over this project, with the application for a building permit.
- C. The program of structural tests and inspections shall not relieve the Contractor or its subcontractors of their responsibilities and obligations for quality control of the work, their other obligations of supervising the work, for any design work which is included in their scope of services, and for full compliance with the requirement of the Contract Documents. Furthermore, the detection of, or failure to detect, deficiencies or defects in the Work during the testing and inspection conducted pursuant to the program shall not relieve the Contractor or its subcontractor of their responsibility to correct all deficiencies or defects, whether detected or undetected, in all parts of the Work, and to otherwise comply with all requirements of the Contract Documents.
- D. The program of structural tests and inspection does not apply to the Contractor's equipment, temporary structures used by the Contractor to construct the project, the Contractor's means, methods, and procedures, and job site safety.
- E. The structural testing and special inspection required by this Section is in addition to the inspections required by the Building Officials. Special inspection is not a substitute for inspection by a local municipal building inspector. Specially inspected work which is installed or covered without the approval of the Engineer or local municipal building inspector is subject to removal or exposure.
- F. The Owner shall employ the Special Inspectors or approved Testing Agencies.
- G. Special Inspector shall be an independently established and recognized agency regularly engaged in conducting tests or furnishing professional and inspection services and shall be approved by the Building Official and/or SER. The agency shall disclose all possible conflicts of interest so that objectivity can be confirmed. The agency shall have adequate equipment to perform all required tests. Personnel performing special inspection activities shall have qualifications according to the requirements for special inspector as noted below.

- H. Special Inspectors as selected and approved by the Building Official and SER shall:
 - 1. Be a qualified person, who shall have the minimum qualifications indicated in the *Statement of Special Inspection*, and demonstrate competence, to the satisfaction of the Building Official and SER, for inspection of the particular type of construction or operation requiring special inspection.
 - 2. Be under the supervision of a professional engineer registered in the state in which work is under construction.
 - 3. Observe the work assigned for conformance with the approved Drawings and Specifications and shall keep records of inspections or tests. The work inspected or tested shall be clearly identified, deficiencies noted, and resolutions stated.
 - 4. Furnish inspection reports directly to the SER. The SER will submit the reports to the Building Official and Construction Manager/General Contractor and the Owner. Reports shall indicate that work inspected was done in conformance with approved construction documents. Discrepancies shall be brought to the immediate attention of the Contractor for correction, then, if uncorrected, the attention of the Building Official and SER prior to completion of that phase of work.
 - 5. Submit a final signed report stating the work was in conformance with the approved Drawings and Specifications and the applicable workmanship provisions of the governing state code.
- I. Special Inspector shall review this specification and Chapter 17 of the Inspection Building Code. In the event of conflict with this specification and the Building Code, the Code shall govern.

1.2 CONTRACTOR'S RESPONSIBILITIES:

- A. Where the document *Statement of Special Inspections* indicates that a structural component or system is subject to structural tests and inspections by Chapter 17, 2012 International Building Code and that the SER for the project has not been retained to design said component or system or to prepare a performance specification for said component system, and the Architect has not otherwise provided for the structural design of said component or system, the Contractor shall retain, or require others under his direction to retain, a professional engineer registered in Rhode Island to design said component or system and to provide the required program of structural tests and inspections for said component or system.
- B. The Contractor shall provide free and safe access to the Work for the SER and all other individuals who are observing the work or performing structural tests or inspections. The Contractor shall provide all ladders, scaffolding, staging, and up-to-date safety equipment, all in good and safe working order, and qualified personnel to handle and erect them, as may be required for safe access.

*****END OF SECTION*****

Final Report of Special Inspections

Project:

Location:

Owner:

Owner's Address:

Architect of Record:

Structural Engineer of Record:

To the best of my information, knowledge and belief, the Special Inspections required for this project, and itemized in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

(Attach continuation sheets if required to complete the description of corrections.)

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Special Inspector Coordinator

(Type or print name)

Signature

Date

Licensed Professional Seal

Final Report of Special Inspections

Agent's Final Report

Project:

Agent:

Special Inspector:

To the best of my information, knowledge and belief, the Special Inspections or testing required for this project, and designated for this Agent in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

(Attach continuation sheets if required to complete the description of corrections.)

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Testing Agency

(Type or print name)

Signature

Date

*Licensed Professional Seal or
Certification*

Statement of Special Inspections

Project: *RIDEM – Great Swamp Shooting Range*

Location: *West Kingston, Rhode Island*

Owner: *Rhode Island Department of Environmental Management (RIDEM)*

Design Professional in Responsible Charge: *Pare Corporation*

This *Statement of Special Inspections* is submitted as a condition for permit issuance in accordance with the Special Inspection and Structural Testing requirements of the Building Code. It includes a schedule of Special Inspection services applicable to this project as well as the name of the Special Inspection Coordinator and the identity of other approved agencies to be retained for conducting these inspections and tests. This *Statement of Special Inspections* encompass the following disciplines:

- Structural Mechanical/Electrical/Plumbing
 Architectural Other: _____

The Special Inspection Coordinator shall keep records of all inspections and shall furnish inspection reports to the Building Official and the Registered Design Professional in Responsible Charge. Discovered discrepancies shall be brought to the immediate attention of the Contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official and the Registered Design Professional in Responsible Charge. The Special Inspection program does not relieve the Contractor of his or her responsibilities.

Interim reports shall be submitted to the Building Official and the Registered Design Professional in Responsible Charge.

A *Final Report of Special Inspections* documenting completion of all required Special Inspections, testing and correction of any discrepancies noted in the inspections shall be submitted prior to issuance of a Certificate of Use and Occupancy.

Job site safety and means and methods of construction are solely the responsibility of the Contractor.

Interim Report Frequency: *Monthly* or per attached schedule.

Prepared by:

Michael J. Rongione, P.E. Pare Corporation

(type or print name)



Signature

Date

Owner's Authorization:

Building Official's Acceptance:

Signature

Date

Signature

Date

Schedule of Inspection and Testing Agencies

This Statement of Special Inspections / Quality Assurance Plan includes the following building systems:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Soils and Foundations | <input type="checkbox"/> Spray Fire Resistant Material |
| <input checked="" type="checkbox"/> Cast-in-Place Concrete | <input checked="" type="checkbox"/> Wood Construction |
| <input type="checkbox"/> Precast Concrete | <input type="checkbox"/> Exterior Insulation and Finish System |
| <input checked="" type="checkbox"/> Masonry | <input type="checkbox"/> Mechanical & Electrical Systems |
| <input checked="" type="checkbox"/> Structural Steel | <input type="checkbox"/> Architectural Systems |
| <input type="checkbox"/> Cold-Formed Steel Framing | <input type="checkbox"/> Special Cases |

Special Inspection Agencies	Firm	Address, Telephone, e-mail
1. Special Inspection Coordinator	<i>To Be Determined</i>	
2. SER – Structural Engineer of Record	<i>Pare Corporation</i>	<i>8 Blackstone Valley Place Lincoln, RI (401)-334-4100</i>
3. GE – Geotechnical Engineer	<i>To Be Determined</i>	
4. OIAF – Owner's Inspection Agency (Field)	<i>To Be Determined</i>	
5. OIAP – Owner's Inspection Agency (Plant)	<i>To Be Determined</i>	
6. ARCH – Architect of Record	<i>To Be Determined</i>	

Note: The inspectors and testing agencies shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the Building Official, prior to commencing work.

Quality Assurance Plan

Quality Assurance for Seismic Resistance

Seismic Design Category *B*
Quality Assurance Plan Required (Y/N) *No*

Description of seismic force resisting system and designated seismic systems:
(*Requirement waived per IBC 2012 Section 1705.11 Exceptions*)

Quality Assurance for Wind Requirements

Vasd (3 second gust) *107 mph*
Wind Exposure Category *B*
Quality Assurance Plan Required (Y/N) *No*

Statement of Responsibility

N/A

Qualifications of Inspectors and Testing Technicians

The qualifications of all personnel performing Special Inspection and Testing activities are subject to the approval of the Building Official. The credentials of all Inspectors and Testing technicians shall be provided if requested.

Key for Minimum Qualifications of Inspection Agents:

When the Registered Design Professional in Responsible Charge deems it appropriate that the firm* performing a stipulated test or inspection have a specific certification or license as indicated below, such designation shall appear below the *Agency Number* on the Schedule.

PE/SE*	Structural Engineer – under the supervision of, or a licensed SE or PE specializing in the design of building structures
PE/GE*	Geotechnical Engineer – under the supervision of, or a licensed PE specializing in soil mechanics and foundations
EIT	Engineer-In-Training – a graduate engineer who has passed the Fundamentals of Engineering examination

American Concrete Institute (ACI) Certification

ACI-CFTT	Concrete Field Testing Technician – Grade 1
ACI-CCI	Concrete Construction Inspector
ACI-LTT	Laboratory Testing Technician – Grade 1&2
ACI-STT	Strength Testing Technician

American Welding Society (AWS) Certification

AWS-CWI	Certified Welding Inspector
AWS/AISC-SSI	Certified Structural Steel Inspector

American Society of Non-Destructive Testing (ASNT) Certification

ASNT	Non-Destructive Testing Technician – Level II or III.
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International Code Council (ICC) Certification

ICC-SMSI	Structural Masonry Special Inspector
ICC-SWSI	Structural Steel and Welding Special Inspector
ICC-SFSI	Spray-Applied Fireproofing Special Inspector
ICC-PCSI	Prestressed Concrete Special Inspector
ICC-RCSI	Reinforced Concrete Special Inspector

National Institute for Certification in Engineering Technologies (NICET)

NICET-CT	Concrete Technician – Levels I, II, III & IV
NICET-ST	Soils Technician - Levels I, II, III & IV
NICET-GET	Geotechnical Engineering Technician - Levels I, II, III & IV

* denoted edits made by Pare Corporation

Other

Item	Agency # (Qualif.)	Scope
1. Shallow Foundations (periodic)	<p><i>GE</i></p> <p><i>(PE/GE)</i></p>	<p><i>Inspect soils below footings for adequate bearing capacity and consistency with construction documents, specifications, and geotechnical report.</i></p> <p><i>Inspect removal of unsuitable material and preparation of subgrade prior to placement of sand/gravel fill or granular fill.</i></p>
2. Testing of Sand/Gravel Fill or Granular Fill (periodic)	<p><i>GE</i></p> <p><i>OIAF</i></p> <p><i>(PE/GE)</i></p>	<p><i>Perform sieve tests (ASTM D422 & D1140) and modified Proctor tests (ASTM D1557) of each source of fill material for conformance to the specifications. (OIAF)</i></p>
3. Placement of Sand/Gravel Fill or Granular Fill (continuous)	<p><i>GE</i></p> <p><i>OIAF</i></p> <p><i>(PE/GE)</i></p>	<p><i>Inspect placement, lift thickness, and compaction of sand/gravel fill or granular fill (OIAF).</i></p>
4. Density of Sand/Gravel Fill or Granular Fill (continuous)	<p><i>SER</i></p> <p><i>GE</i></p> <p><i>OIAF</i></p> <p><i>(PE/GE)</i></p>	<p><i>Perform field density tests of the in-place fill in accordance with the construction documents and specifications (GE, OIAF).</i></p> <p><i>Review test reports for conformance to the construction documents (SER, GE)</i></p>

Item	Agency # (Qualif.)	Scope
1. Mix Design (periodic)	<p>SER OIAF</p> <p>(ACI-CCI ICC-RCSI)</p>	<p>Review mix designs for all classes of concrete for conformance to specifications. Proportioning of materials shall be in accordance with ACI318. (SER)</p> <p>Review concrete batch tickets and verify compliance with approved mix design. Verify that water added at the site does not exceed that allowed by the mix design. (OIAF)</p> <p>Review OIAF reports (SER).</p>
2. Material Certification (periodic)	<p>SER</p>	<p>Review material certificates of compliance or other acceptable documentation for all materials used in the concrete mix designs for conformance with the construction documents.</p>
3. Reinforcement Installation (periodic)	<p>SER OIAF</p> <p>(ACI-CCI ICC-RCSI)</p>	<p>Inspect size, spacing, cover, positioning and grade of reinforcing steel. Verify that reinforcing bars are free of form oil or other deleterious materials. Inspect bar laps and mechanical splices. Verify that bars are adequately tied and supported on chairs or bolsters. (SER, OIAF)</p>
4. Formwork Geometry (periodic)	<p>OIAF</p>	<p>Inspect formwork for general conformance with the construction documents. Review formwork to insure the finished concrete size and shape for conformance to the construction documents.</p>
5. Anchor Rods, including post-installed anchors (periodic)	<p>SER OIAF</p>	<p>Inspect size, length, positioning and embedment of anchor rods. Inspect concrete placement and consolidation around anchors. Inspect installation of post-installed anchors for compliance with manufacturer's requirements. (OIAF)</p> <p>Review OIAF reports (SER).</p>
6. Concrete Placement (continuous)	<p>SER OIAF</p> <p>(ACI-CCI ICC-RCSI)</p>	<p>Review ready mix truck delivery tickets for proper class of concrete and required admixtures. Inspect placement of concrete. Verify conformance to specifications including cold-weather and hot-weather placement procedures. Verify that concrete conveyance and depositing avoids segregation or contamination. Verify that concrete is properly consolidated. (OIAF)</p> <p>Review OIAF reports (SER).</p>
7. Sampling and Testing of Concrete (continuous)	<p>SER OIAF</p> <p>(ACI-CFTT ACI-STT)</p>	<p>Test concrete compressive strength (ASTM C31 & C39), slump (ASTM C143), air-content (ASTM C231 or C173) and temperature (ASTM C1064) for conformance with construction documents. (OIAF)</p> <p>Review concrete test reports for conformance with the construction documents (SER).</p>
8. Curing and Protection (periodic)	<p>PE OIAF</p> <p>(ACI-CCI ICC-RCSI)</p>	<p>Inspect curing, cold weather protection and hot weather protection procedures (OIAF).</p> <p>Review OIAF reports (SER).</p>

Item	Agency # (Qualif.)	Scope
1. Fabricator Certification/ Quality Control Procedures	<p><i>SER</i> <i>(AWS/AISC -SSI ICC-SWSI)</i></p>	<p><i>Review each shop fabrication including fabricator's and welder's certificates and quality control procedures including steel joists and steel deck.</i> <i>Verify whether Fabricator holds a current AISC Category I or II certification, or is a member of the Structural Steel Fabricators.</i> <i>Review OIAF reports.</i></p>
2. Material Certification (periodic)	<p><i>SER</i> <i>OIAF</i> <i>(AWS/AISC -SSI ICC-SWSI)</i></p>	<p><i>Review certified mill test reports for structural steel including steel joists and steel deck. (SER)</i> <i>Verify identification markings on wide-flange shapes, high-strength bolts, nuts and welding electrodes. (OIAF)</i></p>
3. Bolting (Bearing Type - periodic) (Slip-Critical Type – continuous for turn of the nut or calibrated wrench method)	<p><i>SER</i> <i>OIAF</i> <i>(AWS/AISC -SSI ICC-SWSI)</i></p>	<p><i>Inspect installation and tightening of high-strength bolts. Verify bolt size and grade and that splines have separated from tension control bolts. Verify proper tightening sequence. Continuous inspection of bolts in slip-critical connections. (OIAF)</i> <i>Review reports (SER).</i></p>
4. Welding (continuous except periodic for single pass fillet welds < 5/16" or floor and deck welds)	<p><i>SER</i> <i>OIAF</i> <i>(AWS-CWI ASNT)</i></p>	<p><i>Visually inspect all welds in accordance with construction documents and approved shop drawings. Inspect pre-heat, post-heat and surface preparation between passes. Verify size and length of fillet welds. (OIAF)</i> <i>Continuous inspection of ultrasonic testing of all full-penetration welds. (OIAF)</i> <i>Review all reports. (SER)</i></p>
6. Structural Framing, Details, and Assemblies (periodic)	<p><i>SER</i> <i>OIAF</i> <i>(PE/SE)</i></p>	<p><i>Visually inspect steel frame for compliance with structural drawings, approved erection and shop drawings, AISC Code of Standard Practice including bracing, member configuration and connection details. (OIAF)</i> <i>Inspect for size, grade of steel, camber, and installation. (OIAF)</i> <i>Review test reports for conformance with approved shop drawings and construction documents. (SER)</i></p>

Item	Agency # (Qualif.)	Scope
1. Material Grading (periodic)	SER OIAF	<p><i>Review all material submittals and certificates for compliance with the construction documents (SER).</i></p> <p><i>Inspect wood species, grade, and dimensions for blocking, rim boards, and top plates for compliance with approved submittals/construction documents. (OIAF)</i></p>
2. Connections and Fasteners (periodic)	SER OIAF	<p><i>Review all material submittals and certificates for compliance with the construction documents (SER).</i></p> <p><i>Inspect hardware (hold-downs, straps, ties, rods, nuts, anchors) and fasteners for size, type, grade, and location specified in approved submittals/construction documents. Verify hardware installed per manufacturer's procedures. (OIAF)</i></p> <p><i>Review OIAF test reports (SER).</i></p>
3. Framing and Details (periodic)	SER OIAF	<p><i>Inspect blocking, rim boards, and top plates installation for compliance with construction documents (OIAF)</i></p> <p><i>Review OIAF test reports (SER).</i></p>
4. Diaphragms and Shearwalls (periodic)	SER OIAF	<p><i>Inspect size, configuration, stud spacing, blocking and fastening of shear walls and diaphragms. Verify panel grade and thickness. (OIAF)</i></p> <p><i>Review OIAF test reports (SER).</i></p>

Item	Agency # (Qualif.)	Scope
1. Material Certification	ARCH SER	Review all material submittals and certificates for each type of structural masonry unit, mortar, grout and admixtures for conformance to construction documents.
2. Mixing of Mortar and Grout (periodic)	OIAF (ICC-SMSI)	Inspect proportioning, mixing and retempering of mortar and grout. Conduct sufficient number of periodic field review of mortar and grout proportioning, mixing and consistency for conformance with ACI 530.1 and the construction documents.
3. Installation of Masonry (periodic)	SER OIAF (ICC-SMSI)	Inspect size, layout, bonding and placement of masonry units. Inspection mortar application and grouting procedures for conformance with the construction documents (OIAF). Review all reports for conformance with the construction documents (SER).
4. Mortar Joints (periodic)	ARCH OIAF (ICC-SMSI)	Inspect construction of mortar joints including tooling and filling of head joints.
5. Reinforcement Installation (periodic)	SER (ICC-SMSI AWS-CWI)	Inspect size, quantity, condition, placement, positioning and lapping of reinforcing steel for approved shop drawings and construction documents. Inspect welding of reinforcing steel and inspect welder's certifications.
6. Grouting Operations (periodic) (grouting placement, continuous)	OIAF (ICC-SMSI)	Inspect placement and consolidation of grout. Verify grout space is clean. Inspect masonry clean-outs for high-lift grouting.
7. Weather Protection (periodic)	SER OIAF (ICC-SMSI)	Inspect cold weather protection and hot weather protection procedures. Verify that wall cavities are protected against precipitation.

SECTION 01500
TEMPORARY FACILITIES AND CONTROLS

1.1 RELATED DOCUMENTS:

The General Conditions (Special Provisions) and applicable portions of Division 1 of the specifications are a part of this section, which shall consist of all labor, equipment and materials necessary to complete all quality control work indicated on the drawings and herein specified.

1.2 ACCESS:

- A. Block public access to the site for the prosecution of the work.
- B. Provide all necessary scaffolding, platforms, ladders, ramps, chutes, temporary stairs, and all other access items. Maintain in a safe condition throughout the construction process.

1.3 HOISTING FACILITIES:

- A. Provide hoisting facilities as required for the vertical movement of all materials.
- B. Comply with OSHA and other governing codes for all hoists, conveyors, and elevators and maintain the facilities in compliance with the law.

1.4 GUARDRAILS, DECK AND OTHER OPENINGS:

- A. Provide guardrails, barricades, handrails, and covers for decks, and other openings.

1.5 TRASH:

- A. Provide sufficient trash receptacles.
- B. Collect and deposit debris in such collection facilities.
- C. Remove all debris from the job site on a regular basis. Do not allow trash and debris to accumulate or remain on site for longer than 48 hours.

1.6 SANITATION FACILITIES:

- A. Provide adequate temporary toilet facilities.
- B. Maintain such facilities in a clean sanitary condition.

1.7 WEATHER PROTECTION AND TEMPORARY HEAT/VENTILATION:

- A. During construction, provide weather protection for materials which could be damaged by adverse weather conditions.

1.8 OTHER TEMPORARY FACILITIES AND CONTROLS:

- A. Protection of Work-In-Place:
 - 1. Thoroughly protect all completed work and all stored materials.
 - 2. Provide boards, cloths, planks, waterproof paper, canvas or other approved protection and use as necessary to prevent any damage.
 - 3. Replace or rectify work or materials damaged by workers, by the elements or by any other cause, to the satisfaction of the Architect/Engineer and at no additional expense to the Owner.
 - 4. Do not allow workers, including those of any subcontractor or supplier to mark finish surfaces with marking pens or other such devices which are not readily erasable.
- B. Special Openings:
 - 1. Early in the work, confer with all parties providing apparatus of various kinds. Should any be of a size and character than cannot properly be taken into the indicated position through openings shown, make necessary arrangements for the installation of such items in a manner satisfactory to those providing them and to the Owner. Make good any damage that may be caused thereby.

1.9 REMOVAL OF TEMPORARY FACILITIES:

- A. Remove all items indicated above and other construction of a temporary nature from the site as soon as the progress of the work will permit.
- B. Recondition the portions of the site so occupied and restore to conditions acceptable to the Architect/Engineer.

*******END OF SECTION*******

SECTION 01640
PRODUCT HANDLING

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Work included: Protect products scheduled for use in the Work by means including, but not necessarily limited to, those described in this Section.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, and Sections in Division 1 of these Specifications.
 - 2. Additional procedures also may be prescribed in other Sections of these Specifications.

1.2 QUALITY ASSURANCE:

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

1.3 MANUFACTURERS' RECOMMENDATIONS:

- A. Except as otherwise approved by the Architect/Engineer, determine and comply with manufactures' recommendations on product handling, storage, and protection.

1.4 PACKAGING:

- A. Deliver products to the job site in their manufacturer's original container, with labels intact and legible.
 - 1. Maintain packaged materials with seals unbroken and labels intact until time of use.
 - 2. Promptly remove damaged material and unsuitable items for the job site, and promptly replace with material meeting the specified requirements, at no additional cost to the Owner.
- B. The Architect/Engineer may reject as non-complying such material and products that do not bear identification satisfactory to the Architect/Engineer as to manufacturer, grade quality, and other pertinent information.

1.5 PROTECTION:

- A. Maintain finished surfaces clean, unmarred, and suitably protected until accepted by the Owner.

1.6 REPAIRS AND REPLACEMENTS:

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

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

*******END OF SECTION*******

SECTION 01700
CONTRACT CLOSEOUT

1.1 DESCRIPTION:

- A. Work included: Provide an orderly and efficient transfer of the completed Work to the Owner.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. "Substantial Completion" is defined in Paragraph 9.8.1 of the General Conditions.

1.2 QUALITY ASSURANCE:

- A. Prior to requesting inspection by the Architect/Engineer, use adequate means to assure that the Work is completed in accordance with the specified requirements and is ready for the requested inspection.

1.3 PROCEDURES:

- A. Substantial Completion:
 - 1. Prepare and submit the list required by the first sentence for Paragraph 9.8.2 of the General Conditions.
 - 2. Within a reasonable time after receipt of the list, the Architect/Engineer will inspect or determine status of completion.
 - 3. Should the Architect/Engineer determine that the Work is not substantially complete:
 - a. The Architect/Engineer promptly will so notify the Contractor, in writing, giving the reasons therefore.
 - b. Remedy the deficiencies and notify the Architect/Engineer when ready for reinspection.
 - c. The Architect/Engineer will reinspect the Work.
 - 4. When the Architect/Engineer concurs that the Work is substantially complete:
 - a. The Architect/Engineer will prepare a "Certificate of Substantial Completion" on AIA form G704, accompanied by the Contractor's list of items to be completed or corrected, as verified by the Architect/Engineer.
 - b. The Architect/Engineer will submit the Certificate to the Owner and to the Contractor for their written acceptance of the responsibilities assigned to them in the Certificate.
- B. Final Completion:
 - 1. Prepare and submit the notice required by the first sentence of Paragraph 9.10.1 of the General Conditions.
 - 2. Verify that the Work is complete including, but not necessarily limited to, the items mentioned in Paragraph 9.10.2 of the General Conditions.
 - 3. Certify that:
 - a. Contract Documents have been reviewed;
 - b. Work has been inspected for compliance with the Contract Documents;
 - c. Work has been completed in accordance with the Contract Documents;
 - d. Equipment and systems have been tested as required, and are operational;
 - e. Work is completed and ready for final inspection.

4. The Architect/Engineer will make an inspection to verify status of completion.
 5. Should the Architect/Engineer determine that the Work is incomplete or defective:
 - a. The Architect/Engineer promptly will so notify the Contractor, in writing, listing the incomplete or defective work.
 - b. Remedy the deficiencies promptly, and notify the Architect/Engineer when ready for reinspection.
 6. When the Architect/Engineer determines that the Work is acceptable under the Contract Documents, she/he will request the Contractor to make closeout submittals.
- C. Closeout submittals include, but are not necessarily limited to:
1. Operation and maintenance data for items so listed in pertinent other Sections of these Specifications, and for other items when so directed by the Architect/Engineer;
 2. Warranties and bonds;
 3. Keys and keying schedule;
 4. Spare parts and materials extra stock.
 5. Evidence of compliance with requirements of governmental agencies having jurisdiction including, but not necessarily limited to:
 - a. Certificates of Inspection;
 - b. Certificates of Occupancy;
 6. Certificates of Insurance for products and completed operations;
 7. Evidence of payment and release of liens;
 8. List of subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be reached for emergency service at all times including nights, weekends, and holidays.
- D. Final adjustment of accounts:
1. Submit a final statement of accounting to the Architect/Engineer, showing all adjustments to the Contract Sum.
 2. If so required, the Architect/Engineer will prepare a final Change Order showing adjustments to the Contract Sum which were not made previously by Change Orders.

1.4 INSTRUCTION:

- A. Instruct the Owner's personnel in proper operation and maintenance of systems, equipment, and similar items which were provided as part of the Work .

*******END OF SECTION*******

SECTION 01710
CLEANING

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Work included: Throughout the construction period, maintain the structures and site in a standard of cleanliness as described in this Section.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. In addition to standards described in this Section, comply with requirements for cleaning as described in pertinent other Section of these Specifications.

1.2 QUALITY ASSURANCE:

- A. Conduct daily inspection, and more often if necessary, to verify that requirements for cleanliness are being met.
- B. In addition to the standards described in this Section, comply with pertinent requirements agencies having jurisdiction.

PART 2 - PRODUCTS:

2.1 CLEANING MATERIALS AND EQUIPMENT:

- A. Provide required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

2.2 COMPATIBILITY:

- A. Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

PART 3 - EXECUTION:

3.1 PROGRESS CLEANING:

- A. General:
 - 1. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic and providing required protection of materials.
 - 2. Do not allow accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
 - 3. At least twice each month, and more often if necessary, completely remove all scrap, debris, and

waste material from the job site.

4. Provide adequate storage or containment for all items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.

B. Site:

1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.
2. Weekly, and more often if necessary, inspect all arrangements of materials stored on the site. Restack, tidy, or otherwise service arrangements of stored items to meet the requirements of subparagraph 3.1-A-1 above.
3. Maintain the site in a neat and orderly condition at all times.

C. Structures:

1. Weekly, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.

3.2 FINAL CLEANING:

A. "Clean," for the purposed of this Article, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials and appropriate to the nature of the site.

B. Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in Article 3.1 above.

C. Site:

1. Unless otherwise specifically directed by the Architect/Engineer, broom clean paved areas on the site and public paved areas adjacent to the site.
2. Completely remove resultant debris.

D. Schedule final cleaning as approved by the Architect/Engineer to enable the Owner to accept a completely clean Work.

3.3 CLEANING DURING OWNER'S OCCUPANCY:

A. Should the Owner occupy the Work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning shall be as determined by the Architect/Engineer in accordance with the General Conditions of the Contract.

*****END OF SECTION*****

SECTION 01720
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Work included:
 - 1. Throughout progress of the Work, maintain an accurate record of changes in the Contract Documents, as described in Article 3.1 below.
 - 2. Upon completion of the Work, transfer the recorded changes to a set of Record Documents, as described in Article 3.2 below.

- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Other requirements affecting Project Record Documents may appear in pertinent other Sections of these Specifications.

1.2 QUALITY ASSURANCE:

- A. Delegate the responsibility for maintenance of Record Documents to one person on the Contractor's staff as approved by the Architect/Engineer.

- B. Accuracy of records:
 - 1. Thoroughly coordinate changes within the Record Documents, making adequate and proper entries on each page of the Specification and each sheet of the Drawings and other Documents where such entry is required to show the change properly.
 - 2. Accuracy of records shall be such that future search for items shown in the Contract Documents may rely reasonably on information obtained from the approved Project Record Documents.

- C. Make entries within twenty-four (24) hours after receipt of information that the change has occurred.

1.3 SUBMITTALS:

- A. Comply with pertinent provisions of Section 01340.

- B. The Architect/Engineer's approval of the current status of Project Record Documents may be a prerequisite to the Architect/Engineer's approval of requests for progress payment and request for final payment under the Contract.

- C. Prior to submitting each request for progress payment, secure the Architect/Engineer's approval of the current status of the Project Record Documents.

- D. Prior to submitting request for final payment, submit the final Project Record Documents to the Architect/Engineer and secure his approval.

1.4 PRODUCT HANDLING:

- A. Maintain the job set of Record Documents completely protected from deterioration and from loss and damage until completion of the Work and transfer of all recorded data to the final Project Record Documents.
- B. In the event of loss of recorded data, use means necessary to again secure the data to the Architect/Engineer's approval.
 - 1. Such means shall include, if necessary in the opinion of the Architect/Engineer, removal and replacement of concealing materials.
 - 2. In such case, provide replacements to the standards originally required by the Contract Documents.

PART 2 - PRODUCTS:

2.1 RECORD DOCUMENTS:

- A. Job Set: Promptly following receipt of the Owner's Notice to proceed, secure from the Architect/Engineer at no charge to the Contractor one complete set of all Documents comprising the Contract.
- B. Final Record Documents: At a time nearing the completion of the Work, secure from the Architect/Engineer at no charge to the Contractor one complete set of sepia transparencies of all Drawings in the Contract.

PART 3 - EXECUTION:

3.1 MAINTENANCE OF JOB SET:

- A. Immediately upon receipt of the job set described in Paragraph 2.1-A above, identify each of the Documents with the title, **"RECORD DOCUMENTS - JOB SET."**
- B. Preservation:
 - 1. Considering the Contract completion time, the probable number of occasions upon the job set must be taken out for new entries and for examination, and the conditions under which these activities will be performed, devise a suitable method for protecting the job set to the approval of the Architect/Engineer.
 - 2. Do not use the job set for any purpose except entry of new data and for review by the Architect/Engineer, until start of transfer to date to final Project Record Documents.
 - 3. Maintain the job set at the site of Work as that site is designated by the by the Architect/Engineer.
- C. Making entries on Drawings:
 - 1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe the change by graphic line and note as required.
 - 2. Date all entries.
 - 3. Call attention to the entry by a **"cloud"** drawn around the area or areas affected.

4. In the event of overlapping changes, use different colors for the overlapping changes.
- D. Make entries in the pertinent other Documents as approved by the Architect/Engineer.
- E. Conversion of Schematic Layouts:
1. In some cases on the Drawings, arrangements of conduits, piping, ducts and similar items, is shown schematically and is not intended to portray precise layout.
 - a. Final physical arrangement is determined by the Contractor, subject to the Architect/Engineer's approval.
 - b. However, design of future modifications of the facility may require accurate information as to the final physical layout of items which are shown only schematically on the Drawings.
 2. Show on the job set of Record Drawings, by dimension accurate to within one inch, the centerline of each run of items such as are described in subparagraph 3.1-E-1 above.
 - a. Clearly identify the item by accurate note such as "cast iron drain," "galv. water," and the like.
 - b. Show, by symbol or note, the vertical location of the item ("under slab," "exposed," and the like).
 - c. Make all identification sufficiently descriptive that it may be related reliably to the Specifications.
 3. The Architect/Engineer may waive the requirements for conversion of schematic layouts where, in the Architect/Engineer's judgment, conversion serves no useful purpose. However, do not rely upon waivers being issued except as specifically issued in writing by the Architect/Engineer.

3.2 FINAL PROJECT RECORD DOCUMENTS:

- A. The purpose of the final Project Record Documents is to provide information regarding all aspects of the Work, both concealed and visible, to enable future modification of the Work to proceed without lengthy and expensive site measurement, investigation, and examination.
- B. Approval of recorded data prior to transfer:
1. Following receipt of the transparencies described in Paragraph 2.1-B above, and prior to start of transfer of recorded data thereto, secure the Architect/Engineer's approval for all required revisions.
- C. Transfer of data to Drawings:
1. Carefully transfer change data shown on the job set of Record Drawings to the corresponding transparencies, coordinating the changes as required.
 2. Clearly indicate at each affected detail and other Drawing a full description of changes made during construction, and the actual location of items described in subparagraph 3.1-E-1 above.
 3. Call attention to each entry by drawing a "cloud" around the area or areas affected.
 4. Make changes neatly, consistently, and with the proper media to assure longevity and clear reproduction.
 5. Contractor shall have as-built drawings of the project completed and approved by the Owner.
- D. Transfer of data to other Documents:
1. If the Documents other than the Drawings have been kept clean during progress of the Work, and if entries thereon have been orderly to the approval of the Architect/Engineer, the job set of those Documents other than the Drawings will be accepted as final Record Documents.

2. If any such Document is not so approved by the Architect/Engineer, secure a new copy of that Document from the Architect/Engineer at the Architect/Engineer's usual charge for reproduction and handling, and carefully transfer the change data to the new copy to the approval of the Architect/Engineer.

E. Review and Submittal:

1. Submit the completed set of Project Record Documents to the Architect/Engineer as described in Paragraph 1.3-D above.
2. Participate in review meetings as required.
3. Make required changes and promptly deliver the final Project Record Documents to the Architect/Engineer.

3.3 CHANGES SUBSEQUENT TO ACCEPTANCE:

- A. The Contractor has no responsibility for recording changes in the Work subsequent to Final Completion, except for changes resulting from work performed under Warranty.

*******END OF SECTION *******

SECTION 02230
SITE PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 REFERENCES

- A. All work specified in this Section shall conform to “Standard Specifications for Road and Bridge Construction” of the Rhode Island Department of Transportation, latest revision, herein referred to as “State Standards” or “Standard Specifications”.
- B. Existing Conditions Plan compiled from the following sources:
1. “Rhode Island D.E.M. Shooting Range off Great Neck Road, West Kingston, RI – Existing Conditions” dated January 2015 and prepared by National Surveyors–Developers, Inc. at 42 Hamlet Ave, Woonsocket, RI.

1.3 SUMMARY

- A. The work of this Section includes the following:
1. Provisions for protection of all existing utilities to remain from damage particularly at heavy construction vehicle crossings.
 2. Removal, disposal, capping or plugging of drainage piping at the locations specified on the drawings.
 3. Removal and disposal of flexible pavement and concrete walks at the locations specified on the drawings.
 4. Removal and disposal of guardrail.
 5. Remove and dispose concrete or stone foundation remnants.
 6. Clearing and Grubbing.
 7. Cleaning and maintenance of the site and stormwater management system.
- B. Related Sections include the following:
1. Section 02300 Earthwork

1.4 DEFINITIONS

- A. Cleaning as described in Subsection 212.01.2a of the State Standards.
- B. Maintenance as described in Subsection 212.01.2b of the State Standards.
- C. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials.

- D. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.5 MATERIAL OWNERSHIP

- A. Except for materials indicated to remain on the Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.
- B. The Owner reserves the right to claim ownership over any materials from the site, including earthwork. The materials claimed by the Owner shall be stockpiled on the site as directed.

1.6 SUBMITALS

- A. Shop Drawings:
 - 1. Submit drawings or details indicating proposed provisions for protection of existing utilities as the work requires. These utilities must be protected from damage particularly by heavy construction equipment driving over the top of them.

1.7 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Owner and Owner's Representative not less than two weeks in advance of proposed utility interruptions in writing. Renotify in writing 72 hours in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Owner's written permission.
 - 3. All power shut downs shall be coordinated with the Owner.
 - 4. Underground utilities were compiled from available record plans and aboveground locations and are approximate. The Contractor shall contact "Dig-Safe" at 1-888-DIGSAFE 72 hours to mark existing utilities prior to commencing work on any part of the site.
- B. The Contractor is responsible to schedule the work and determine any required temporary utility lines and connections required to keep the existing facilities in operation. The cost to furnish and install temporary utility lines and connections shall be included in the Contractor's base bid.
- C. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with the Owner and utility companies to shut off services if lines are active.
- D. Do not commence site operations until temporary erosion and sedimentation control measures are in place.
- E. Removal of all asbestos piping or structures, if found, shall be in accordance with Subsection 201.03.8 of the State Standard Specifications.
- F. Demolition of Buildings shall be in accordance with Subsection 201.03.12 of the State Standard Specifications.

PART 2 - PRODUCTS**2.1 GENERAL**

- A. The Contractor shall provide all materials and equipment in suitable and adequate quantity as required to accomplish the work shown and specified.

PART 3 - EXECUTION**3.1 REMOVE AND DISPOSE DRAINAGE AND OTHER GRAVITY UTILITY PIPING**

- A. All pipe or conduit designated to be removed shall be so-removed and legally disposed of off-site. Drain pipes or other pipes, ducts, etc., cut and deemed advisable to remain in the earth shall be plugged with concrete, except that metal drain pipes may be sealed with screw type plugs or caps. Drain pipes or other pipes that are cut for a new connection shall be temporarily capped and sealed water tight to prevent sediment or water from entering the utility.
- B. The Contractor shall cooperate with the Owner and utility companies so that the demolition work may be performed in accordance with their regulations and with the approval of the Owner.
- C. Removal of all asbestos cement pipe, if found, shall be in accordance with Subsection 201.03.8 of the Standard Specifications.

3.2 REMOVE AND DISPOSE CONCRETE UTILITY STRUCTURES, MANHOLES, CATCH BASINS, AND CISTERNS

- A. If discovered, concrete utility structures that conflict with the proposed work and that are determined to be abandoned shall be removed and legally disposed of off-site. The Contractor shall cooperate with the Owner and utility companies so that the demolition work may be performed in accordance with their regulations and with the approval of the Owner's Representative.

3.3 REMOVE AND DISPOSE, CONCRETE RAMPS, CONCRETE WALKS, AND RAILINGS

- A. In accordance with Subsections 201.03.7, and 201.03.10 of the Standard Specifications.

3.4 REMOVE AND DISPOSE GUARDRAIL

- A. In accordance with Subsections 201.03.10 of the Standard Specifications.

3.5 REMOVE AND DISPOSE CONCRETE FOUNDATION REMNANTS

- A. The Contractor shall excavate concrete foundation remnants uncovered during excavation for proposed improvements. The contractor may process existing onsite concrete material to be utilized onsite.

3.6 REMOVE AND DISPOSE OF BUILDINGS

- A. In accordance with Subsections 201.03.12 of the Standard Specifications.

3.7 CLEARING AND GRUBBING

- A. The Contractor shall remove and legally dispose off-site all plants designated for removal and all debris, organic matter, and objectionable material which is not suitable at no additional cost to the Owner.
- B. Clearing and grubbing shall include the removal of all trees, shrubs, vines, and all stumps as indicated on the drawings and as directed by the Owner's Representative. No burning shall be allowed on-site.
- C. Clear site of trees, shrubs, and over vegetation, except for those indicated to remain as follows:
 - 1. Completely remove all stumps and roots to the following minimum depths;
 - a. Eighteen (18) inches below existing ground level for shrubs.
 - b. Three (3) feet below existing ground level for trees.
 - 2. Use only hand methods for grubbing inside drip line of trees indicated to remain.
 - 3. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches will obstruct installation of new construction.
 - 4. Unless further excavation is required, fill depressions caused by clearing and grubbing work with Common Borrow material or approved onsite material.
 - a. Place borrow material in horizontal layers not exceeding six (6) inches loose depth, and thoroughly compact each layer to a density equal to that of the adjacent original ground.

3.8 DISPOSAL

- A. Disposal: Remove material, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property. Any potentially contaminated soil material encountered, shall be brought to the attention of The Owner for direction.
- B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

3.9 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction. The Contractor shall employ a Professional Land Surveyor registered in Rhode Island to perform a benchmark and field verification survey prior to commencing work. The Contractor is responsible to provide horizontal and vertical layout of all proposed work.
- B. Locate and clearly flag trees and vegetation to remain or to be relocated. Review trees with Owner prior to removal.
- C. Protect existing site improvements to remain from damage during construction.
- D. Restore damaged improvements to their original condition, as acceptable to Owner.

3.10 CLEANING AND MAINTENANCE OF STORM DRAIN SYSTEM

- A. The Contractor shall remove sediment and debris from the existing drainage system prior to commencing work.
- B. During construction the Contractor shall be responsible to clean sediment and debris from the existing and recently installed drainage system.
- C. Prior to project completion the complete drainage system shall be cleaned of all debris and sediment.

*******END OF SECTION*******

SECTION 02250
EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 REFERENCES

- A. All work specified in this Section shall conform to “Standard Specifications for Road and Bridge Construction” of the Rhode Island Department of Transportation, latest revision, herein referred to as “State Standards”.
- B. Existing Conditions Plan compiled from the following sources:
 - 1. “Rhode Island D.E.M. Shooting Range off Great Neck Road, West Kingston, RI – Existing Conditions” dated January 2015 and prepared by National Surveyors–Developers, Inc. at 42 Hamlet Ave, Woonsocket, RI.

1.3 SUMMARY

- A. The work of this Section includes the following:
 - 1. Provision of erosion controls, specifically compost filter socks, temporary diversions, AND temporary sediment traps as indicated on the drawings or as directed by the Owners Representative.
 - 2. Maintenance and cleaning of erosion and sedimentation controls specifically compost filter socks, baled hay erosion checks, temporary diversions, temporary sediment traps, and catch basin inlet protection as necessary or as directed by the Owner’s Representative.
- B. Related Sections include the following:
 - 1. Section 02300 Earthwork.

1.4 DEFINITIONS

- A. Cleaning as described in Subsection 212.01.2a of the State Standards.
- B. Compost Filter Sock: Three-dimensional tubular filtration device constructed by filling a mesh tube with a compost filter media.
- C. Maintenance as described in Subsection 212.01.2b of the State Standards.

1.5 SUBMITTALS

- A. Shop Drawings:
 - 1. Product information depicting that the products furnished meet the project specifications.

1.6 PROJECT CONDITIONS

- A. Do not commence operations which disturb the ground surface until temporary erosion and sedimentation control measures are in place.
- B. The Contractor is responsible for establishing and maintaining all sediment and erosion controls in accordance with the Rhode Island Erosion and Sediment Control Manual.

PART 2 PRODUCTS

2.1 EROSION AND SEDIMENTATION CONTROL MEASURES

- A. Compost Filter Sock.
 - 1. Materials shall be in accordance with AASHTO Designation: MP 9-06. Compost material shall meet applicable Federal and State Regulations.
 - 2. For compost filter socks 18" or less in diameter, wooden stakes shall be 1 inch by 1 inch, at 10-foot intervals on center, and of a length that shall project into the soil 1 foot leaving 3 to 4 inches protruding above the filter sock.
 - 3. For compost filter socks greater than 18" in diameter, wooden stakes shall be 2 inch by 2 inch, at 10-foot intervals on center, and of a length that shall project into the soil 1 foot leaving 3 to 4 inches protruding above the filter sock.
- B. Temporary Turf Reinforcement Mat
 - 1. Temporary turf reinforcement mats shall be North American Green Product S150 or approved equivalent.
 - 2. Temporary turf reinforcement mat shall be degradable after 12 to 24 months
 - 3. Provide a temporary turf reinforcement mat designed to stabilize a 3:1 slope or greater.
- C. Filter Fabric
 - 1. See Geotextiles in Division 2 Section 02300 Earthwork for specification.
- D. Seed Mixtures
 - 1. In accordance with Section M.18.10.5 of the State Standards.
- E. Temporary Sediment Traps, Swales, and Diversions
 - 1. Refer to Section 02300 Earthwork for soil materials and excavation.
 - 2. Provide temporary seeding.
 - 3. Provide turf reinforcement mat as required to stabilize side slopes.

PART 3 - EXECUTION

3.1 PROVISION OF COMPOST FILTER SOCKS

- A. Trenching is not required, for typical installation; therefore, soil should not be disturbed upon installation. Compost filter socks shall be placed over the top of ground and wooden stakes shall be driven through the center of the filter socks to anchor them to the ground. To ensure optimum performance, heavy vegetation shall be cut down or removed and extremely uneven

surfaces shall be graded to ensure that the compost filter sock uniformly contacts the ground surface.

- B. Compost filter socks may be vegetated by incorporating seed into the compost prior to placing it in the tube.
- C. The ends of the compost filter sock shall be directed upslope, to prevent stormwater from running around the end of the sock.

3.2 PROVISION OF BALED STAW EROSION BARRIERS AND CHECK DAMS

- A. In accordance with Subsection 206.03.1 of the State Standards.
- B. Baled hay is not permissible.
- C. Baled straw may be utilized in place of baled hay.

3.3 TEMPORARY TURF REINFORCEMENT MAT

- A. Install turf reinforcement mat on all exposed cut/fill slopes with a slope 3:1 or greater to protect against rainfall and wind erosion and hold moisture content to enhance vegetation growth in seed where shown in the plans.
- B. Install erosion control lining in the required locations immediately after the areas have been seeded.
 - 1. Place the erosion control lining over the seed mulch to fit against the contours of the area. It shall be applied without stretching, lie smoothly but loosely, and be free of wrinkles and bunches. Roll the material in place and in the direction of the flow of surface water. Anchor the up-grade end of the erosion lining in a narrow trench 6" deep. Firmly tamp the trench backfill in place.
 - 2. In ditches and on slopes, provide check or junction slots at no greater than 50' intervals.
 - 3. Where the erosion lining comes into contact with the edges of catch basins or other structures, place a tight fold in the edge of the material and bury it a minimum of 6" into the soil.
 - 4. Install staples no more than 6" apart at all anchor, junction or check slots.
 - 5. Where two lengths of erosion control lining are joined, the end of the upgrade strip shall overlap the downgrade by a minimum of 6" strip and the two strips shall be anchored together.

3.4 MAINTENANCE AND CLEANING OR EROSION AND POLLUTION CONTROLS

- A. In accordance with Subsection 212.03 of the State Standards.
- B. Repair all erosion controls at substantial completion and get inspection and approval of the condition of the protection from the Owner's Representative.

3.5 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to the Drawings.
- B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- D. Following stabilization of the site and the receipt of permission from the Owner's Representative, the Contractor shall remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.6 DISPOSAL

- A. Disposal: Dispose of natural material collected from the erosion and sedimentation controls onsite in upland areas. Any waste materials collected, including trash and debris shall be legally disposed of off the Owner's property.
- B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

3.7 PREPARATION

- A. Restore damaged improvements to their original condition, as acceptable to Owner.

3.8 SEEDING

- A. In accordance with Section L.02.03 of the State Standards.

*******END OF SECTION*******

SECTION 02300
EARTHWORK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 REFERENCES

- A. All work specified in this Section shall conform to “Standard Specifications for Road and Bridge Construction” of the Rhode Island Department of Transportation, latest revision, herein referred to as “State Standards”.

1.3 SUMMARY

- A. This Section includes all excavation including, but not limited to, the following:
1. Preparing subgrades for walks, pavements, and lawns.
 2. Preparing bearing surfaces for footings and slabs.
 3. Subbase course for walks.
 4. Subbase course for paving.
 5. Subsurface drainage backfill for walls and trenches.
 6. Excavating and backfilling for utility trenches.
 7. Excavating and backfilling for demolition of building and structures.
 8. Backfilling for retaining walls.
 9. Geotextiles
- B. Related Sections include:
1. Section 02230 – SITE PREPARATION
 2. Section 02250 – EROSION AND SEDIMENTATION CONTROLS

1.4 SUBMITTALS

- A. Product Data: For the following:
1. Geotextiles
 2. Provide a 12-by-12-inch sample of geotextiles and the manufacturer’s recommended installation procedure.
- B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance with the following requirements indicated:
1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.
 2. Laboratory compaction curve according to ASTM D 1557 for each on-site and borrow soil material proposed for fill and backfill.

3. Internal friction angle according to ASTM D3080 for each on-site and borrow material proposed for construction of the berms.
 4. Natural angle of repose according to ASTM C1444 for on-site and borrow material proposed for use as ballistic sand.
- C. Submit the qualifications of the Registered Professional Land Surveyor performing layout and data collection work.
- D. Provide documentation verifying the accuracy of field engineering work. Submit 5 stamped copies of final record drawings of field engineering layouts and as-built survey. Submit an electronic file (.dwg format) on CD of all final plans.

1.5 SITE INFORMATION

- A. All soil material shall remain on-site
- B. It is hereby understood that the Contractor has carefully examined the site and all conditions affecting work under this Section. No claim for additional costs will be allowed because of lack of full knowledge of existing conditions.
- C. Plans, surveys, measurements and dimensions, under which the work is to be performed, are believed to be correct to the best of the Engineer's knowledge, but the Contractor shall have examined them for himself during the bidding period, as no allowance will be made for any errors or inaccuracies that may be found herein.
- D. The Contractor may request to perform test borings and other explorations at no cost to the Owner.
- E. The costs of additional rock excavation resulting from changes in the work shall be paid for as outlined in the measurement and payment section of this specification.
- F. The Contractor will not be eligible to receive additional compensation for dewatering exceeding the Contractor's initial bid.
- G. Fill material present on-site may contain brick, debris, or quantities of silt that may limit re-use of this material. The Contractor may conduct testing at his own expense to confirm whether this material is suitable for re-use. The Contractor is made aware of this condition and will not be eligible to receive additional compensation for imported material exceeding the Contractor's initial bid.
- H. It is the responsibility of the Contractor under this Contract to do the necessary excavation, filling, grading, and rough grading to bring the existing grades to subgrade and parallel to finished grades as specified herein and as shown on the Drawings for this Work. The Contractor shall visit the site prior to submitting a bid to become familiar with the extent of the work to be done under this Contract. The Contractor shall be responsible for determining the quantities of earth materials that must be imported to complete the work under this Section. All imported earth materials required to construct the project shall be included in the Contractor's base bid.

- I. The Contractor is allowed to re-use excavated On-Site Common Borrow as fill in accordance with this specification. All On-Site Common Borrow used as backfill shall be compacted to the required percentage of maximum dry density included in Table 2 below.
 - 1. The Contractor is made aware that On-Site Common Borrow may not meet soil gradations specified in Table 1 below. Additional efforts required to reuse On-Site Common Borrow are the responsibility of the Contractor and shall result in no additional expense to the Owner or a request for additional time for delays caused by its usage.
 - 2. The Contractor is responsible for any additional work required to install this material in accordance with the specifications.
 - 3. If project delays will result from the additional time required to re-work On-Site Common Borrow, placed as fill in accordance with the specifications, the Contractor shall remove material that does not meet the compaction requirements, stockpile on-site, and provide imported fill meeting the specifications. This imported material shall be provided at no additional expense to the Owner.
 - 4. Any project delays resulting from additional time required to work this material are the responsibility of the Contractor.

- J. The Contractor shall use suitable on-site soils and fill, and soil from off-site sources, as needed. Please note that not all on-site materials will be suitable for reuse, nor will all required material gradations be present on the site; however, all material must remain on-site. Imported materials are anticipated for this project.

- K. Contractor shall protect and adjust moisture condition of all on-site and imported materials for proper installation, compaction, and use. This includes covering, drying, and adding moisture as required to maintain suitable workability of the soil materials. Please note onsite and imported materials will not necessarily be encountered, or delivered in a suitable condition as environmental factors prevalent at the time of construction will impact soil materials.

1.6 UNIT PRICES

- A. Rock Measurement: Volume of rock actually removed, measured in original position, but not to exceed the limits specified in PART 3 - EXECUTION.

- B. Unit prices for rock excavation include all labor, equipment, and materials required for removal and stockpiling of rock. Unit prices for rock excavation also include all labor, equipment, and materials required for replacement of rock excavation with approved materials where the rock excavation extends beyond the specified excavation limits. Any excavation beyond the specified excavation limits must be approved by the Owner's representative prior to removal. Specified excavation limits for rock are specified in 3.6 ROCK EXCAVATION.

1.7 DEFINITIONS

- A. Backfill: Soil material used for fill and excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.

- B. Base Course: Course placed between the subbase course and asphalt paving.
- C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil for use as fill or backfill.
- E. Boulder: A soil particle with a minimum dimension of 36 inches.
- F. Building Area: the area defined by the projection of a line from two foot outside of the edge of the footing extending upward and outward at a 1.5H: 1V.
- G. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- H. Deleterious Material: Trash, debris, clay, topsoil, roots, organic material friable, bottle, or otherwise degradable materials that compromise the strength and properties of soils.
- I. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated on the Drawings.
 - 1. Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Owner's Representative. Additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
 - 2. Bulk Excavation: Excavation more than 6 feet in width and more than 10 feet in length for the installation of utilities, foundations, and footings.
 - 3. Trench Excavation: Excavation 6 feet in width or less for the installation of utilities, foundations, and footings.
 - 4. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Owner's Representative. Unauthorized excavation, as well as remedial work directed by Owner's Representative, shall be without additional compensation.
 - 5. Unclassified Excavation: The nature of materials to be encountered has not been identified or described herein.
- J. Fill: Soil materials used to raise existing grades.
- K. Frost Zone: The area within 40 inches of finished grade.
- L. Imported Material: Material obtained by the Contractor from sources off the site.
- M. Influence Area: The area within planes sloped downward and outward at an angle of 60 degrees from the horizontal from (a) 1 foot outside the outermost edge at the base of foundations or slabs; or (b) 1 foot outside the outermost edge at the surface of pavements; or (c) 0.5 foot outside the exterior edge at the spring line of pipes.
- N. Optimum Moisture Content: Determined by the ASTM standard specified to determine the maximum dry density for relative compaction.
- O. Prepared Ground Surface: The ground surface after clearing, grubbing, stripping, excavation, and scarification and/or compaction.

- P. Relative Compaction: The ratio, in percent, of the as-compacted field dry density to the laboratory maximum dry density as determined by ASTM D1557.
- Q. Relative Density: As defined by ASTM D4253 or D4254.
- R. Rock: Material in beds, ledges, unstratified masses, conglomerate deposits that cannot be removed, in the opinion of the Engineer, without systematic drilling, ram hammering, blasting, or ripping. Rock also includes boulders of rock material that exceed 2 cu. yd. for bulk excavation or 1 cu. yd. for trench excavation.
1. Bulk Rock Excavation: Rock encountered within bulk excavation as defined above.
 2. Trench Rock Excavation: Rock encountered within trench excavation as defined above.
- S. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- T. Subbase Course: Course placed between the subgrade and base course for asphalt pavement, or course placed between the subgrade and a cement concrete or asphalt walk.
- U. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- V. Topsoil: Natural or cultivated top layer of the soil profile or manufactured topsoil; containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inch in diameter; and free of weeds, roots, and toxic and other non-soil materials.
- W. Unsuitable Soils: Existing soils that, in the opinion of the Engineer and Owner's Representative, are unsuitable to remain in their existing location that are deposited outside the excavation limits. This does not include topsoil, subsoil, and silty-sand materials.
- X. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.
- Y. Well-Graded: A mixture of particle sizes that has no specific concentration or lack thereof of one or more sizes. Well-graded does not define any numerical value that must be placed on the coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters. Well-graded is used to define a material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids.

1.8 IMPORTED MATERIAL ACCEPTANCE

- A. All imported earth materials specified in this section are subject to the following requirements:
1. Materials imported to the site by the Contractor for on-site use shall not contain oil and/or hazardous materials.
 2. All tests necessary for the Contractor to locate acceptable sources of imported material shall be made by the Contractor. Certification that the material conforms to the Specification

requirements along with copies of the test results from a qualified commercial testing laboratory shall be submitted to the Engineer for approval at least 5 calendar days before the material is required for use. All material samples shall be a minimum of 40 pounds and furnished by the Contractor at the Contractor's sole expense. Samples shall be representative and be clearly marked to show the source of the material and the intended use on the project. Sampling of the material source shall be done by the Contractor in accordance with ASTM D75. Tentative acceptance of the material shall be based on an inspection of the source by the Engineer and/or the certified test results submitted by the Contractor to the Engineer at the Engineer's discretion. No imported materials shall be delivered to the site until the proposed source and the Engineer has tentatively accepted materials tests in writing. Final acceptance will be based on Quality Control and Quality Assurance tests made on samples of material taken from the completed and compacted course.

3. If tests conducted by the Contractor or the Engineer, indicate that the material does not meet Specification requirements; material placement will be terminated until corrective measures are taken. Material that does not conform to the Specification requirements and is placed in the work shall be removed and replaced at the Contractor's sole expense. Retesting of material that does not meet specification requirements shall be performed at the Contractor's sole expense.

1.9 QUALITY ASSURANCE

- A. Employ a qualified surveyor, registered with the State of Rhode Island as a Professional Land Surveyor, as required for all layout and to establish grades for the work being performed
- B. Tests and analysis of geotechnical properties of the soil material shall be performed in accordance with ASTM D3080, ASTM D422, ASTM C1444 ASTM D1557, ASTM D2922, and ASTM D4318. Engage a qualified independent geotechnical testing agency to perform field quality control testing qualified according to ASTM E 329.
- C. Contractor's testing agency shall inspect and test subgrade layers and each fill layer or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- D. The Contractor shall perform in place density tests in accordance with ASTM D1556, D2922, or D3017 as the Work progresses, to determine the degree of compaction. Any corrective work required as a result of such tests, such as additional compaction, or a decrease in the thickness of layers, shall be performed by the Contractor at no additional expense to the Owner. In place density testing shall be made at the Contractor's expense by a qualified geotechnical testing laboratory.
- E. The Contractor shall perform in place density testing on on-site and off-site borrow materials placed as fill and backfilled at a minimum frequency of two tests per lift but no less than one test per 200 cubic yards of material placed in any one lift. Compaction testing will be performed in accordance with ASTM D2922, and D3017.

- F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; re-compact and re-test until specified compaction is obtained. Any corrective work required shall be performed by the Contractor, at no additional expense to the Owner. In-place density testing shall be made at the Contractor's expense by the geotechnical testing laboratory.
- G. All temporary shoring and bracing shall be designed, detailed, and stamped by a Professional Engineer registered in the State of Rhode Island.
- H. Pre-excavation Conference: Conduct conference at Project site prior to the start of construction. Date and time to be specified by the Owner's Representative.

1.10 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner and then only after arranging to provide temporary utility services according to requirements indicated.
 - 1. Notify Owner and Architect not less than two weeks in advance of proposed utility interruptions in writing. Renotify 72 hours in advance of proposed utility interruptions.
 - a. Notifications should be made to the Owner's Representative.
 - b. Do not proceed with utility interruptions without Owner's written permission.
 - c. All power shutdowns shall be coordinated with the Owner.
 - 2. Contact "Dig Safe" at 1-888-Dig Safe to verify locations of existing underground utilities in areas of proposed excavation prior to commencing any excavation effort.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed on the Drawings. Coordinate with utility companies to shut off services if lines are active.

1.11 WEATHER LIMITATIONS

- A. Material excavated when frozen or when air temperature is less than 40 degrees F shall not be used as fill or backfill until material completely thaws.
- B. Material excavated during inclement weather shall not be used as fill or backfill until after material drains and dries sufficiently for proper compactions.
- C. Material containing moisture greater than 2% above optimum moisture content, frost, or snow will not be used as backfill. Subgrades or placed fill that demonstrates moisture greater than 2% above optimum moisture content, frost, or snow will not be backfilled over until the material has been dried to below 2% above optimum moisture and is free of frost and snow.

1.12 EXCAVATION SAFETY

- A. The Contractor shall be solely responsible for making all excavations in a safe manner. Contractor shall comply with all Local and State OSHA requirements.

- B. Provide appropriate measures to attain a stable base, retain excavation side slopes and prevent earth slides to ensure that persons working in or near the excavation are protected.
- C. The Work of this Section shall be performed in accordance with all applicable Federal, State, and local regulations, laws, codes, and ordinances governing the handling, transportation and disposal of contaminated materials and demolition and construction debris considered unacceptable for reuse on-site.

1.13 LAYOUTS AND GRADES

- A. All line and grade work not presently established at the site shall be laid out by a survey team under the supervision of a Registered Land Surveyor or Professional Engineer employed by the Contractor in accordance with Drawings and Specifications. The Contractor shall supply all additional layout and grade control as necessary to properly implement and construct the work. The Contractor shall establish permanent benchmarks and replace as directed any which are destroyed or disturbed.
- B. The words "finished grades" as used herein shall mean final grade elevations indicated on the Drawings. Spot elevations shall govern over proposed contours. Where not otherwise indicated, project site areas outside of the building shall be given uniform slopes between points for which finished grades are indicated or between such points and existing established grades.

1.14 TOLERANCES

- A. All material limits shall be constructed within a vertical tolerance of 0.1 foot and a horizontal tolerance of 1 foot except where dimensions or grades are shown or specified as minimum. All grading shall be performed to maintain slopes and drainage as shown. No reverse slopes will be permitted.

1.15 DRAINAGE

- A. The Contractor shall control the grading in areas under construction on the site so that the surface of the ground will properly slope to prevent accumulation of water in excavated areas and adjacent properties.
- B. The Contractor shall excavate interceptor swales and ditches where necessary prior to the start of major earthmoving operations to insure minimal erosion and to keep areas as free from surface water as possible.
- C. Should surface, rain, or ground water be encountered during the operations, the Contractor shall furnish and operate pumps or other equipment, and provide all necessary piping to keep all excavations clear of water at all times and shall be responsible for any damage to work or adjacent properties for such water. All piping exposed above ground surface for this use, shall be properly covered to allow foot traffic and vehicles to pass without obstruction.
- D. Presence of ground water in soil will not constitute a condition for which an increase in the contract price may be made. Under no circumstances place concrete fill, lay piping, or install

appurtenances in excavation containing free water. Keep utility trenches free of water until pipe joint material has hardened and backfilled to prevent flotation.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: The Contractor may reuse excavated on-site material for fill and backfilling where the material excavated is satisfactory and conforms with the below specified gradation requirements. The Contractor is to provide imported soil materials with satisfactory properties conforming with the below specified gradation requirements when sufficient satisfactory soil materials are not available from excavations.
1. Provide soil free of debris, waste, frozen materials, vegetation, and other deleterious matter.
 2. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
 3. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at the time of compaction.
 4. Unsatisfactory Soils are defined as soils not conforming to the satisfactory soils criteria unless otherwise approved by the Engineer.
- B. Satisfactory Soils: Soils being free of rock or gravel larger than 3 inches in any dimension, debris, broken pavement, waste, frozen materials, vegetation, and other deleterious matter and conform to the criteria listed below:
1. Existing concrete slabs and footings to be demolished may be processed onsite to confirm with Onsite Common Borrow and utilized in the construction of the inner portion of the side berms.
 2. Gradations of satisfactory soils are as shown in the Table below:

Table 1: SOIL GRADATIONS					
Sieve Size	Sand Gravel Fill*** (RIDOT M.01.02.2)	Granular Fill*** (RIDOT M.01.02.1)	1-1/2 inch Crushed Stone*** (RIDOT M.01.04)	3/4 inch Crushed Stone	Ballistic Sand****
3-inch*	100	60-100	100	-	-
1-1/2-inch	-	70-100	85-100	100	-
¾-inch	-	-	10-40	85-100	-
½-inch	50-85	50-85	0-8	-	-
³ / ₈ -inch	45-80	-	-	20-55	-
No. 4	40-75	30-55	-	0-10	100
No. 10	30-60	-	-	-	-
No. 40	10-35	0-45	-	-	93-100
No. 60	-	-	-	-	55-65
No. 100	5-20**	-	-	-	25-30
No. 200	0-8	2-10	<1	<1	20-30

* The maximum recommended stone size is three inches where placed as base course below slabs and pavement; elsewhere, maximum stone size shall be 2/3 of the loose lift thickness.

** The amount passing the No. 100 sieve should be between 40 and 70 percent of that amount passing the number 40 sieve.

***Rhode Island Department of Transportation (RIDOT) gradation is an acceptable alternative to the gradation specified.

**** Ballistic Sand must have a clay content of no less than 20% and no more than 25%.

3. Common Borrow shall be imported or excavated onsite material free of roots, sod, rubbish, debris, frozen materials, broken pavement, or other deleterious or organic matter, and conform to the following requirements.
 - a. Imported Common Borrow shall conform to the specified gradation of Granular Fill in the table above.
 - b. Onsite Common Borrow shall conform to the specified gradation of Granular Fill in the table above, but may contain no more than 15-percent by weight passing the No. 200 sieve. Onsite Common Borrow shall not be placed as foundation wall backfill, as pavement base or subbase courses, as retaining wall backfill, or locations where free-draining backfill are required.
 - c. Stones from excavated onsite material retained on a 3-inch sieve, less than 6-inches in diameter, and not exceeding two-thirds of the thickness of the horizontal layers placed after compaction can be placed for construction. Materials meeting these criteria shall not be included in the analysis for gradation. Materials exceeding this size shall not be placed in backfill below paved areas.
 - d. Common borrow shall be capable of supporting slopes proposed on the drawings.

4. Subbase Material shall be free of rock or gravel larger than 3 inches in any dimension, debris, broken pavement, waste, frozen materials, vegetation, and other deleterious matter and conform to the gradation for Granular Fill in the table above within this specification.
 5. Base Course shall be material free of rock or gravel larger than 3 inches in any dimension, debris, broken pavement, waste, frozen materials, vegetation, and other deleterious matter and conform to the gradation for Sand Gravel Fill in the table above within this specification.
 6. Riprap shall conform to RI Standard M.10.03. Filter stone shall conform to RI Standard M.10.03.1.
 7. Drainage Stone or Crushed Stone or 1 ½" Crushed Stone shall be imported material conforming to the gradation for 1 ½" Crushed Stone in the table above and having a maximum percentage loss of 12 percent as determined by the sodium sulfate test, AASHTO T104, and comply to the gradation provided in the table above.
 8. Sand Gravel Bedding and Granular Fill Bedding shall conform to the Sand Gravel Fill and Granular Fill gradations, respectively, specified above except that 100% by weight must pass the 1 ½" sieve.
 9. Gravel Borrow shall conform to the Sand Gravel Fill Gradation in the Table above.
 10. Structural fill below footings and slabs on grade shall conform to the Sand Gravel Fill Gradation in the Table above except that 100% by weight must pass the 1 ½" sieve.
 11. Sand shall meet ASTM C-33.
- C. Screened Loam shall be in accordance with Section M.18 of the State Standards.
- D. Clay Liner shall conform to the following requirements:
1. Soil must have a maximum remolded coefficient of permeability of 1×10^{-5} centimeters per second throughout its thickness. The soil material must be free of particles greater than three inches (3") in any dimension.
 2. Compaction must be performed by properly controlling the moisture content, lift thickness, and other necessary details to obtain satisfactory results.
 3. The moisture content of the soil must be maintained within the range necessary before and during compaction of the soil lift to ensure that the remolded lift meets the maximum in-situ permeability soil requirements.
- E. Crushed Limestone must consist entirely of limestone. The material shall conform to the AASHTO #4 gradation requirements or the 1-1/2" crushed stone gradation in the table above, and have a maximum percentage loss of 12 percent as determined by the sodium sulfate test, AASHTO T104.

2.2 GEOTEXTILES

- A. Filter Fabric: Non-woven geotextile shall be nonwoven and needle punched pervious sheets of polyester, polyethylene, nylon, or polypropylene filaments formed into a uniform pattern conforming to the MIRAFI 140N or approved equivalent. The geotextile shall have minimum properties as stated in the following table, when measured in accordance with the referenced standards.

Test	Method	Nonwoven ⁽¹⁾
Grab Tensile Strength (lbs)	ASTM D-4632	120
Puncture Strength (lbs)	Modified ASTM D-3787 Using 5/16-inch flat tipped rod	65 min
Mullen Burst (lbs/in ²)	ASTM D-3786	225 min
Elongation at Required Strength (%)	ASTM D-4632	50 min
Equivalent Opening (US Standard Sieve)	ASTM D-4751	70-100
Permittivity (sec ⁻¹)	ASTM D-4491 with 60 mm Falling Head	1.7 min
Water Flow Rate (gal/min/ft ²) at 50 mm Constant Head	(2)	80 –140

(1) All numerical values represent minimum/maximum average roll values (i.e., the average of minimum test results on any roll in a lot should meet or exceed the minimum specified values).

(2) Water flow rate in gal/min/ft² shall be determined by multiplying permittivity in sec⁻¹ as determined by ASTM D-4491 by a conversion factor of 74.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. All temporary shoring and bracing shall be designed, detailed, and stamped by a Professional Engineer registered in the State of Rhode Island.
- C. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Section 02230 – SITE PREPARATION.
- D. Protect and maintain erosion and sedimentation controls, which are specified in Section 02250 – EROSION AND SEDIMENTATION CONTROLS, during earthwork operations.
- E. The use of onsite, excavated material may require stockpiling to allow the material to dry prior to placement. Provide erosion-control measures as specified in the drawings and as required by the Owner's Representative to prevent erosion of piles during wet weather periods.
- F. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Groundwater may be present within the limits of excavation. The Contractor is made aware of this condition and shall include dewatering within his Lump Sum Bid.

- C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
 - 2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 WORK IN FREEZING WEATHER

- A. Protect excavation bottoms against freezing when atmospheric temperature is forecasted to be less than 35 degrees Fahrenheit.
- B. In freezing weather, a layer of fill shall not be left in an uncompacted state at the close of a day's operation. Prior to terminating operations for the day, the final layer of fill, after compaction, shall be rolled with a smooth-wheeled roller to eliminate ridges of soil left by tractors, trucks and compaction equipment.
- C. The Contractor shall not place a layer of compacted fill on snow, ice, or soil that was permitted to freeze prior to compaction. Replacement of these unsatisfactory materials will be required as directed by the Owner's Representative.
- D. Do not excavate to full indicated depth when freezing temperatures may be expected, unless work can be completed to subgrade or piping can be installed and backfilled the same day. Protect the excavation from frost if placing of concrete or piping is delayed.
- E. The Contractor shall keep the operations under this Contract clear and free of accumulation of snow within the limits of Contract Lines as required to carry out the work.

3.4 BLASTING

- A. No blasting is permitted.

3.5 EXCAVATION, GENERAL

- A. The Contractor shall excavate to the lines, grades and dimensions shown and as necessary to accomplish the Work. Excavate to within tolerance of plus or minus 1.0 feet except where dimensions or grades are shown or specified as maximum or minimum. Allow for working space.
- B. Material to be excavated will be classified as earth or rock. Do not excavate rock until it has been classified and quantified by the Contractor's land surveyor, and verified by the Owner's Representative
 - 1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
- C. All topsoil and unsuitable or excess materials shall be stripped from areas of new construction, regrading, or site improvements. Existing topsoil shall be stripped and stored on-site before any

underlying excavating is begun. Materials suitable for reuse shall be stored in locations and approved by the Owner's Representative that will not interfere with construction operations.

- D. All excess and unsuitable materials shall remain on-site in the "Erodible Material Stockpile" area as shown on the contract documents.

3.6 ROCK EXCAVATION

- A. Definitions and Classifications: The following classifications of excavation will be made only when rock excavation is required.
- B. "Rock Excavation" consists of removal and stockpiling of materials encountered that cannot be excavated without continuous and systematic drilling and blasting or continuous use of a ripper or other special equipment, except such materials that are classed as earth excavation. Typical of materials classified as rock excavation are as follows:
 - 1. Rock or stone in original ledge.
 - 2. Hard shale in original ledge.
 - 3. Boulders on site, outside trench limits, exceeding three cubic yards in volume.
- C. Intermittent drilling and ripping performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation.
- D. All rock excavation shall be included within the original Contract Sum based upon the quantities provided in PART 4 - MEASUREMENT AND PAYMENT. Payment for rock excavation shall be adjusted in accordance with 4.1.C.2 Quantities and Payment of Rock Excavation.
- E. Unit prices for rock excavation include all labor, equipment, and materials required for removal and stockpiling of rock. Unit prices for rock excavation also include all labor, equipment, and materials required for replacement of rock excavation with approved materials where the rock excavation extends beyond the specified excavation limits. Any excavation beyond the specified excavation limits must be approved by the Owner's Representative prior to removal.
- F. Rock capable of removal through standard excavation procedures shall be removed from the excavation, measured by the Contractor, and verified by the Owner's Representative.
- G. The dimensions and quantity of the uncovered rock in place and the rock removed from the trench shall be measured by a Licensed Land Surveyor registered in the State of Rhode Island at the Contractor's expense. All survey information shall be supplied to the Owner's Representative for verification of the quantity. Survey information shall include the existing rock surface topography, the removed rock surface topography and the rock removal limits as specified herein.
- H. If a change in the work occurs, which includes the excavation of additional rock outside the original contract limits, the Contractor shall uncover all rock to be removed. Upon uncovering rock in excavations that cannot be removed by standard excavation measures, the Contractor shall expose all faces of rock in the area that requires excavation and notify the Owner. The dimensions and quantity of the rock in place and the rock removed from the trench shall be measured by a Licensed Land Surveyor registered in the State of Rhode Island at the Contractor's

expense. All survey information shall be supplied to the Owner's Representative for verification of the quantity.

- I. Rock shall be removed by mechanical means and methods
- J. Rock Removal Limits
 - 1. The Contractor shall remove rock to elevations, which will allow the installation of all foundations, footings, utilities, structures, trees and plantings, shown on the drawings.
 - 2. The Contractor shall remove rock to a minimum of 30 inches below finished grade in paved areas and a minimum of 24 inches below finished grade in landscaped areas.
 - 3. Around proposed utilities, the Contractor shall remove rock to the lines and subgrade elevations indicated on drawings and as dictated within this specification. The Contractor shall remove sufficient rock to permit the installation of permanent construction without exceeding 6 inches beneath pipe in trench, and the greater of 24 inches wider than pipe or 36 inches wide.
- K. Rock Excavation for the Installation of Structures
 - 1. Boulders and bedrock encountered during the site preparation should be removed from the building area. Any boulder or bedrock located within the building area should be removed to a depth of at least 12 inches below the foundation elevation. Voids that result from boulder removal should be backfilled with compacted Granular Fill.
 - 2. Bedrock excavated for the building footings and slabs should be over excavated to allow for the placement of a compacted 12-inch Sand Gravel Fill cushion below the foundations and slabs placed in horizontal lifts with a maximum loose lift thickness of 12 inches. The cushion material should extend a minimum of 2 feet beyond the horizontal limits of the foundations or slab. Care should be taken when removing rock adjacent to the existing structure to prevent undermining and disturbance of the footing.
- L. Rock Excavation for the Removal of Utilities and Structures
 - 1. Remove rock directly above and to the sides of piped utilities and structures proposed for removal without exceeding the following dimensions:
 - a. 12 inches outside of concrete structures, walls, and footings.
 - b. 12 inches from either edge of piped utility and 6 inches below piped utility
 - c. 6 inches outside of edge of concrete cast against grade.
 - d. 6 inches beneath bottom of concrete pads or slabs on grade.
 - 2. Upon uncovering rock within a trench that cannot be removed by standard excavation measures, the Contractor shall expose all faces of rock within the trench and notify the Owner. The dimensions of the rock in place shall be measured by survey instrument by a RI Licensed Land Surveyor at the Contractor's expense and verified by the Owner's Representative.
 - 3. Rock capable of removal through standard excavation procedures shall be removed from the trench, measured by the Contractor, and verified by the Owner's Representative.

3.7 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
- B. All unsuitable and fill materials shall be removed from the proposed building area to a limit defined by a 1-horizontal to 1-vertical slope extending downward and outward from two feet outside the edges of the building footing to firm undisturbed glacial till or bedrock. Boulders encountered within these areas shall be removed to a depth of at least 12 inches below the bottom of footings. Voids that result from boulder excavations shall be backfilled with Granular Fill and compacted.
- C. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grade to leave solid base to receive other work.
 - 1. The influence area below footings is defined as the area under footings extending from 2-feet outside the bottom edge of footing downward at an angle of 1 horizontal to 1 vertical.
 - 2. Construction staging for the proposed building should be scheduled such that construction can proceed systematically and safely to avoid excavations within the influence areas of newly installed or existing footings. Where it will be necessary to excavate within influence areas, temporary support systems will be required to retain the surrounding soil and safely support structure loads. The scheduling process should consider the construction of structures within the project area and the construction of third-party structures that are adjacent to the project area.
 - 3. The earth slope along the bottom of sloped footings (i.e., subgrade or bearing surface) should not exceed a slope of 2 horizontal and 1 vertical to allow a stable subgrade to be provided prior to the placing of concrete
- D. Over-excavation by the Contractor, excavation below the proposed bottom of excavation, shall be backfilled in 6 inch lifts with compacted Sand Gravel Fill compacted to 95% until the proposed subgrade elevation is reached and the subgrade stabilized.
- E. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

3.8 SUBGRADE INSPECTION

- A. Notify Owner's Representative when excavations have reached the required subgrade and bearing surface.
- B. If Owner's Representative determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll the subgrade and the bearing surface below the building slabs to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated bearing surface or subgrades.

1. Completely proof-roll the subgrade and the bearing surface in one direction, repeating proof-rolling in direction perpendicular to first direction. Continue this process until the area has been proof-rolled at least 6 times. Limit vehicle speed to 3 mph.
 2. Proof-roll with a vibratory roller with a static weight of no less than 10,000 lbs and a dynamic weight of 20,000 lbs.
 3. Smaller compaction equipment may be used when the area is being compacted and cannot accommodate heavy equipment with approval by Engineer. Compaction equipment must compact soils to the required density, smaller lifts may be required during placement of soil material.
 4. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Owner's Representative, and replace with compacted backfill or fill as directed.
- D. Reconstruct bearing surfaces and subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Owner's Representative, without additional compensation.

3.9 EXCAVATION OF UNSUITABLE MATERIALS

- A. The Contractor shall notify the Owner's Representative and Engineer when excavations uncover potential unsuitable materials.
- B. Payment for all excavation and stockpiling of Unsuitable Soils within the limit of excavation shall be included as part of the original Contract Sum.
- C. Excavation and stockpiling of Unsuitable Soils outside the limit of excavation shall be paid for in accordance with the Unit Prices included in PART 4 - MEASUREMENT AND PAYMENT of this specification.
1. Unit prices for unsuitable soils excavation include all labor, equipment, and materials required for removal of unsuitable soils, stockpiling. Unit prices for unsuitable soil also include all labor, equipment, and materials required for replacement of unsuitable soil excavation with approved materials. Any unsuitable soil excavation outside of the limit of excavation must be approved by the Engineer and Owner's Representative prior to removal.
 2. The dimensions and quantity of the Unsuitable Soils excavated shall be measured by a Professional Land Surveyor registered in the State of Rhode Island at the Contractor's expense. The Surveyor shall measure the elevations of the unsuitable materials prior to excavation and the surface topography following excavation. All survey information shall be supplied to the Owner's Representative for verification of the quantity. Survey information shall include the topography of the uncovered suitable soil surface prior to excavation and the topography of the final soil surface following excavation.

3.10 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean

concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Engineer.

- B. Concrete required to fill unauthorized excavation shall be furnished and installed at the expense of the Contractor.

3.11 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow materials and satisfactorily excavated soil materials in locations approved by the Owner. Place, grade, and shape stockpiles to drain surface water. Cover exposed soil stockpiles with at least six mils of ballasted polyethylene sheeting to prevent windblown dust. Provide erosion control measures as shown on the Drawings.
- B. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
- C. Stockpile excavated material that is suitable for use as fill or backfill until material is needed.
- D. Post signs indicating proposed use of material stockpiled. Post signs that are readable from all directions of approach to each stockpile. Signs should be clearly worded and readable to equipment operators from their normal seated position.
- E. Confine material storage to within the Limits of Work and approved work areas. Do not obstruct roads or streets.
- F. Do not stockpile excavated material adjacent to trenches and other excavations unless excavation side slopes and excavation support systems are designed, constructed, and maintained for stockpile loads.
- G. Do not stockpile excavated materials near or over existing facilities, adjacent property, or completed Work, if weight of stockpiled material could induce excessive settlement.
- H. No stockpiling of demolition debris including concrete, brick, asphalt materials that are not intended for onsite reuse will be permitted. Stockpiled materials intended for use or reuse as backfill material shall have adequate erosion controls measures in place. These erosion controls may include strawbale and silt fence perimeters around the pile(s) and polyethylene sheet covers on the pile(s).

3.12 BACKFILL, GENERAL

- A. The contractor shall notify the Engineer and Owner's Representative a minimum of 2 days prior to backfilling utility trench to schedule inspection.
- B. Place and compact backfill in excavations promptly, but not before completing the following:
 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation
 2. Surveying locations of underground utilities for Record Documents
 3. Testing and inspecting underground utilities

- 4. Removing concrete formwork
 - 5. Removing trash and debris
 - 6. Removing temporary shoring and bracing, and sheeting
 - 7. Receiving approval from the respective Utility Company, and the Owners Representative following inspection
- C. Place backfill on subgrades free of mud, frost, snow, or ice.
- D. Backfill Material Selection: Unless otherwise specified or directed, material used for filling and backfilling shall meet the requirements specified under PART 2 - PRODUCTS. Backfill materials shall be placed in the areas as indicated in the table below:

Fill at depths greater than 1-foot below footings and slabs within the Building Area	Sand Gravel Fill or Granular Fill
Fill around footings for building and structures within the Influence Area	Sand Gravel Fill
Fill within utility trenches below pavement and sidewalk subgrade	Granular Fill
Fill below utility bedding	Granular Fill
Fill placed in landscaped areas outside of the Influence Area	Common Borrow

- E. All demolished features shall be backfilled such that finished grades match adjacent grades.
- F. Place and compact fill material in layers to required elevations.
- G. After backfilling excavations, the Contractor shall maintain the surfaces of backfill areas in good condition so as to present a smooth surface at all times level with adjacent surfaces. The Contractor shall repair any subsequent settling over backfilled areas immediately, in a manner satisfactory to the Designer, and such maintenance shall be provided by the Contractor for the life of this Contract, at no additional expense to the Owner.
- H. The finished subgrade of the fills and filled excavations shall not be disturbed by traffic or other operations and shall be maintained in a satisfactory condition until the finished courses are placed. The storage or stockpiling of materials on finished subgrade will not be permitted.
- I. The Contractor shall provide uniform smooth grading of all areas to be graded, as indicated and as directed, including excavated and filled sections, embankments and adjacent transition areas, and all areas disturbed as a result of the Contractor’s operations. The finished surfaces shall be reasonably smooth, compacted and free from surface irregularities.
- J. Grading in the vicinity of backfilling shall be properly pitched to prevent water from running into the backfilled area. Work areas shall be kept free from water during performance of the work under this Contract at no expense to the Owner. The Contractor shall build diversion berms and other devices necessary for this purpose.
- K. Place backfill on stable subgrades free of mud, frost, snow or ice.
- L. Frozen material shall not be used nor shall borrow be placed on frozen material. If during the construction, the top layer becomes frozen, the frozen material shall be removed before a succeeding layer is placed thereon.

3.13 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact initial backfill conforming to the specified material requirements to the height specified on the Drawings over the utility pipe or conduit.
- C. Backfill voids with satisfactory soil while installing and removing shoring and bracing.
- D. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- E. Bedding material shall be placed and compacted in maximum 6" lifts.

3.14 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.
 - 3. The Contractor shall furnish water for compaction. Water for compaction from sources other than potable sources shall be as approved by the Owner's Representative.

3.15 COMPACTION OF BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment, and not more than 6 inches in loose depth for material compacted by hand-operated tampers/plate compactors. Place base material below paved areas in 6-inch lifts.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
 - 1. All fill – 95%.

3.16 SUBBASE AND BASE COURSE

- A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.
- B. Place subbase and base course on subgrade in 6-inch lifts and compact as specified.

3.17 FIELD QUALITY CONTROL

- A. Place backfill and fill soil materials in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment, and not more than 6 inches in loose depth for

material compacted by hand-operated tampers/plate compactors. Place base material below paved and building areas in 6-inch lifts.

- B. The Contractor shall use caution when compacting near existing utilities including electric and communications duct banks. Any damage to existing utilities or structures resulting from compaction operations shall be repaired at the expense of the Contractor.
- C. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- D. Compact soil materials to not less than the following percentages of maximum dry density:

TABLE 2: MINIMUM COMPACTION REQUIREMENTS	
Location	Percent of Maximum Dry Density ¹
Backfill below footings, within the building area and below slabs ²	95
Backfill on either side of foundation walls, retaining walls, and frost walls	95
Backfill within pavement base and sub base layers	95
Backfill below pavement sub base layers	92
Around and above utilities within the building area	95
Around and above utilities in paved areas	92
Fill within berms	95
Backfill within landscaped areas	85

¹ Maximum dry density as determined by the Modified Proctor test (ASTM D 1557)

² Building area is described as an area extending downward and outward from the outside edge of the footing at a 1H:1V slope.

3.18 PROTECTION

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

3.19 DISPOSAL OF WASTE MATERIALS

- A. Disposal: Remove site waste material, including trash and debris, and legally dispose of it off site.

3.20 GEOTEXTILES

- A. Install Geotextiles in accordance with Manufacturer's recommendations.

3.21 OIL AND HAZARDOUS MATERIAL CONTAMINATION

- A. Contractor to be familiar with typical soil conditions encountered in earthwork projects related to existing shooting ranges.
- B. All workers are to be lead safety trained per OSHA 29 CFR 1926.62 and respirator qualified per 20 CFR 1910.134.
- C. Submit an Environmental Health and Safety Plan (per OSHA) which covers all aspects of the work being performed on-site including, but not limited to, methods for dust control, personal air monitoring, decontamination of equipment and clothing, and personal protective equipment (PPE). PPE level D shall be included as the basis of design. The trade contractor shall be responsible for their own worker safety.
- D. Dust control shall be included and maintained throughout the project/ Dust control is provided on a daily basis, or as needed, with no exceptions.
- E. Furnish and install hand washing station.

PART 4 - MEASUREMENT AND PAYMENT

4.1 GENERAL

- A. Payment for earthwork as outlined in this Section or shown on the Drawings, including, but not limited to, all design, submittals, materials, labor, equipment, and all other incidentals associated with this work shall be included in the Contractor's Base Bid.
- B. Unit prices for rock excavation include all labor, equipment, and materials required for removal and stockpiling of rock. Unit prices for rock excavation also include all labor, equipment, and materials required for replacement of rock excavation with approved materials where the rock excavation extends beyond the specified excavation limits. Any excavation beyond the specified excavation limits must be approved by the Owner's Representative prior to removal. Specified excavation limits for rock are specified in 3.6 ROCK EXCAVATION.
- C. Unit prices for unsuitable soils excavation include all labor, equipment, and materials required for removal of unsuitable soils, and stockpiling of unsuitable soils. Unit prices for unsuitable soil also include all labor, equipment, and materials required for replacement of unsuitable soil excavation with approved materials. Any unsuitable soil excavation must be approved by the Owner's Representative prior to removal.
 - 1. Quantities and Payment of Unsuitable Soil Conditions:
 - a. If unsuitable materials are encountered beyond the limits of excavation as specified on the Drawings and Specifications, the Contractor shall notify the Owner's Representative in writing. The Contractor shall carry excavation deeper and replace the excavated

material with appropriate specified material or concrete as directed by the Owner's Representative or Geotechnical Engineer.

- b. Removal of topsoil, subsoil, and rock layer as specified in this specification will not be considered as unsuitable soil conditions.
- c. Only changes in the work authorized in advance by the Owner's Representative in writing shall constitute an adjustment in Contract Price.
- d. Material that is too wet or too dry for compaction of the particular material in place as determined by the Owner's Representative and/or Soil Testing Company and is disturbed by the Contractor during construction operations so that proper compaction cannot be reached shall be removed and replaced with approved material as directed by the Owner's Representative or Engineer at no additional cost to the Owner.
- e. The Contractor shall follow a construction procedure, which permits visual identification of firm natural ground.
- f. The Contractor shall carry in the Base Bid 500 cubic yards for removal of unsuitable materials and replacement with suitable compacted fill material in place, as directed herein. The Base Bid shall cover all costs related to such excavation, stockpiling, and replacement with compacted fill of approved material, overhead, and profit. No amount other than the Unit Price provided by the Contractor will be paid by the Owner for excavation herein defined.
 - 1) If the total quantity of unsuitable material and its replacement with compacted fill exceeds the amount included in the Contract hereinabove, the Owner shall pay for the excess amount of unsuitable soil excavation and replacement with suitable compacted material at the Unit Price of \$10.00 per cubic yard.
 - 2) If the total quantity of unsuitable material and its replacement with compacted fill is less than the amount included in the Contract as listed above, the Contract Sum will be decreased by the difference in excavation and its replacement multiplied by the unit price of \$8.00 per cubic yard.

2. Quantities and Payment of Rock Excavation

- a. The Contractor shall include in the base bid 36 cubic yards of Bulk Rock Excavation rock and its removal from site.
 - 1) The Unit Price for Bulk Rock Excavation as specified herein shall not exceed \$40.00 per cubic yard.
- b. The Contractor shall include in the base bid 12 cubic yards of Trench Rock Excavation and its removal from site.
 - 1) The Unit Price for Trench Rock Excavation rock removal as specified herein shall not exceed \$130.00 per cubic yard.

D. All quantities of unanticipated unsuitable soils and rock excavated are to be measured in place by a Professional Land Surveyor registered in Rhode Island as described above and verified by the Owner's Representative prior to removal.

E. The Contractor shall submit signed slips showing quantities of Unanticipated Unsuitable Soils and Rock removed from excavations at the end of each workday, with a total quantity mutually

agreed upon. Slips shall be signed by the Owner's on-site representatives at the end of each day signifying that the quantities are accurate. The Owner has the right to inspect individual loads, slips and quantities as they arrive at or leave from the site and as they are weighed out at the stone quarry. These quantities are for reference only and will not be used to calculate payment with the unit prices above.

*******END OF SECTION*******

SECTION 02630
STORM DRAINAGE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 REFERENCES

- A. All work specified in this Section shall conform to “Standard Specifications for Road and Bridge Construction” of the Rhode Island Department of Transportation, latest revision, herein referred to as “State Standards”.

1.3 SUMMARY

- A. This Section includes gravity-flow, nonpressure storm drainage outside the building, with the following components:
1. Pipe
 2. Cleanout

1.4 DEFINITIONS

- A. PVC: Polyvinyl chloride plastic.
- B. HDPE High Density Polyethylene.
- C. RCP Reinforced Concrete Pipe
- D. PE: Polyethylene

1.5 SUBMITTALS

- A. The Contractor shall submit for approval, manufacturer’s printed recommendations for the storage, protection, handling, installation and testing of stormwater piping, fittings and appurtenances, which shall be strictly adhered to by the Contractor.
- B. Shop Drawings: For the following:
1. Pipe of all materials.
 2. Geotextiles.
- C. Conformance Certificate: Each shipment of castings and concrete manholes and catch basins shall be accompanied with the manufacturer’s notarized certification and cylinder testing results that materials meet specified requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect pipe, pipe fittings, and seals from dirt and damage.
- B. Handle catch basins and manholes according to manufacturer's written rigging instructions.
- C. Use only nylon-protected slings to handle pipe. The use of hooks or bare cables will not be permitted.
- D. Avoid damage to castings from impact, abrasion, or corrosion during handling and storage.
- E. Do not store PVC piping and fittings in the sunlight for extended periods of time. Store pipe in accordance with manufacturer's recommendations.
- F. Ship rubber gaskets in cartons and store in a clean area away from grease, oil, ozone producing electric motors, heat and the direct rays of the sun.
- G. Use all means necessary to protect precast concrete units and materials before, during and after installation and to protect the installed work and materials for all other trades.
- H. In case of damage, immediately make all repairs and replacements necessary to the approval of the Owner's Representative at the Contractor's expense.
- I. Pipe, pipe fittings, and other associated appurtenances damaged during deliver handling or storage shall be replaced at no additional cost to the Owner.

1.7 PROJECT CONDITIONS

- A. The Contractor shall provide means of stormwater management during construction to control runoff and protect downstream areas from damage resulting from stormwater runoff.
- B. The Contractor is responsible for any damage resulting from stormwater runoff during construction, including damage from flooding.
- C. The Contractor shall verify the existing foundation drain pipe size and material prior to construction.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

- A. PVC Profile Gravity Sewer Pipe and Fittings: ASTM F 794 pipe, with bell-and-spigot ends; ASTM D 3034 fittings, with bell ends.
- B. The pipe and fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusion or other injurious defects. The pipe shall be as uniform as commercially practical in color, capacity, density and other physical properties.
- C. Joints shall be bell and spigot. For SDR-35 PVC pipe, the bell shall consist of an integral wall section with a solid cross section rubber ring factory-assembled, securely locked in place to

prevent displacement. Joints shall conform to ASTM Standard D 3212. For SCH 40 PVC piping, joints shall be glued with PVC cement approved by the manufacturer.

- D. All fittings and accessories shall have dimensions as recommended by the manufacturer and have bell and/or spigot configurations compatible with that of the pipe.
- E. Pipe shall pass impact resistance test in accordance with ASTM D 2444 and minimum pipe stiffness test at 5% deflection in accordance with ASTM D 2412.
- F. The normal length of 12-inch size and smaller pipe shall be 12.5 feet.
- G. Pipe and fittings shall be manufactured in the United States of America and shall be accompanied by the manufacturer's certificate of compliance, in addition to meeting the performance tests specified hereinafter.
- H. PVC pipe shall be SCH 40 where pipe has less than 2 feet of cover or as directed by the Owner's Representative.
- I. PVC perforated pipe shall conform to ASTM/ANSI D 2759 or ASTM F 810. Perforations shall be 5/8" holes on 5" centers.

2.2 HIGH-DENSITY POLYETHYLENE PIPE AND FITTINGS

- A. High-Density Polyethylene Pipe and fittings shall be ADS N-12 IB ST Smooth Interior Pipe, ADS N-12 IB ST High Capacity Large Diameter Pipe or approved equivalent. Joints shall be soil-tight and include a rubber gasket on the spigot end of the pipe. When installed into the bell end, the joint shall be sealed.
- B. Pipe shall conform to AASHTO M294 (Type 'S') for the specified diameters and strength classes.
- C. Pipe shall be rated to withstand H-20 Loading Criteria with 18" of cover.

2.3 FLEXIBLE PIPE COUPLINGS

- A. Flexible Couplings: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end as manufactured by Fernco Inc. or approved equivalent.

2.4 CLEANOUTS

- A. Cast-Iron Cleanouts: Frame and cover shall be able to withstand HS-20 loading criteria.
- B. PVC cleanouts: PVC body with PVC cap and screw type cover set no more than 6" below cast iron frame and cover. The cast iron cover shall be set to finish grade and secured with concrete as shown in the Drawings. Frame and cover shall be able to withstand H20-44 loading criteria.

2.5 GEOTEXTILES

- A. Refer to Section 02300 for requirements regarding geotextile filter fabrics.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Section 02300 - Earthwork.

3.2 PIPE INSTALLATION

- A. Use only nylon-protected slings to handle pipe. The use of hooks or bare cables will not be permitted.
- B. PVC Piping: No machinery shall directly contact the PVC pipe to push the pipe into place. The pipe shall be pushed into place by hand. The use of a hammer or mallet is permitted, with the use of a board to shield the end of the pipe being struck by the hammer. The pipe shall not be directly contacted with a hammer or mallet. Any pipe damaged while being pushed into place or while being laid in the trench shall be removed from the site and replaced at the expense of the Contractor.
- C. Pipe shall be inspected before any backfill is placed. Any pipe determined by the Owner's Representative to be out of alignment, unduly settled, or damaged shall be taken up and re-laid or replaced at no additional cost to Owner.
- D. General Locations and Arrangements: Drawing plans and details indicate location and arrangement of underground storm drainage piping. Install piping as indicated, following piping manufacturer's written instructions.
- E. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- F. If conflicts between utilities, the Contractor shall stop work on the utilities, contact the Engineer, and await direction from the Engineer.
- G. Install piping with **30-inch** minimum cover unless otherwise specified on the Drawings.
- H. Install piping with a minimum of 0.005 ft/ft slope.
- I. Install PVC piping according to ASTM D 2321, ASTM F 1668, and manufacturer's recommendations.

3.3 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extension from drain pipe to cleanout at grade. Use PVC pipe fittings in sewer pipes at branches for cleanouts. Cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in pipe.

- B. Set cleanout frames and covers in earth in a cast-in-place concrete block, 12 by 12 by 8 inches deep. Top of concrete block shall be laid 3" below finished grade. Top of frame shall be set flush with finish grade where laid in earth.
- C. Set cleanout frames and covers in bituminous concrete and concrete pavement or slabs with tops flush with pavement surface. Top of concrete block shall be laid at the bottom of the bituminous binder course where laid in pavement surface.

3.4 IDENTIFICATION

- A. Materials and their installation are specified in Section 02300 - Earthwork. Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
 - 1. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.5 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 - 1. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Crushed, broken, cracked, or otherwise damaged piping.
 - 2. The Contractor shall, at his own expense, replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 - 3. The Contractor shall repair any defects or corrections required by the Owner's Representative.

3.6 CLEANING

- A. The Contractor shall clean interior of piping and structures of dirt, debris, and superfluous materials prior to commencing work, during construction and prior to acceptance of stormwater drainage system.
- B. The Contractor shall also clean downstream portions of the stormwater conveyance system which recovered silt deposits from the construction activity.

3.7 RECORD DRAWINGS

- A. All installed underground utilities shall be designated on as-built drawings by the contractor of record and provided to the Owner and Engineer in AutoCAD electrical format prior to completion of the project. All as-built drawings, (underground and above ground) shall be dimensioned from permanent benchmarks such as existing buildings and include depths at various points throughout the extent of the work, and invert elevations at all structures.

*****END OF SECTION*****

SECTION 02821
CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 REFERENCES

- A. All work specified in this Section shall conform to "Standard Specifications for Road and Bridge Construction" of the Rhode Island Department of Transportation, latest revision, herein referred to as "State Standards".
- B. Existing Conditions Plan compiled from the following sources:
1. "Rhode Island D.E.M. Shooting Range off Great Neck Road, West Kingston, RI – Existing Conditions" dated January 2015 and prepared by National Surveyors–Developers, Inc. at 42 Hamlet Ave, Woonsocket, RI.

1.3 SUMMARY

- A. This section specifies requirements for chain link fencing and accessories including gates, posts and post foundations, hardware and appurtenances, of various types and configurations at the locations indicated on the Drawings or as directed by the Owner, all in accordance with this Specifications.
- B. The Contractor shall provide all labor, equipment, materials and accessories necessary to install all chain link fence and gate.

1.4 SUBMITTALS

- A. The Contractor shall submit the following for approval:
1. Three samples, approximately 6 inches long or 6 inches square, of fabric material, post section, and typical accessories.
 2. Shop drawings showing fence layout & dimensions, height, sizes of posts, rails, braces, gates, footings, accessories, bending strengths, and assembly.
 3. Manufacturer's certified test data demonstrating compliance with all performance specifications for framework and fabric.
 4. Provide Manufacturer's standard limited warranty that its Galvalin Fabric/Galvanized Framework Chain Link Fence is free from red dust and other defects in material and workmanship for a period of 25 years from the date of purchase.

1.5 QUALITY CONTROL

- A. Shop welding shall be in conformance with the latest AWS standards, and no field welding shall be required.
- B. Wire gauges shall conform to American Steel and Wire Co. gauges.
- C. Bolts, washers, and nuts shall be galvanized steel in conformance with the requirements as specified in the State Standards.
- D. Mild steel bars and shapes shall conform to ASTM A36.
- E. Products from qualified manufacturers having a minimum of five years experience manufacturing chain link fencing will be acceptable by the architect as equal, if approved in writing, tens days prior to bidding, and if they meet the following specifications for design, size gauge of metal parts and fabrication.

PART 2 - MATERIALS

2.1 GENERAL

- A. All fencing and appurtenances shall be provided by a single manufacturer. All fencing and appurtenances shall be manufactured by "Master Halco, Inc." or approved equivalent.
- B. Products from qualified manufacturers having a minimum of five years experience manufacturing chain link fencing will be acceptable as equal, if approved in writing, tens days prior to bidding, and if they meet the following specifications for design, size gauge of metal parts and fabrication.
- C. The overall height of ground-mounted fence shall be as indicated on the Drawings.
- D. New Posts and Framework shall be manufactured in accordance with ASTM MA120. Posts and framework shall be Schedule 40 steel pipe, standard weight, one piece without joints. .
- E. Fence is not designed with Privacy Slats. If privacy slats are installed, fence hardware, posts, rails, shall be re-designed to withstand wind loads per the building code in this region.

2.2 CHAIN LINK FENCE FABRIC

- A. Fabric: 2-inch diamond mesh steel wire, top and bottom edge knuckle selvage and closed, 9 gauge except as otherwise specified on drawings. Fabric shall be galvanized.

- B. The fabric wire shall have a minimum breaking strength of 850 lbs. when tested per U.S. Government Spec. RR-F—191/1A.
- C. Fabric shall measure the height specified on the Drawings and be knuckled at top selvage and twisted and barbed at bottom selvage.
- D. Fabric shall be fastened to all rails and line posts by means of No. 6 gauge wire ties spaced approximately 12 inches O.C. Fabric shall be fastened to end, corner, pull and gate posts by means of tension bars, held in place at 12-inch intervals by tension bar bands, nuts, and bolts. Tension bars shall be $\frac{1}{4}$ inch by $\frac{3}{4}$ inch and full height of fabric.

2.3 FRAMEWORK AND HARDWARE

- A. All framing and accessories shall be provided as required to complete the fence system. All framework and accessories shall be galvanized.
- B. Posts and rails shall be Schedule 40 steel pipe, minimum yield strength of 30,000psi, standard weight, one piece without joints, having the following minimum outside diameters, and minimum weights per linear foot:
 - 1. Line Posts 2-1/2 inches @ 3.7 lbs.
 - 2. End, Corner, and Pull Posts 4 inches @ 9.1 lbs.
 - 3. Rails 1-5/8 inches @ 2.3 lbs.
 - 4. Gate Posts 4 inches @ 9.1 lbs.
- C. Line Posts, Gate Posts, and Corner Posts shall be square and designed by a Professional Engineer Registered in the Commonwealth of Massachusetts to have the required dimensions and gauge thickness to support the fence for the design loads below:
 - 1. Design Loads:
 - a. Dead Loads: Self Weight and Appurtenances
 - b. Wind Loads:
 - 1) Velocity = 105 miles per hour
 - 2) Exposure C
 - 3) Importance Factor = 1.0
- D. Spacing between end, corner, pull, or line posts shall not exceed 10 ft 0-in. Posts of all types shall be of sufficient length to fully support fence fabric height and allow for installation to the depth of footing specified below ground level.
- E. Post tops shall be pressed steel or malleable iron, designed to exclude moisture from the posts and receive the top rail.

- F. The fence shall have a continuous top rail for its full length. The top rail shall pass through openings provided in the line post tops, and each length shall be coupled with an internal self-centering, swaged sleeve for a distance of 6 inches.
- G. Horizontal braces (brace rail) shall be provided where required at all pull, corner, and terminal posts midway between the top rail and ground, and shall extend from pull, corner, and terminal posts to the first adjacent line posts. Braces shall be securely fastened to the line posts, pull, corner, and terminal posts by rail ends and brace bands. Brace rails shall be galvanized steel, 1-5/8 inches outside diameter pipe, weighing not less than 2.3 pounds per linear foot with plain ends. Each corner and pull post shall be braced and trussed on two sides; each terminal post shall be braced and trussed on one side.
- H. Diagonal braces (truss rods) shall be provided with all horizontal braces and shall be trussed from the brace ends on the line post back to the bottom of pull, corner or terminal post. The diagonal brace rods shall be galvanized steel. Each brace rod shall be provided with a heavy malleable iron hot-dip zinc-coated turnbuckle to provide means for adjusting the tension in the diagonal brace.

2.4 GATES

A. General

1. The fabric shall be of the same material as for fence, and shall be attached to the gate frame on all four sides by means of fasteners and tension bars.
2. For each gate, heavy hardware and accessories shall be provided and shall include hinges, latches, keepers, and gate stops as appropriate.

B. Swing Gates

1. The gate shall be "freehanging" type, single leaf, and sized as shown on the Drawings. The gate manufacturer shall supply gates of appropriate construction, which will be structurally stable and meeting the intended dimensions. The gate shall be manufactured by Master Halco Inc. or approved equal.
2. The gate frame shall be constructed of 2-inch square aluminum tubing alloy 6063-T6, weighing 0.94 lbs per linear foot, welded at the joints. The combined track and top frame member shall be extruded aluminum-sized per manufacturer's recommendations. The bottom frame member shall be 2-inch by 4-inch aluminum tubing weighting 1.71 pounds per linear foot.
3. Support posts for the gate shall be of 4-inch outside diameter, Schedule 40 steel pipe, ASTM A-120, as specified above
4. Vertical uprights and diagonal truss rods shall be provided as necessary to insure rigidity of the gate frame and prevent sagging
5. Appurtenant hardware assemblies for each support post, latch assembly with provisions for padlocking, and gate stop assembly shall be provided.

C. Polymer Coating: As selected by Owner.

2.5 ACCESSORIES

- A. Chain link fence accessories: ASTM F 626 Provide items required to complete fence system. Galvanize each ferrous metal item and finish to match framing. Fittings should match manufacturer specifications.
- B. Post caps: Formed steel or cast malleable iron weather tight closure cap for tubular posts. Provide one cap for each post. Provide tops to permit passage of top rail.
- C. Top rail and rail ends: Pressed steel per ASTM F626, for connection of rail and brace to terminal posts.
- D. Top rail sleeves: 7" expansion sleeve with a minimum .137" wire diameter and 1.80" length spring, allowing for expansion and contraction of top rail.
- E. Wire ties: 9 gauge [0.148"] 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.
- F. Brace and tension (stretcher bar) bands: Pressed steel, minimum 300 degree profile curvature for secure fence post attachment. At square post provide tension bar clips.
- G. Tension (stretcher) bars: One piece lengths equal to 2 inches less than full height of fabric with a minimum cross-section of 3/16" x 3/4". Provide tension (stretcher) bars where chain link fabric meets terminal posts.
- H. Tension wire: Galvanized coated steel wire, 7 gauge, [0.177"] diameter wire with tensile strength of 75,000 psi.
- I. Truss rods & tightener: Steel rods with minimum diameter of 5/16". Capable of withstanding a tension of minimum 2,000 lbs.

PART 3 - EXECUTION

3.1 GENERAL

- A. Installation of permanent fencing shall not begin until completion of final grading within the mechanical equipment area.
- B. Fabric bottom shall be approximately parallel to final surface grade or as specified on the drawings, allowing no more than 6 inches clear distance between the fabric bottom and grade.
- C. Abrasions shall be touched up to the Owner's satisfaction by methods approved in writing by the Owner. The Owner reserves the right to require replacement of scratched or otherwise damaged fence components.

3.2 INSTALLATION OF POSTS

- A. Posts shall be set plumb, in proper alignment, and embedded in 3,000 psi concrete unless otherwise specified on the plans or for temporary fencing. Holes for post footings shall be drilled in firm, undisturbed, or compacted soil. Concrete shall be placed in a continuous pour to the lines and elevations noted on the Drawings. Contractor shall install temporary guys, or braces, as may be required to support the posts in proper position until such time as the concrete has set sufficiently to anchor said posts. Concrete footings shall be carried to the depth and dimensions shown on the Drawings.
- B. Where rock is encountered within the required depth to which the post is to be erected, a hole of a diameter slightly larger than the largest dimension of the post shall be drilled into the rock and the post grouted in. The regular dimensioned concrete footing as shown on the plans shall then be placed between the top of the rock and required grade shown on the plans.
- C. All hollow pipe and tube type post shall be fitted with post tops. The bases of the post tops shall have flanges that fit around the outside of the posts and shall be secured.
- D. Pull posts shall be installed at all points of inflection greater than 30 degrees in the line of the fence and at all points of abrupt changes in grade.

3.3 INSTALLATION OF FABRIC

- A. The fabric shall be unrolled on the outside of the fence line with the bottom edge of the fabric against the posts. The various rolls shall be spliced to form a continuous mesh pattern by bringing the ends close together and weaving in a picket in such a way that will engage both ends of the rolls and catch, with each twist, each separate mesh of the picket of both rolls of fabric.
- B. At end, corner or gateposts, the stretcher bar shall be slipped through the end picket of the fabric and the stretcher bar bands at the same time. The bolts in the stretcher bar bands shall then be tightened. Additional rolls of fabric shall be spliced and placed as the erection progresses along the fence. In long sections, an intermediate pull post with horizontal braces and diagonal braces shall be provided every 500 feet.
- C. The fabric shall be placed by securing one end and applying sufficient tension to remove all slack before making attachments elsewhere. After the fabric has been stretched, it shall be attached to the line posts and rails with fabric ties spaced at 12 inches apart. The topmost clip shall be placed on the line post as near the top of the fabric as possible and lowest clip as near the bottom of the fabric as possible. At terminal sections (end, corner and pull) and gateposts, the fabric shall be fastened with stretcher bars and bands. The fastenings shall be spaced at 12 inches on centers for terminal sections (end, corner and pull) and gateposts. The topmost band shall be placed on these posts as near the top of the fabric as possible and the lowest band as near the bottom as possible.
- D. Before making a closure, the other end of the run shall be fastened to the end, corner, or gatepost as described previously. The operation of making a closure of a run shall be as follows. The stretching equipment shall be clamped on the ends of the fabric parallel to each other and about

5-feet apart when the tension is first applied. The stretching shall continue until the slack has been removed from both sections of the fabric. If the ends overlap, the fabric shall be cut to match. The ends shall be joined by the insertion of a picket similar to the methods of connecting two rolls of fabric.

3.4 INSTALLATION OF GATES

- A. Gates shall be installed plumb, level, and secure for full opening without interference. The gates shall be hung on gate fittings as shown on the plans. Gates shall be erected to open in the direction indicated and shall be provided with gate latches as shown on the drawings.

3.5 ADDITIONAL INSTALLATION

- A. Braces:
 - 1. When top rail is not used, braces shall be placed 12 inches down from the top of the terminal posts and shall extend from the terminal (end, corner, and pull) post and gate posts to the brace post. The braces shall be securely fastened to the post and trussed from brace post back to terminal post with round rod and turnbuckle, all as shown on the drawings.

3.6 INSPECTION, TESTS AND GUARANTEES

- A. The Owner shall have the right to inspect and test any materials or their fabrication at any time during construction at the mill, shop or field. At the option of the Owner, certified mill tests of materials may be accepted in lieu of tests.
- B. The Contractor shall furnish to the Owner, prior to installation, notarized certification and satisfactory guarantees by the fence manufacturer covering any faults and/or defects in any part of the fence arising from defective workmanship or materials for a period of one (1) year, and any rust and corrosion for twenty five (25) years, from the date of final acceptance of the project.

*******END OF SECTION*******

SECTION 02822
VEHICLE BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 REFERENCES

- A. All work specified in this Section shall conform to “Standard Specifications for Road and Bridge Construction” of the Rhode Island Department of Transportation, latest revision, herein referred to as “State Standards”.
- B. Existing Conditions Plan compiled from the following sources:
 - 1. “Rhode Island D.E.M. Shooting Range off Great Neck Road, West Kingston, RI – Existing Conditions” dated January 2015 and prepared by National Surveyors–Developers, Inc. at 42 Hamlet Ave, Woonsocket, RI.

1.3 SUMMARY

- A. This Section includes the following:
 - 1. Timber Guardrail
- B. Related Sections include the following:
 - 1. Section 02300 Earthwork for soil materials, excavating, backfilling, and site grading.

1.4 SUBMITTALS

- A. Shop Drawings shall be submitted containing information on the dimension, materials, and hardware used to construct the guardrail.
- B. Layout drawings showing the layout, locations of bends, and the limit of transitions.

1.5 PROJECT CONDITIONS

- A. Guardrail shall be installed in a straight line or in a consistent arc as depicted on the Drawings. Posts shall be set plumb. Any posts or beams not set in alignment shall be removed and reset by the Contractor to meet these requirements at no additional cost to the Owner. Presence of rock or other constraints will not relieve this requirement.

PART 2 - PRODUCTS

2.1 GUARDRAIL

- A. All timber items shall be pressure-treated sawn structural lumber, either spruce or fir, and shall conform to the requirements of AASHTO M168.
- B. Timber Rail shall be cut from the specified grade for dry, well-seasoned and dressed spruce or fir, which shall meet the applicable requirements of AASHTO M168. Where preservative treatment is specified this shall conform to the requirements for "Preservative Treatments for Timber" of the AASHTO Standard Specifications for Highway Bridges. Timber Preservatives shall conform to the requirements of AASHTO M133.
- C. Timber posts shall be fabricated from an approved or specified timber species and shall be of the quality, diameter, or section, and length as specified or as shown on the Plans. Treated posts shall be fabricated before treatment in accordance with AASHTO M133.

2.2 HARDWARE

- A. Splices and end connections shall be of the type and design specified or shown on the Plans, and shall be of such strength as to develop the full design strength of the rail elements.
- B. Unless otherwise specified, all fittings, bolts, washers, nuts, and other accessories shall be galvanized in accordance with the requirements of AASHTO M111. All galvanizing shall be done after fabrication.
- C. End anchor rods and accessories shall be as specified or as shown on the Plans and shall be of such size and strength as to develop the full design strength of the rail elements.

PART 3 - EXECUTION

3.1 GUARD RAIL

- A. The Construction Method outlined below was taken from the State Standards.
 - 1. All posts shall be set in dug holes or driven, suitable caps and equipment must be used by the Contractor to prevent damage to the posts while driving into place. The area adjacent to the post shall be backfilled and thoroughly compacted.
 - 2. If rock is found, material must be removed in order to make a sufficient hole for the post.
 - 3. The hole formed shall be compacted and backfilled before the posts are driven.
 - 4. All posts shall be set plumb and aligned with the rail, and then the rail elements are to be erected to create a smooth rail as shown on plans.
 - 5. Rail elements shall be erected to produce a smooth, continuous installation, all as indicated on the Plans.
 - 6. The Contractor is responsible for furnishing extra-long posts where field conditions require. The posts shall be of such length that the minimum depth in the ground as shown on the plans.

7. End anchor posts shall be set in excavated holes. Areas adjacent to the post shall be back-filled and compacted.
8. All bolts shall be drawn tight. Bolts shall be of sufficient length to extend beyond the nuts.

*******END OF SECTION*******

SECTION 03110
CONCRETE FORMWORK

PART 1 - GENERAL

1.1 GENERAL PROVISIONS:

- A. All of the Contract Documents, including General and Supplementary Conditions apply to the Work of this Section.

1.2 SCOPE:

- A. This section specifies requirements for concrete formwork to produce cast-in-place concrete structures as shown on the Drawings and as specified herein. The work shall consist of designing, furnishing, constructing and removing formwork for all cast-in-place concrete structures.
- B. Use forms, wherever necessary, to confine the concrete and shape it to the required lines, and to provide the specified finish. Construct forms with sufficient strength to structurally support the work, and withstand the pressure resulting from placement and vibration of the concrete, and maintain forms rigidly in position. Construct forms sufficiently tight to prevent loss of mortar from the concrete.

1.3 REFERENCES:

- A. American Concrete Institute (ACI):
 - 1. ACI 117: Standard Specification for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301: Standard Specification for Structural Concrete.
 - 3. ACI 347: Guide to Formwork for Concrete.
- B. Rhode Island State Building Code.

1.4 DESIGN REQUIREMENTS:

- A. Design formwork to support vertical loads and lateral pressures resulting from placement and vibration of concrete in accordance with the requirements of ACI 301 and ACI 347, and as specified herein.
- B. Camber the formwork to compensate for anticipated deflections due to the weight and pressure of the fresh concrete and due to construction loads.
- C. Provide shores and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations. Use wedges or jacks, individually or in combination for adjustment.
- D. Design forms and falsework to include assumed values of live loads, dead load, weight of moving equipment operated on formwork, concrete mix, height of drop, vibrator frequency, ambient

temperature, lateral stability, and other factors pertinent to the safety of the structure during construction.

- E. Provide and design forms to conform with expansion and construction joint locations.

1.5 SUBMITTALS:

- A. Submittals for the following items shall be made in accordance with the requirements as specified in spec section 01340
- B. Submit the following at least 30 days before the first concrete placement:
 - 1. Manufacturer's data and installation instructions for proprietary form accessories, form coatings, pipe sleeves and seals, form ties and manufactured form systems if used.
 - 2. Certification that form coatings comply with the requirements of this Section.

1.6 QUALITY ASSURANCE:

- A. Provide in accordance with the requirements as specified.
- B. Tolerances:
 - 1. Permissible surface irregularities for the various classes of concrete surface finish as specified in Section 03 30 00, Cast-in-Place Concrete, are defined as "finishes", and are to be distinguished from tolerances as specified herein. Deviations from the established lines, grades, and dimensions will be permitted to the extent set forth herein.
 - 2. The tolerance limits specified in this Section and the surface finish irregularities permitted in Section 03 30 00, Cast-in-Place Concrete, are not the limits to which forms may be built or by which damaged from sheathing may be used. These limits are provided only for the occasional slight misalignment or irregularity of surface, which may occur despite a serious effort to build and maintain the forms accurately and securely with an even surface. These limits will be allowed only for inadvertent or relatively infrequent irregularities of the degree mentioned, but practices and form materials will be prohibited which without doubt will result in the creation of additional irregularities, even though these would be within the limits specified.
 - 3. Where specific tolerances are not stated herein or shown on the Drawings for a structure, portion of a structure, or other feature of the work, permissible deviations will be interpreted conforming to the tolerances stated herein for similar construction. Specific maximum or minimum tolerances as shown on the Drawings in connection with any dimension shall be considered as supplemental to the tolerances specified herein and shall govern. Concrete forms shall be set and maintained within the tolerance limits necessary to ensure that the completed work will be within the tolerances specified. Concrete construction that exceeds the tolerance limits specified or as shown on the Drawings shall be remedied or removed and replaced by the Contractor at no cost to the Owner.
 - 4. Tolerances shall be as specified in ACI 117, Standard Specifications for Tolerances for Concrete and Materials.

PART 2 - PRODUCTS**2.1 MATERIALS:**

- A. Forms for Exposed Finish Concrete: Construct formwork for exposed concrete surfaces with smooth faced undamaged plywood or metal, metal-framed plywood faced or other acceptable panel-type facing materials approved by Engineer, to provide continuous, straight, smooth as-cast surfaces, and produce a uniform and consistent texture and pattern on the surfaces. Metal patches on forms for these surfaces will not be permitted. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on the drawings.
1. Use overlaid plywood complying with U.S. Product PS-1 "A-C or B-B High Density Overlaid Concrete Form", Class I.
 2. Use 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. Tubular Fiber Forms:
1. Provide forms with spirally constructed laminated plies of fiber.
 2. Provide forms with wall thickness as recommended by the manufacturer to meet load requirements of the various uses and sizes.
 3. Provide forms with wax coated outside surfaces for moisture resistance.
 4. Provide forms with inside surface coated with bond-breaker compound.
- D. Form Ties:
1. Form Ties: For concrete structures, which will not be in view or buried below finish grade, use carbon steel factory-fabricated, removable or stay in place snap-off type form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units, which will leave no metal closer than 1-1/2" to surface. Provide ties which, when removed, will leave holes not larger than 1" diameter in concrete surface. Patch all holes with non-shrink grout.
 2. Form ties and spreaders for walls in areas exposed to view shall be Stainless Steel Cone-Tight Tyscru by Richmond Screw Anchor Co.; Dayton Sure-Grip and Shore Co.; or substitute approved by Engineer with Plastic cone-tight type cones having a 1" setback and a taper from 1" to 1-1/4". Tyscru cone holes shall be sealed with plastic set back plugs, color as selected by Engineer from manufacturer's standard color selection or filled with non-shrink grout. Tyscru ties shall be sized to satisfy loading requirements.
 3. In lieu of form ties specified above, fiberglass form tie systems shall be used. Fiberglass form ties shall be standard gray color. The concrete structure shall be finished by grinding the fiberglass form tie flush with the finish surface of the concrete structure.
 - a. If tapered architectural holes are required, dummy tapered cones having a 1" setback and a taper from 1" to 1-1/4 shall be fastened to the interior of the formwork to achieve the specified pattern on the finish structure.
- E. Form Releasing Agents: Provide commercial formulation form-releasing agents that will not bond with, stain, nor adversely affect concrete surfaces requiring bond or adhesion, nor impede the

wetting of surfaces to be cured with water or curing compounds. Volatile organic compound emissions of form coating agent shall not exceed 2.09 pounds per gallon (250 grams per liter).

- F. Chamfer Strips: Provide 1-inch triangular fillets, unless noted otherwise on drawings, to form all exposed concrete corners. Material shall be rubber or polyvinyl chloride type, or smooth clear, sealed softwood.

PART 3 - EXECUTION

3.1 INSPECTIONS:

- A. Examine the substrate and conditions under which work of this Section is to be performed, and correct unsatisfactory conditions, which would prevent proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 FORM CONSTRUCTION:

- A. General:
 - 1. Construct forms as designed and in accordance with Contractor's approved working drawings conforming to ACI 347, to the exact sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, grades, level, and plumb work in finished structures.
 - 2. Provide for openings, offsets, keyways, recesses, moldings, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features required. Use selected materials to obtain required finishes.
 - 3. Forms for concrete which accommodate work of other trades, fabricated before the opportunity exists to verify the measurements of adjacent construction, shall be accurately sized and located as dimensioned on the Drawings. In the event that deviation from the Drawing dimensions results in problems in the field, the Contractor shall be responsible for resolution of the conditions as approved by the Engineer, at no cost to the Owner.
- B. Fabrication:
 - 1. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage concrete surfaces.
 - 2. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Brace temporary closures and set tightly to temporary openings on forms in as many inconspicuous locations as possible, commensurate with design requirements. Form intersecting planes to provide true, clean cut corners.
- C. Falsework:
 - 1. Erect falsework and support, brace, and maintain it to safely support vertical, lateral, and asymmetrical loads applied until complete structure has attained design strength. Construct falsework so that adjustments can be made for take-up and settlement, and access is provided for inspection.
 - 2. Provide wedges, jacks or chamfer strips to facilitate vertical adjustments. Carefully inspect falsework and formwork during and after concrete placement operations to determine

abnormal deflection or signs of failure; make necessary adjustments to product work of required dimensions.

- D. Forms for Exposed Concrete:
 - 1. Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes. Do not splinter forms by driving ties through improperly prepared holes
 - 2. Provide sharp clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or grits to maintain true, square intersections.
 - 3. Use extra studs, walers, and bracing to prevent bowing of forms between studs and to avoid bowed appearance in concrete. Do not use narrow strips of form material, which will produce bow.
- E. Corner Treatment:
 - 1. Unless shown otherwise, form chamfers with 1-inch by 1-inch strips, accurately formed and surfaced to produce uniformly straight lines and tight edge joints on exposed concrete. Extend terminal edges to required limits and miter chamfer strips at changes in direction.
- F. Control Joints: Locate as indicated on the Drawings.
- G. Provision for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Verify size and location of openings, recesses and sleeves with the trade requiring such items. Accurately place and securely support items to be built into forms.
- H. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove encrusted mortar and grout, chips, wood, sawdust, dirt, and other debris just before concrete is placed. Retighten forms immediately after concrete placement as required to eliminate mortar leaks.

3.3 FORM COATINGS:

- A. Coat form contact surfaces with form-releasing agent before reinforcement is placed. Do not allow excess form coating material to accumulate in the forms or to come into contact with surfaces that will be bonded to fresh concrete. Apply in strict compliance with manufacturer's instructions.
- B. Remove surplus coating on form surfaces before placing concrete.

3.4 INSTALLATION OF EMBEDDED ITEMS:

- A. Set and build into the forms, anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of the items to be attached thereto.
- B. Set edge forms or bulkheads and intermediate screed strips for slabs, to obtain required elevation and contours in the finished slab surface. Provide and secure units to support types of screeds required.

3.5 REMOVAL OF FORMS:

- A. Formwork not supporting concrete, such as sides of walls, columns, and similar parts of the Work, may be removed after cumulatively curing at not less than 50 degrees F for 72 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operation, and provided that curing and protection operations are maintained.
- B. Formwork supporting weight of concrete, such as elevated beams, joists, slabs and other structural elements may not be removed until concrete has attained 70% of its design minimum 28-day compressive strength, and has cumulatively cured for no less than 7 days. Concrete shall have sufficient strength to safely support its own weight and construction live loads and lateral pressures. Determine potential compressive strength of in-place concrete testing field-cured specimens representative of the concrete location or members, as specified in Section 03 30 00, Cast-in-Place Concrete.
- C. Form facing material may be removed one day after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.
- D. Form ties: The concrete structure shall be finished by grinding the fiberglass form ties flush with the finish surface of the concrete structure.

3.6 REUSE OF FORMS:

- A. Clean and repair surfaces of forms to be reused in the work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable. When forms are reused for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets. Apply new form releasing agent to all form areas that will be in contact with concrete.
- B. Do not reuse forms if there is any evidence of surface wear and tear, splits, fraying, delamination or other damage which would impair the quality of the concrete surface or prevent obtaining the specified concrete finish.

*****END OF SECTION*****

SECTION 03151**CONCRETE CONTROL, CONSTRUCTION, AND EXPANSION JOINTS****PART 1 - GENERAL****1.1 GENERAL PROVISIONS:**

- A. All of the Contract Documents, including General and Supplementary Conditions apply to the Work of this Section.

1.2 SCOPE:

- A. Section includes: All work necessary to provide construction joints, expansion joints, and control joints in structural or plain concrete as indicated and specified.

1.3 REFERENCES:

- A. American Society for Testing and Materials (ASTM) Publications:
 - 1. C 920: Specification for Elastomeric Joint Sealants.
 - 2. C1193: Guide for Use of Joint Sealants.
 - 3. D1751: Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
 - 4. D1752: Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.4 SUBMITTALS:

- A. Shop Drawings: Submit the following in accordance with the requirements as specified in Section 01340
 - 1. Manufacturer's printed data and literature for all specified materials and locations where materials are to be used.
 - 2. Manufacturer's printed instruction for:
 - a. Treatment of cut surfaces of premolded expansion joint filler.
 - b. Preparation of concrete for joint sealant.
- B. Samples of joint fillers.
- C. Color samples or charts for joint sealants.

1.5 QUALITY ASSURANCE:

- A. Do not omit control, construction, or expansion joints.
- B. Do not add or relocate control, construction, or expansion joints without written authorization from the Engineer.
- C. Cast slabs and beams monolithically without horizontal joints.

- D. Do not use horizontal joints within foundation mats, base slabs, footings, pile caps, slabs on grade or elevated beams and slabs.
- E. Provide control, construction, and expansion joints in concrete fills and toppings at the same location as the control, construction and expansion joints in the supporting concrete.
- F. Reject material exceeding expiration date for use.
- G. Insure that concrete surfaces to receive joint sealant are cleaned in accordance with the printed instructions of the joint sealant manufacture.

1.6 DELIVERY AND STORAGE:

- A. Transport, handle and deliver materials to the job site in the manufacturer's sealed bags, unopened containers or banded pallets.
- B. Store materials off the ground on a platform or skids and protect with covers from snow, rain and ground splatter.
- C. Store joint sealants in a dry warm location to prevent freezing.
- D. Store plastic products under cover in a dry cool location, out of direct sunlight.

PART 2 - PRODUCTS

2.1 PREMOLDED JOINT FILLER:

- A. Provide premolded-joint filler conforming to ASTM D1752, Type I or Type II.
- B. Provide Type III self-expanding cork where specifically indicated.
- C. Provide joint filler of same thickness as expansion joint width indicated.
- D. Provide maximum length filler manufactured to minimize field splicing.

2.2 JOINT SEALANT:

- A. Horizontal Expansion and Construction Joints: Provide one-component, self-leveling, polyurethane-base joint sealant for expansion joints in horizontal surfaces and surfaces inclined less than 30 degrees from the horizontal. Acceptable products:
 1. Sikaflex-1CSL by Sika Corporation
 2. Approved equivalent.
- B. Provide joint sealant for expansion joints in walls and surfaces inclined greater than 30 degrees from the horizontal conforming to ASTM C920, Type S or M, Grade NS, Class 25.
- C. Horizontal Control Joints: Provide 2-component, self-leveling 100% solids, flexible, control joint resin. Acceptable products:
 1. Sikadur 51 SL by Sika Corporation
 2. Approved equivalent.

- D. Provide compatible joint sealants as recommended by manufacturer when they abut each other.
- E. Provide sealant intended for continuous submergence in liquid containing structures.

2.3 BOND BREAKER FOR JOINT SEALANTS:

- A. Provide polyethylene tape, coated tape or metal foil.

2.4 BACK-UP MATERIAL FOR JOINT SEALANTS:

- A. Provide polyethylene foam or polychloroprene foam rubber.
- B. Do not use material impregnated with oil, bitumen or similar substances.
- C. Provide back-up material as recommended by joint sealant manufacturer that is compatible with the joint sealant and has the same expansion/contraction capability as joint sealant.

PART 3 - EXECUTION

3.1 CONSTRUCTION JOINTS:

- A. Locate and install construction joints as indicated or, if not indicated, locate so as not to impair the strength and appearance of the structure. Submit proposed construction joint locations for approval.
- B. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints.
- C. Key groove all construction joints unless otherwise indicated. Wall horizontal joints need not be keyed except where specifically indicated.
- D. Key grooves shall be one-third the thickness of the thinner member and 1-1/2-in. deep unless otherwise indicated.
- E. Use tapered key groove forms to permit form removal without damage to the groove. Taper not to exceed 2 inches per foot.
- F. Center waterstops in construction joints unless otherwise indicated. Secure waterstops in position by tie wire to adjacent reinforcing every 12 inches.
- G. Consolidate concrete during placement in the vicinity of key groove without damaging or dislodging waterstop.
- H. Remove all key groove forms.
- I. Clean key groove of laitance, curing sealant, foreign materials and protrusions of hardened concrete. Roughen by bush hammer or lightly sandblast to expose coarse aggregate. Blow out debris and dust with oil-free compressed air.
- J. Protect exposed key groove and waterstop from damage.

3.2 EXPANSION JOINTS:

- A. Install expansion joints in accordance with the manufacturers printed instructions and as indicated.
- B. Center waterstops in expansion joints unless otherwise indicated. Secure waterstops in position by tie wire to adjacent reinforcing every 12 inches.
- C. Consolidate concrete during placement in vicinity of expansion joint without damaging premolded joint filler and waterstop.
- D. Prepare joint to receive sealant by sand-blasting then blowing out the joint with clean, dry, compressed air.

3.3 PREMOLDED JOINT FILLER:

- A. Treat cut surface of premolded joint filler in conformance with manufacturer's printed instructions.
- B. Place premolded joint filler against the bulkhead form and fasten to the inside of the form with noncorrosive fasteners. Remove all fasteners when bulkhead form is removed.
- C. Prevent disturbance of or damage to premolded joint filler.
- D. Fill expansion joint completely with premolded joint filler, except as specified below.
- E. Secure wood strips to expansion joint surfaces, which are to receive joint sealant.
- F. Use tapered wood strips with the smaller width being the same width as the expansion joint and of depth necessary to install the joint sealant and back-up materials.
- G. Use materials to secure the premolded joint filler and wood strips that will not harm concrete or affect the joint sealant bond to concrete.
- H. Do not remove wood strips until forms are removed as specified in the Concrete Formwork section.
- I. Clean groove of laitance, curing sealant, foreign materials and protrusions of hardened concrete. Blow out debris and dust with oil-free compressed air.

3.4 CONTROL JOINTS:

- A. Saw-cut control joints at locations indicated on the Drawings or at locations approved by the Engineer of Record if not shown on the Drawings.
- B. Saw cut joints to $\frac{1}{4}$ of the depth of the slab or concrete member immediately after slab finishing.
- C. All control joints shall be made within 8 hours of concrete placement.

- D. Prepare all control joints to receive sealant by high-pressure washing after saw-cutting, sand-blasting after the joints are dry, and then blowing out the joints with clean, dry, compressed air.

3.5 JOINT SEALING:

- A. Seal the dry clean concrete in joints in conformance with manufacturer's printed instruction.
- B. Install back-up and bond breaker materials where required or recommended by the manufacturer.
- C. Prime concrete, fill flush with joint sealant to required thickness, tool to concave shape and seal in conformance with manufacturer's printed instructions and ASTM C1193.
- D. Prevent spilling joint sealant over adjoining surfaces. Use tape adjacent to joint as required. Remove all tape completely from concrete surface after installing joint.
- E. Do not prime concrete or install joint sealant when sealant, air or concrete temperature is less than 40 deg. F. or as required by manufacturer.

*******END OF SECTION*******

SECTION 03200
CONCRETE REINFORCING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS:

- A. All of the Contract Documents, including General and Supplementary Conditions apply to the Work of this Section.

1.2 SCOPE:

- A. This Section specifies all work necessary to provide all concrete reinforcement such as reinforcing steel, welded wire fabric, and concrete inserts as shown on the Drawings and as specified herein.

1.3 REFERENCES:

- A. American Concrete Institute (ACI)
 - 1. ACI 315: Details and Detailing of Concrete Reinforcement
 - 2. ACI 315R: Manual of Engineering and Placing Drawings for Reinforced Concrete Structures
- B. American Society for Testing and Materials (ASTM):
 - 1. A185: Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement
 - 2. A 615: Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
 - 3. A 706/A 706M: Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement
- C. American Welding Society (AWS):
 - 1. AWS D1.4: American Welding Society, Structural Welding Code, and Reinforcing Steel.
- D. Rhode Island State Building Code

1.4 SUBMITTALS:

- A. Submittal for the following items shall be made in accordance with the requirements as specified.
- B. Shop Drawings:
 - 1. Shop drawings for reinforced concrete structures shall be submitted after the concrete pour sequences, construction joint locations, and placement schedules have been approved by the Engineer.
 - 2. At least 30 days before each scheduled concrete placement, submit shop drawings covering the reinforcing steel details, bar lists, support bars and details, locations of reinforcing bar cut-offs, splices, development lengths and placement details. Prepare shop drawings in accordance with ACI 315 and 315R from reinforcement details shown on the drawings.
 - 3. Mill Certificates: Accompanying the shop drawings, submit steel producer's certification of mill analysis, tensile, and bend tests for reinforcing steel.

4. Welder's certification in conformance with AWS D1.4, when welding is indicated or specified. Testing of welds shall be conducted and witnessed by an independent testing laboratory prior to welding of reinforcement. Maintain qualification and certification records at the job site, readily available for examination of test results.
- C. Manufacture's literature including installation instructions for the following.
 1. Supports

1.5 QUALITY ASSURANCE:

- A. Provide in accordance with the requirements of the Quality Control section and as specified.
- B. Do not fabricate reinforcement until shop and placement drawings have been approved by the Engineer.
- C. Tolerances:
 1. Tolerances shall be as specified in ACI 315R.

1.6 DELIVERY, STORAGE, AND HANDLING:

- A. Delivery: Deliver reinforcement to the job site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on shop drawings.
- B. Storage: Store reinforcement at the job site in a manner to prevent damage and accumulation of dirt and excessive rust.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Reinforcing bars shall be newly rolled deformed bars conforming to ASTM A615 Grade 60, unless otherwise indicated on the Drawings.
 1. Bars to be welded shall conform to ASTM A706 deformed, Grade 60.
 2. Provide mill bent reinforcing bars, bent cold to the dimensions indicated and conforming to the requirements of ACI SP-66.
- B. Welded wire fabric shall conform to ASTM A 185, with a minimum ultimate tensile strength of 70,000 psi. Provide in sizes indicated. Provide support bars and reinforcing bar supports as specified to obtain the concrete cover.
- C. Bar support and accessories shall be galvanized or plastic coated and shall conform to ACI 315. Provide minimum size number 5 support bars.
- D. Provide 3-in. by 3-in. plain precast concrete blocks and precast concrete doweled blocks for reinforcing bar supports in foundation mats, base slabs, footings, pile caps, grade beams and slabs on grade. Provide block thickness to produce concrete cover of reinforcement as indicated. Provide blocks of Type II cement with 3000 psi minimum compressive strength in conformance with the Section 03 30 00, Cast-in-Place Concrete.

- E. Wire for tying reinforcement in place shall be No. 16 AWG or heavier black soft-annealed wire

2.2 FABRICATION:

- A. Fabricate reinforcement only after shop drawings have been returned by the Engineer marked "Approved".
- B. Provide reinforcing bars that have been cut and bent before shipment. If bars must be bent on site, bend reinforcing steel cold, and do not straighten or rebend in a manner, which will damage the material. Bend in conformance with requirements of ACI SP-66 or with ASTM A767 when reinforcement is to be galvanized.
- C. Splices:
 - 1. Provide standard reinforcement splices by lapping ends, placing bars in contact, and tightly wire tying for the full length of the splice. All lap splices shall be ACI 318, Class B, unless indicated otherwise on the Drawings.
 - 2. Adjacent splices shall be staggered whenever possible.

PART 3 - EXECUTION

3.1 GENERAL:

- A. General: Comply with Concrete Reinforcing Steel Institute's recommended Practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.

3.2 PLACEMENT:

- A. Comply with the specified standards for details and methods of reinforcement placement and supports, and as herein specified. Comply with concrete protective cover requirement indicated on the Drawings.
- B. Clean reinforcement to remove loose rust and mill scale, earth, and other materials that would reduce or destroy bond with concrete.
- C. Position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.
- D. Place reinforcement to obtain the specified coverage for concrete protection. Arrange, space, and securely tie bars and bar supports together with wire, to hold reinforcement accurately in position during concrete placement operation. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
- E. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh.

- F. Provide supports of sufficient numbers and strengths to carry reinforcement. Do not place reinforcing bars more than 2 inches beyond the last leg of any continuous bar support. Do not use supports as bases for runways for conveying equipment and similar construction loads.
- G. Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits or embedded items. Bars moved more than three inches are subject to approval of Engineer. Place required number of bars.
- H. Position dowels accurately, rigidly support, and securely tie. Align dowels normal to concrete surface before concrete placement. Setting dowels into wet concrete is prohibited.
- I. Provide and place safety caps on all exposed ends of vertical reinforcement.
- J. Tie a minimum of 25 percent of all intersecting bars in foundation mats, base slabs, footings, pile caps, slabs on grade and elevated slabs.
- K. Do not splice reinforcement steel in foundation mats, base slabs, beams, girders, slabs and walls at points of maximum stress unless otherwise indicated.
- L. Lap splice welded wire fabric reinforcement at least one full mesh. Stagger splices to avoid continuous laps in either direction and wire tightly together. Straighten rolled welded wire fabric reinforcement into flat sheets before use.
- M. Provide continuous reinforcement through construction joints.

*******END OF SECTION*******

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 GENERAL PROVISIONS:

- A. All of the Contract Documents, including General and Supplementary Conditions apply to the Work of this Section.

1.2 SCOPE:

- A. This Section specifies requirements for furnishing, placement, finishing, curing and protecting of all concrete, plain and reinforced as shown on the Drawings and as specified herein. Review and approval of the Contractor's Working drawings by the Engineer does not relieve the Contractor of the responsibility for the adequacy of Work.

1.3 REFERENCES:

- A. General: Where the language in any of the documents referred to herein be in the form of a recommendation or suggestion, such recommendations or suggestions shall be deemed to be mandatory for these Specifications.
- B. American Concrete Institute (ACI):
1. ACI 117: Standard Tolerances for Concrete Construction and Materials (except as modified in this Specification Section for anchor rod placement).
 2. ACI 211.2: Standard Practice for Selecting Proportions for Structural Lightweight Concrete
 3. ACI 213: Guide for Structural Lightweight Aggregate Concrete
 4. ACI 301: Specifications for Structural Concrete
 5. ACI 302: Guide for Concrete Floor and Slab Construction
 6. ACI 304R: Guide for Measuring, Mixing, Transporting and Placing Concrete.
 7. ACI 305R: Hot Weather Concreting
 8. ACI 306: Cold Weather Concreting
 9. ACI 308: Standard Practice for Curing Concrete
 10. ACI 309R: Guide for Consolidation of Concrete
 11. ACI 318: Building Code Requirements for Structural Concrete
- C. American Society for Testing and Materials (ASTM):
1. C31 Making and Curing Concrete Compression and Flexural Strength Test-Specimens in the Field
 2. C33 Specification for Concrete Aggregates
 3. C39 Test Method for Compressive Strength of Cylindrical Concrete Specimens
 4. C94 Specifications for Ready Mixed Concrete
 5. C127 Standard test method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate
 6. C136 Sieve Analysis of Fine and Coarse Aggregate

7. C138 Unit Weight, Yield, and Air Content of Concrete
 8. C143 Test for Slump of Portland Cement Concrete
 9. C150 Specification for Portland Cement
 10. C171 Sheet Materials for Curing Concrete
 11. C172 Sampling Fresh Concrete
 12. C173 Standard test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
 13. C205 Standard Specifications for Portland Blast Furnace Slag Cement
 14. C231 Test for Air Content of Freshly Mixed Concrete by the Pressure Method
 15. C260 Specification for Air-Entraining Admixtures for Concrete
 16. C309 Specification for Liquid Membrane Forming Compounds for Curing Concrete
 17. C340 Standard Specifications for Portland-Pozzolan Cement
 18. C494 Specification for Chemical Admixtures for Concrete
 19. C618 Standard Specifications for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
 20. C827 "Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
 21. C845 Standard Specifications for Expansive Hydraulic Cement
 22. C989 Specification for Ground Iron Blast-Furnace Slag for Use in Concrete and Mortars
 23. C1017 Standard Specifications for Chemical Admixtures for Use in Producing flowing Concrete
 24. C1064 Test Method for Temperature of Freshly Mixed Portland-Cement Concrete
 25. C1107: Specification for Packaged Dry, hydraulic Cement Grout (Non-Shrink)
 26. C1157 Standard Performance Specifications for Silica Fume in Cementitious Mixtures
 27. C1240 Standard Specification for Silica Fume for Use in Hydraulic-Cement Concrete
 28. D1751: Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 29. E154 Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
- D. Federal Specifications (Fed. Spec.):
1. TT-S-00230: Sealing Compound: Elastomeric Type, Single Component (for Caulking, Sealing, and Glazing in Buildings and Other Structures)

1.4 DESIGN REQUIREMENTS:

- A. Codes: Building concrete shall be in conformance with the requirements of ACI 318, and the Rhode Island State Building Code.
- B. Coordinate use of curing compounds with the floor coatings, sealers, and hardeners.
- C. Air-entrain all exterior exposed concrete.

1.5 SUBMITTALS:

- A. Product Data: Submit design mix including color additives as applicable. Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, synthetic fibers, admixtures, color additives,

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patching compounds, waterstops, joint systems, curing compound, and others as requested by the Engineer.

- B. Shop Drawings: Submittals included in the Section shall be in accordance with the requirements specified. Submit Working drawings for all Work under this Section to the Engineer for approval. Show location of joints, concrete pouring sequence, schedule dates, rate of placement and methods. All concrete mix designs shall conform to ACI-318, Chapter 5 and as specified. All concrete mix designs and concrete material tests shall be signed and sealed by a Professional Engineer in the State of Rhode Island.
- C. Samples: Submit samples of materials as specified, including names, sources and descriptions.
- D. Laboratory Test Reports: Submit laboratory test reports for concrete, concrete materials, and mix design tests.
- E. Material Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.
- F. Submit prior to start of Work written reports of each proposed mix for each class of concrete. Do not begin concrete production until mixes have been approved by the Engineer.
- G. Batch Ticket Information: Provide concrete delivery tickets showing job name and location, date and time of delivery, quantity of concrete, quality and type of concrete, admixtures, amount of water added, and all other relevant information as described in ASTM C-94. Submit original batch tickets and 2 copies at the end of each week.

1.6 QUALITY ASSURANCE:

- A. Provide in accordance with the requirements as specified.
- B. Concrete Testing Service: The Contractor shall employ and pay an independent testing laboratory to perform material evaluation tests and to design concrete mixes and provide copies of recently made material tests and mix designs.
- C. Materials and installed Work may require testing and retesting at any time during progress of Work. Allow free access to material stockpiles and facilities. All tests, including retesting of rejected materials and installed Work, shall be done at Contractor's expense.
- D. Workmanship: The Contractor is responsible for correction of corrected Work that does not conform to the specified requirements, including strength, tolerances and finishes. Correct deficient concrete as directed at no additional cost to the Owner.

1.7 DELIVERY, STORAGE AND HANDLING:

- A. Order concrete from batching plant so that trucks arrive at discharge locations when concrete is required. Avoid excessive mixing of concrete or delays in placing successive layers of concrete in forms.

- B. Deliver concrete to discharge locations in watertight agitator or mixer trucks without altering the water-cement ratio, slump, air entrainment, temperature and homogeneity.
- C. Concrete not conforming to specification, unsuitable for placement, exceeding the time or temperature limitations or not having a complete delivery batch ticket will be rejected.

1.8 JOB SITE:

- A. Weather: Protect concrete from damage and reduced strength or performance due to weather extremes during mixing, placing and curing.
- B. Cold Weather: Unless special precautions are taken to protect concrete, do not Work when temperatures are below 40°F or when temperatures are expected to fall below 40°F within 72 hours after placing concrete.
 - 1. Comply with ACI 306 in cold weather.
 - 2. Maintain concrete temperature of at least 60°F. Reinforcement, forms and ground in contact with concrete shall be free of frost.
 - 3. Keep concrete and formwork at least 50°F for at least 96 hours after placing concrete.
 - 4. The use of calcium chloride in any form is not permitted. Non-chloride accelerator shall be used when ambient temperature is below 50°F.
 - 5. Admixture manufacturer shall provide technical assistance at no additional cost. A manufacturer's representative shall be available for consultation by phone or on site upon 72-hour notice.
- C. Hot Weather: Concrete, when deposited, shall be less than 85°F. Cool the mix in a manner acceptable to the Engineer if the concrete temperature is higher.
 - 1. Comply with ACI 305 in hot weather.
 - 2. Retarder shall be used when ambient temperature exceeds 80°F.
- D. Schedule delivery of colored concrete to provide consistent mix times from batching until discharge.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS:

- A. Portland Cement: ASTM C 150, Type II for all Work unless otherwise specified. Use one brand of cement throughout project.
- B. Normal Weight Aggregates: ASTM C 33, and as herein specified. Use ¾" maximum size for all concrete, except for slabs-on-grade use 1-1/2" maximum. Provide aggregates from a single source for exposed concrete.
- C. Water: Clean, potable and free from foreign materials such as oils, acids, alkalis, and organic materials in amounts harmful to concrete and embedded steel. Provide water which meets ACI/ASTM requirements for concrete mix water.
- D. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

1. Products: Subject to compliance with requirements, products which may be incorporated in the Work include the following
 - a. "Air-Mix"; Euclid Chemical Co.
 - b. "Sika AeA-14"; Sika Corp.
 - c. "MasterAir VR 10 or MasterAir AE 90"; Master Builders
 - d. "Darex AEA" or "Daravair"; W.R. Grace
 - e. Or equal.

- E. Water Reducing Admixture: ASTM C 494, Type A, and containing not more than 0.1% chloride ions. Follow manufacturer's recommendations for amount of admixture to be added to the concrete. Admixture shall be compatible with air-entraining admixtures.
 1. "WRDA with Hycol"; W. R. Grace.
 2. "Eucon WR-75"; Euclid Chemical Co.
 3. "Master Pozzolith" Master Builders
 4. "Sikament 686"; Sika Chemical Corp.
 5. Or equal.

- F. High-Range Water Reducing Admixture (SuperPlasticizer): ASTM C 494, Type F or Type G and containing not more than 0.1% chloride ions. Follow manufacturer's recommendations.
 1. Products: Subject to compliance with requirements, products which may be incorporated in the Work include the following:
 - a. "ADVA CAST 585"; W. R. Grace.
 - b. "Super P"; Anti-Hydro.
 - c. "Sikament 686"; Sika Chemical Corp.
 - d. "Master Rheobuild 1000"; Master Builders.
 - e. Or equal.

- G. Water Reducing, Non-Chloride Accelerator Admixture: ASTM C 494, Type E or C, and containing not more than 0.1% chloride ions.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Accelguard 80"; Euclid Chemical Co.
 - b. "MasterSet FP 20"; Master Builders, Inc.
 - c. "PolarSet"; Grace Construction Products.
 - d. Or equal.

- H. Water Reducing, Retarding Admixture: ASTM C 494 Type D, and containing not more than 0.1% chloride ions.
 1. Products: Subject to compliance with requirements, products that may be incorporated in the Work include the following:
 - a. "MasterPozzolith-80"; Master Builders.
 - b. "Eucon Retarder 75"; Euclid Chemical Co.
 - c. "Daratard 17"; W. R. Grace.
 - d. "Plastiment"; Sika Chemical Co.
 - e. Or equal.

- I. Prohibited Admixtures: Calcium chloride thycyanates or admixtures containing more than 0.1% chloride ions are not permitted.

2.2 RELATED MATERIALS:

- A. Reglets: Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 26 gauge galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.
- B. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. Per sq. yd., complying with AASHTO M 182, Class 2.
- C. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
1. Waterproof paper.
 2. Polyethylene film.
 3. Polyethylene-coated burlap.
- D. Joint Sealants shall be provided in color to match color of concrete.
- E. Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound complying with ASTM C 309, Type I, Class A. Moisture loss not more than 0.055 gr./sq. cm. when applied at 200 sq. ft./gal.
1. Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:
 - a. "MasterKure"; Master Builders.
 - b. "A-H 3 Way Sealer WB"; Anti-Hydro Waterproofing Co.
 - c. "Kurez DR VOX"; Euclid Chemical Co.
 - d. "Clear Seal"; A.C. Horn, Inc.
 - e. "Sealco 309"; Gifford-Hill/American Admixtures.
 - f. "Cure & Seal LV 25% J20UV"; Dayton Superior.
- F. Underlayment Compound: Free flowing, self-leveling, pumpable cementitious base compound.
1. Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:
 - a. "Ardex K-15"; Ardex Engineered Cements.
 - b. "Silflo 230"; Silpro Masonry Systems.
 - c. "Ultraplan"; Mapei.
- G. Bonding Compound: Polyvinyl acetate or acrylic base.
1. Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:
 - a. Acrylic or Styrene Butadiene:
 - 1) "J-40 Bonding Agent"; Dayton Superior Corp.
 - 2) "Everbond"; L & M Construction Chemicals.
 - 3) "Hornweld"; A. C. Horn, Inc.
 - 4) "Daraweld C"; W. R. Grace.
- H. Adjustable inserts: Adjustable inserts shall be hot-dip galvanized in conformance with ASTM A123 and A153. Adjustable insets shall be:

1. Ductile iron wedges inserts, Type F-7 manufactured by Dayton Sure-Grip & Shore Co.
 2. Malleable iron peerless wedge inserts, insert as manufactured by Richmond Screw, Anchor Co., Inc.
 3. Malleable iron wedge inserts, Type HW as manufactured by Hohmann & Barnard Inc.
- I. Vapor barrier shall be Stego Wrap Vapor Barrier (15 mil) or equivalent, in accordance with ASTM E 1745. Use caution to avoid perforations in the vapor barrier material. Install barrier in accordance with ASTM E 1643 and ASTM F 710 guidelines.
- J. Concrete Moisture Vapor Reduction Admixture (MVRA): MVRA shall be provided at all slabs-on-grade and slabs-on-metal deck.
- MVRA Basis-of-Design Product: "Barrier One High Performance Concrete Admixture" by Barrier One, Inc. Other admixtures must be compatible with the MVRA. Subject to compliance with requirements, comparable products which may be incorporated in the Work include, but are not limited to, the following:
1. Moxie 1800 Super Admix; Moxie International.
 2. Concure Systems Admixture; Concure Systems, Inc.

2.3 PROPORTIONING AND DESIGN OF MIXES:

- 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 trial batch method used, use an independent testing facility acceptable to the Engineer for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.
- B. Submit written reports for review of design mix for specified strength of concrete within 15 days prior to start of Work. Do not begin concrete production until mixes have been reviewed.
- C. Strength: Provide concrete having the following minimum compressive strength at 28 days:
1. Class 4000 – 3/4" normal weight concrete: Typical, unless noted otherwise.
 2. Class 5000 – 3/4" normal weight concrete: Use in exterior slabs on grade
- The concrete quality, mixing and placing shall conform to ACI-318, Chapter 5.

Design mixes to provide normal weight concrete with the following properties, as indicated:

Minimum Design Compressive Strength	Minimum Strength fc 7 days	Laboratory Testing Age 28 day	Minimum ** Cement Content/cu.yd.	Maximum* W/C Ratio
4,000 (3/4") psi	2,400 psi	4,000 psi	565	.45
5,000 (3/4") psi	3,500 psi	5,000 psi	705	.40

*Maximum: Decrease if possible

**Minimum: Increase as necessary to meet all other stated requirements.

- D. Adjustment 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 and as accepted by the Engineer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by the Engineer before using in Work.
- E. Admixtures:
1. Use water-reducing admixture or high range water reducing admixture (super plasticizer) in all concrete in strict accordance with the manufacturer's printed instructions.
 2. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50°F in strict accordance with the manufacturer's printed instructions.
 3. Use high-range water-reducing admixture in pumped concrete required to be watertight, and concrete with water/cement ratios below 0.40.
 4. Use air-entraining admixture in all concrete except interior slabs, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content as follows:
 - a. $\frac{3}{4}$ " aggregate normal weight concrete: 6.0% with a tolerance of $\pm 1\%$
- F. Consistency:
1. The consistency shall be uniformly maintained within the allowable range of slump for the job materials. Ordinarily the slump shall not be less than 1-1/2" inch nor more than 4 inches, unless in the opinion of the Engineer, job conditions warrant exceeding these limits. The consistency shall be determined by the AASHTO Method T-119. This range of slump is to be maintained for all concrete including pumped concrete.
 2. Concrete containing HRWR admixture (super-plasticizer): Not more than 7" after addition of HRWR to site-verified 1-1/2" to 4" slump concrete.
 3. Ramps, slabs and sloping surfaces: Not more than 3 inches.
 4. Reinforced foundation systems: Not less than 1-1/2" inch nor more than 4 inches.
- G. Concrete Moisture Vapor Reduction Admixture (MVRA) shall be used in strict accordance with the manufacturer's printed instructions. The MVRA manufacturer shall provide a minimum 10-year warranty effective from the date of substantial completion. In order to qualify for the warranty, the following items must be implemented prior to placement of the concrete:
1. Concrete mix design is submitted to MVRA manufacturer for review and comment.
 2. Concrete supplier must verify in writing that strict water/cement ratio compliance has been met for all concrete batches utilizing the waterproofing admixture.
 3. Concrete supplier must verify in writing that manufacturer's instructions for use at batch plant were strictly followed for batches provided for the job.

2.4 CONCRETE MIXING:

- A. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as herein specified. Delete references for allowing additional water to be added to batch for material with insufficient slump. Addition of water to the batch will not be permitted.
1. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required. When air temperature is between

85°F (30° C) and 90°F (32° C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90°F (32°C), reduce mixing and delivery time to 60 minutes.

2. During cold weather heat water, sand and cement materials per recommendations of ACI 306.

- B. High Early Strength Concrete: Follow manufacture's product specific installation guidelines. Cement shall be added to a pre-measured amount of water that does not exceed the manufacturer's maximum recommended water content. Material can be extended up to 60% using pea gravel.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Batch, mix and deliver Portland cement concrete in conformance with ASTM 94. Batch all constituents at central batching or mixing plant. Produce concrete in conformance with ACI 301 and as specified.
- B. Seasonal Conditions:
 1. Conform to ACI 305R and as specified for hot weather concreting. Do not add retarder admixture to any concrete.
 2. Conform to ACI 306R and as specified for cold weather concreting. Do not add accelerator admixture to any concrete.

3.2 INSTALLATION OF EMBEDDED ITEMS:

- A. Set and build into Work, anchorage devices and other embedded items required for other Work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto. Embedded items, including column anchor rods and concrete reinforcement, shall be set prior to the placement of concrete. Embedded items shall not be "wet-set" without prior written approval from the Engineer of Record.
- B. Install anchor rods, accurately located, to elevation required and complying with the following tolerances (acceptable deviation from rod locations shown on the Drawings):
 1. 3/4" and 7/8" diameter rods: +/- 1/4"
 2. 1", 1-1/4", and 1-1/2" diameter rods: +/- 3/8"
 3. 1-3/4", 2", and 2-1/2" diameter rods: +/- 1/2"
- C. Clean embedded items of oil, ice, dirt and all other foreign items.
- D. For embedded pipes, complete all necessary testing requirements prior to placing concrete.

3.3 PLACING CONCRETE:

- A. General:

1. Concrete formwork shall satisfy the requirements of Section 03 11 00, Concrete Formwork. Do not place concrete until the depth, character and adequacy of forms, falsework, embedments, and the placing of the steel reinforcement have been approved by the Engineer. The method and manner of placing the concrete shall be such as to avoid segregation of aggregate and displacement of the reinforcement. Troughs, pipes and chutes may be used as aids in placing concrete when necessary. Dropping the concrete a distance of more than five feet, or depositing a large quantity at one point, will not be permitted. Concrete shall be placed upon clean, damp surfaces, free from running water, or upon properly consolidated soil.
 2. Do not add water to concrete during delivery, at the Project site, or during placement, unless approved by the Engineer of Record. Amount of water to be added at the project site shall be indicated on the mix design and batch tickets submitted by the contractor. Water shall be added prior to on-site testing of the concrete mix.
 3. Before placing concrete, and if agreed upon by the Engineer of Record, water may be added at the Project site, subject to the limitations of ACI 301.
 - a. Do not add water to concrete after adding high-range water-reducing admixtures.
 4. Retempering of concrete by adding water or any other material shall not be permitted.
 5. Concrete placement, finishing and curing, and all other pertinent construction practices shall be in accordance with ACI 117 and ACI 301. In addition to the requirements of ACI 117 and ACI 301, the following shall apply:
 - a. Concrete shall be placed so that a uniform appearance of surfaces will be obtained.
 - b. Concrete shall be placed and consolidated free of rock pockets, honeycombs, and voids.
 - c. Concrete shall be deposited as nearly as practicable in its final position, to avoid segregation due to rehandling or flowing, and shall not be subjected to any procedure that will cause segregation.
 - d. Concrete shall be placed and consolidated in walls in approximately 18-inch layers, proceeding at a uniform rate or per the form designer's recommendation.
 - e. Subgrade shall be slightly moist when the concrete is placed for floor slabs, to prevent excessive loss of water from the concrete mix.
- B. Consolidating:
1. Consolidate concrete with suitable mechanical vibrators operating within concrete. When necessary, vibrating shall be supplemented by hand spading with suitable tools to assure proper and adequate consolidation. Vibrators shall be manipulated so as to Work the concrete thoroughly around the reinforcement and embedded fixtures and into corners and angles of the forms. The vibration at any joint shall be of sufficient duration to accomplish consolidation but shall not be prolonged to the point where segregation occurs.
 2. Employ as many vibrators and tampers as necessary to secure the desired results. For every two vibrators required for the job, an additional standby vibrator shall be kept on the site. Do not place subsequent layers of concrete until the previous layer has been consolidated as specified. Internal vibrators shall have a minimum frequency of 8000 vibrations per minute when immersed in concrete and shall have sufficient amplitude to effectively consolidate the concrete.
 3. Prevent the following practices:
 - a. Pushing of concrete with vibrator.

- b. External vibration of forms.
 - c. Allowing vibrator to vibrate against reinforcing steel where steel projects into green concrete.
 - d. Allowing vibrator to vibrate against the contact faces of forms.
- C. Cold Weather: Do not place concrete when the ambient temperature is below 40°F, unless specifically authorized by the Engineer. Conform to the requirements of ACI 306R during cold weather.
- D. Hot Weather: Do not place concrete with a mix temperature exceeding 90°F, unless specifically authorized by the Engineer. Conform to the requirements of ACI 305R during hot weather.
- E. Construction Joints:
- 1. When the placing of concrete is suspended, necessary provisions shall be made for joining future Work before the placed concrete takes its initial set. For the proper bonding of old and new concrete, such provisions shall be made for grooves, steps, keys, dovetails, reinforcing bars or other devices as may be prescribed. Before depositing new concrete against concrete which has hardened, the surface of the hardened concrete shall be cleaned by a heavy steel broom, roughened slightly, wetted, and covered with a neat coating of cement paste or grout. Install joint sealant where shown on the Drawings, in accordance with manufacturer's instructions.
 - 2. Joints shall be perpendicular to the main reinforcement.
 - 3. Construction joints in floors shall be located within the middle third spans of slabs, beams, and girders.
- F. Expansion and Control Joints: Expansion and control joints shall be constructed in the locations and to the dimensions and details shown on the Drawings.
- G. Defective Work:
- 1. All defective Work disclosed after the forms have been removed shall be immediately removed and replaced. If dimensions are deficient, or if the surface of the concrete is bulged, uneven, or shows honeycomb, which in the opinion of the Engineer cannot be repaired satisfactorily, the entire Section shall be removed and replaced at no cost to the Owner.
 - 2. Other Work considered to be defective includes, but is not limited to, the following:
 - a. Concrete in which defective or inadequate steel reinforcement has been placed.
 - b. Concrete incorrectly formed, or not conforming to details and dimensions on the Drawings or with the intent of these documents, or the concrete surfaces of which are out of plumb or level beyond specified tolerances.
 - c. Concrete below specified strength.
 - d. Concrete containing wood, cloth, or other foreign matter, rock pockets, voids, honeycombs, cracks or cold joints not scheduled or indicated on the Drawings.

3.4 CONCRETE FINISHING:

- A. Exposed concrete surfaces shall be true, smooth, and free from open or rough spaces, depressions, or projections. The concrete in horizontal plane surfaces shall be brought flush with the finished top surface at the proper elevation and shall be struck off with a straightedge and

floated. Mortar finishing will not be permitted, nor shall dry cement or sand-cement mortar be spread over the concrete during the finishing of horizontal plane surfaces.

- B. Following placement of concrete for slabs and floors, tamp to force coarse aggregate away from surface, bull float, and steel trowel. Floor areas designated to receive a floor coating shall receive a finish as recommended by the coating manufacturer. Steel trowel finish shall be provided for surfaces that will receive flooring and all exposed floor areas.
- C. Overall conformance to design grade shall be within $\frac{3}{4}$ " of design elevation.
- D. The following requirements shall govern concrete finishes so indicated on the Drawings.
 - 1. Float Finish: Force coarse aggregate away from surface; float to a smooth and even surface.
 - 2. Trowel Finish:
 - a. After floating, begin the first trowel finish operation using a power-driven trowel; begin final troweling when the surface produces a ringing sound as the trowel is moved over the surface.
 - b. Do not over-trowel or start troweling late.
 - c. Consolidate the concrete surface by the final hand troweling operation, free from trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding $\frac{1}{8}$ " in 10'-0" when tested with a 10'-0" straight-edge.
 - 3. Apply nonslip broom finish to exterior concrete as specified, immediately after trowel finishing; roughen the concrete surface by brooming in the direction perpendicular to the main traffic route.
 - a. Use a fiber bristle broom.
 - b. Frequently clean broom to avoid deep brooming.
 - 4. Finishing Formed Surface:
 - a. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or Concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding $\frac{1}{4}$ inch in height rubbed down or chipped off.
 - b. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projects, completely removed and smoothed.
 - c. Smooth-Rubbed Finish: Provide smooth-rubbed finish on scheduled concrete surfaces that have received smooth-formed finish treatment not later than one (1) day after form removal.
 - 1) Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 - d. Grout-Cleaned Finish: Provide grout-cleaned finish on scheduled concrete surfaces that have received smooth-formed finish treatment.

- 1) Combine one part Portland Cement to one and one-half parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to form the consistency of thick paint. Blend standard Portland Cement and white Portland Cement in amounts determined by trial patches so that final color of dry grout will match adjacent surfaces.
- 2) Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least thirty-six (36) hours after rubbing.
- e. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar uniformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent uniformed surfaces unless otherwise indicated.

E. Monolithic Slab Finishes

1. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and where indicated.
 - a. After placing slabs, finish surface to tolerances of F(F) 15 (floor flatness) and F(L) 13 (floor levelness) measured according to ASTM E 1155. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
2. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and where indicated.
 - a. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats or by hand-floating if area is small or inaccessible to power units. Finish surfaces to tolerances of F(F) 18 (floor flatness) and F(L) 15 (floor levelness) measured according to ASTM E 1155. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
3. Trowel Finish: Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or thinset quarry tile, paint, or another thin film-finish coating system.
 - a. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances of F(F) 25 (floor flatness) and F(L) 20 (Floor levelness) measured according to ASTM E 1155. Grind smooth any surface defects that would telegraph through applied floor covering system.
4. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately flow by slightly scarifying the surface with a fine broom.
5. Non-slip Broom Finish: Apply a non-slip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

- a. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
6. Non-slip Aggregate Finish: Apply non-slip aggregate finish to concrete stair treads, platforms, ramps, sloped walks.
 - a. After completing float finishing and before starting trowel finish, uniformly spread 25 lbs. Of dampened non-slip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as specified.
 - b. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose non-slip aggregate.

3.5 CURING AND PROTECTION:

- A. Initial Curing: All concrete shall be properly cured and protected in accordance with ACI 308. Maintain concrete above 50 degrees F during first seven days after placing. The Work shall be protected from the elements, flowing water, and from defacement of any nature, during construction. The concrete shall be cured as soon as it has sufficiently hardened, by covering with an approved material. Water-absorptive coverings shall be thoroughly saturated when placed, and kept saturated for a period of at least seven days. Curing mats or blankets shall be sufficiently weighted or tied down to keep the concrete surface covered and to prevent the surface from being exposed to air currents. Where wooden forms are used, they shall be kept wet at all time until removed, to prevent the opening of joints and drying out of the concrete. Membrane curing compounds shall be coordinated with the surface to be painted, covered with plaster, covered with sealer, and other surfaces which curing compound would adversely affect subsequent construction.
- B. Duration of Curing: The final curing shall continue until the cumulative number of days or fractions thereof, not necessarily consecutive, during which the temperature of the air in contact with the concrete is above 50°F, has totaled 7 days beyond the initial curing period.
 1. If high-early strength concrete has been used, the final curing shall continue for a total of 3 days beyond the initial curing period.
 2. Rapid drying at the end of the curing period shall be prevented.
- C. Formed Surfaces: Steel forms heated by the sun and all wood forms in contact with the concrete during the curing period shall be kept wet.
 1. If forms are to be removed during the curing period, one of the specified curing materials or methods shall be employed immediately.
 2. Such curing shall be continued for the remainder of the curing period.

3.6 CONCRETE SURFACE REPAIRS:

- A. General: Any defective Work disclosed after removal of forms shall be immediately removed and replaced. If in the opinion of the Engineer, the surface of the concrete cannot be repaired satisfactorily, the entire Section shall be removed and replaced at no additional expense to the Owner.

- B. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to the Engineer.
1. Cut out honeycomb, rock pockets, voids over 1" in any dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.
- C. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- D. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to the satisfaction of the Engineer. Surface defects, as such, include color and texture irregularities, bulges, uneven surfaces, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.
- E. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.
- F. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic labs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness using a template having required slope.
- G. Repair defective areas, except random cracks and single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4" clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- H. Repair isolated random cracks and single holes not over 1" in diameter by dry-pack method. Groove top of cracks and cutout holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry pack after bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.
- I. Perform structural repairs with prior approval of the Engineer for method and procedure, using specified epoxy adhesive and mortar.

J. Repair methods not specified above may be used, subject to acceptance of the Engineer.

3.7 QUALITY CONTROL TESTING DURING CONSTRUCTION:

- A. A statement of special inspections will be established by the Registered design professional in responsible charge who will prepare a schedule of tests to be carried out by an independent testing agency. All costs for inspection and testing shall be borne by the Owner. Materials and workmanship shall be subjected to inspection and testing in mill, shop, and/or field by the Registered design professional in responsible charge and/or Testing Agency. Such inspection and testing shall not relieve the Contractor of his responsibility to provide his own inspection, testing, and quality control as necessary to furnish materials and workmanship in accordance with requirements of Contract Documents.
- B. The General Contractor shall notify the Registered design professional in responsible charge and the Testing Agency prior to start of any phase of concrete work so as to afford them reasonable opportunity to inspect the work. Such notification shall be made at least 24 hours in advance.
- C. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
1. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 2. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; one for each day's pour of each type of air-entrained concrete.
 3. Concrete Temperature: Test hourly when air temperature is 40°F and when 80°F and above; and each time a set of compression test specimens are required.
 4. Compressive Strength Tests: ASTM C39; one set for each day's pour exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. over and above the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
 - a. When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches if fewer than 5 are used.
 - b. When total quantity of a given class of concrete is less than 50 cu. yds, strength test may be waived by the Engineer if, in his judgment, adequate evidence of satisfactory strength is provided.
 - c. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 - d. Strength level of concrete will be considered satisfactory if both of the following requirements are met:
 - 1) Every arithmetic average of any three consecutive strength tests equals or exceeds the specified 28-day compressive strength ($f'c$).
 - 2) No individual strength test results falls below the specified 28-day compressive strength ($f'c$) by more than 500 psi when $f'c$ is 5000 psi or less; or by more than $0.1 \times f'c$ when $f'c$ is greater than 5000 psi.

- D. Test results will be reported in writing to the Engineer and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name and location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- F. Additional Tests: The Contractor's Independent testing service shall make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Engineer. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods as directed.

*******END OF SECTION*******

SECTION 03350
CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY:

- A. Section Includes:
 - 1. Single application cure-seal-hardener for new concrete floors.
 - 2. Precautions for avoiding staining concrete before and after application.
- B. Related Section:
 - 1. Cast-In-Place Concrete: Division 03 Cast-In-Place Concrete sections.

1.2 REFERENCES:

- A. ASTM International (ASTM):
 - 1. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 2. ASTM C779 Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
 - 3. ASTM C805 Standard Test Method for Rebound Number of Hardened Concrete.
 - 4. ASTM C1028 Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
 - 5. ASTM D3359 Standard Test Methods for Measuring Adhesion by Tape Test.
 - 6. ASTM G23 Practice for Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials (Withdrawn 2000).

1.3 SUBMITTALS:

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Section 01100
- B. Product Data: Submit product data, including manufacturer's data sheet, installation instructions and technical bulletins for specified products.
- C. Certificates: Manufacturer's certification that the installer is acceptable.
- D. Maintenance Data: Maintenance instructions, including precautions for avoiding staining after application.

1.4 QUALITY ASSURANCE:

- A. Installer Qualifications: Acceptable to the manufacturer.
- B. Regulatory Requirements: All applicable federal, state, and municipal regulations shall be followed.

1.5 DELIVERY, STORAGE & HANDLING:

- A. General: Comply with Division 01 Product Requirements section.

- B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
- D. Handling: Protect materials from dirt, corrosion, oil, grease and other contaminants.

PART 2 - PRODUCTS

2.1 MATERIAL:

- A. Manufacturer:
 1. Curecrete Distribution, Inc. Contact: 1203 W. Spring Creek Place, Springville, UT 84663-0551; Telephone: (800) 998-5664, (801) 489-5663; Fax: (801) 489-3307; website: www.ashfordformula.com.
 2. Approved equivalent.
- B. Basis of Design Cure-Seal-Hardener: Ashford Formula, a water-based chemically reactive penetrating sealer and hardener that seals.
 1. Abrasion Resistance to Revolving Disks: At least a 32.5% improvement over untreated samples when tested in accordance with ASTM C779.
 2. Surface Adhesion: At least a 22% increase in adhesion for epoxy when tested in accordance with ASTM D3359.
 3. Hardening: As follows when tested in accordance with ASTM C39:
 - a. After 7 Days: An increase of at least 40% over untreated samples.
 - b. After 28 Days: An increase of at least 38% over untreated samples.
 4. Coefficient of Friction: 0.86 dry, 0.69 wet when tested in accordance with ASTM C1028.
 5. Rebound Number: An increase of at least 13.3% over untreated samples when tested in accordance with ASTM C805.
 6. Light Exposure Degradation: No evidence of adverse effects on treated samples when tested in accordance with ASTM G23.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS:

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

3.2 EXAMINATION:

- A. Do not begin installation until substrates have been properly prepared and are suitable for application of product.

- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.3 PREPARATION:

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Do not use frozen material. Thaw and agitate prior to use.
- D. If construction equipment must be used for application, diaper all components that might drip oil, hydraulic fluid or other liquids.

3.4 INSTALLATION:

- A. All work must be performed by an applicator certified by the manufacturer. Certification credentials are required.
- B. New Concrete: Apply cure-seal-hardener to new concrete as soon as the concrete is firm enough to work on after troweling; with colored concrete, wait a minimum of 30 days before application.
 1. Spray on at rate of 200 ft²/gal (5 m²/L).
 2. Keep surface wet with cure-seal-hardener for a minimum soak-in period of 30 minutes without allowing it to dry out or become slippery. In hot weather, slipperiness may appear before the 30 minute time period has elapsed. If that occurs, apply additional cure-seal-hardener as needed to keep the entire surface in a non-slippery state for the first 15 minutes. For the remaining 15 minutes, mist the surface as needed with water to keep the material in a non-slippery state. In hot weather conditions, follow manufacturer's special application procedures.
 3. When the treated surface becomes slippery after this period, lightly mist with water until slipperiness disappears.
 4. Wait for surface to become slippery again, and then flush entire surface with water to remove all cure-seal-hardener residue.
 5. Squeegee surface completely dry, flushing any remaining slippery areas until no residue remains.
 6. Wet vacuum or scrubbing machines can be used in accordance with manufacturer's instructions to remove residue.

3.5 PROTECTION:

- A. Protect installed floors for at least 3 months until chemical reaction process is complete.
 1. Do not allow traffic on floors for 3 hours after application.
 2. Do not allow parking of vehicles on concrete slab.
 3. If vehicles must be temporarily parked on slab, place dropcloths under vehicles during entire time parked.
 4. Do not allow pipe cutting using pipe cutting machinery on concrete slab.

5. Do not allow temporary placement and storage of steel members on concrete slabs.
6. Clean up spills immediately and spot-treat stains with degreaser or oil emulsifier.
7. Clean floor regularly in accordance with manufacturer's recommendations.

*******END OF SECTION*******

SECTION 03600
GROUTING

PART 1 - GENERAL

1.1 SCOPE:

- A. All of the Contract Documents, including General and Supplementary Conditions apply to the Work of this Section.
- B. This Section specifies the furnishing and installing non-shrink grout for pump, motor, and equipment base plates or bedplates; column base plates and miscellaneous base plates; and other uses of grout as indicated on the Drawings. Unless otherwise specified, all grouting shall be done with non-shrinking grout.
- C. This section also specifies furnishing and installing two component epoxy systems for grouting of anchor bolts, threaded rod anchors, and reinforcing bars to be installed in hardened concrete and masonry. Anchor bolts, adhesive anchors, and threaded rod anchors are covered in Section 05500, Miscellaneous Metals.

1.2 SUBMITTALS:

- A. Submit Certificate of Compliance of products with these specifications.
- B. Submit the following in accordance with the requirements as specified in Section 01340
 - 1. Manufacturer's printed data and literature for all specified materials and locations where materials are to be used.
 - 2. Manufacturer's installation/application instructions.

1.3 QUALITY ASSURANCE:

- A. Provide in accordance with the requirements as specified.
- B. Ensure surfaces to be grouted are clean and sound and are not feathered at edges.
- C. Handle grout as concrete with regard to temperature and curing as specified in Section 03 30 00, Cast-in-Place Concrete.
- D. Observe safety precautions as outlined in the manufacturer's literature and as printed on containers and labels.

PART 2 - PRODUCTS

2.1 NON-SHRINK CEMENT:

- A. Provide non-shrink, non-metallic cement-based grout requiring only addition of water with a minimum 28-day compressive strength of 6000 psi.
- B. Provide shrinkage and compensation characteristics in both the plastic and hardened states, conforming to ASTM C-1107, Grade C.

- C. Grout shall exhibit small but predictable amount of expansion sufficient to counteract the normal shrinkage of cement.
- D. The expansion shall occur after initial set to insure maximum contact between grout and base plates, beams, masonry, or other surfaces.
- E. Manufactured by:
 1. "Five Star Grout" by Five Star Products Inc.
 2. "Sika Grout 212" as manufactured by Sika Corporation.
 3. Masterflow 928 Grout by Master Builders, Inc.
 4. Or approved equal.

2.2 EPOXY GROUT FOR REINFORCING BARS AND THREADED ROD ANCHORS:

- A. Epoxy bonding/grouting adhesive shall be a multi-purpose 2 component, 100% solids, moisture tolerant structural epoxy adhesive conforming to the current ASTM C881 specifications.
- B. Manufactured by:
 1. "MasterEmaco ADH 1420" as manufactured by Master Builders, Inc.
 2. "Sikadur 32, Hi Mod" by Sika Corporation
 3. "Resi-Bond (J-58)" by Dayton Superior
 4. Or approved equal.

PART 3 - EXECUTION

3.1 NON-SHRINKING GROUT:

- A. Non-shrinking grout shall be furnished factory premixed so that only water is added at the jobsite. Grout shall be mixed in a mechanical mixer. No more water shall be used than is necessary to produce a flowable grout.
- B. Preparation
 1. The concrete or masonry surfaces to receive nonshrinking grout shall be saturated with water for at least 12 hours preceding grouting unless additional time is required by the grout manufacturer. Remove all standing water or puddles prior to application of grout.
 2. Remove dust, laitance, grease, curing compounds, impregnations, waxes, foreign particles and disintegrated materials by mechanical abrasion methods such as sandblasting. Sandblast structural and reinforcing steel to remove loose material and expose sound metal.
 3. Construct appropriate sturdy forms to contain grout at the fluidity level at which it will be used.
- C. Placement
 1. Unless otherwise specified or indicated on the drawings, grout under base plates shall be $\frac{3}{4}$ -inches thick.
 2. Grout shall be placed in strict accordance with the directions of the manufacturer so that all spaces and cavities below the top of base plates and bedplates are completely filled, without voids.
 3. Forms shall be provided where structural components of base plates or bedplates will not confine the grout.

4. Place grout only from one side of base plates to avoid entrapping air. Provide adequate air vent holes in large base plates. Work or flow into place, filling all cavities.
5. Reinforce grout pads or applications three inches or more in thickness with wire mesh or reinforce bars.
6. Excessive means of vibration may cause segregation of aggregates and will not be permitted.

D. Edge Finishing

1. In all locations where the edge of the grout will be exposed to view, the grout shall be finished smooth after it has reached its initial set. Except where shown to be finished on a slope, the edges of grout shall be cut off flush at the base plates, bedplates, members, or pieces of equipment.

E. Curing

1. Nonshrinking grout shall be protected against rapid loss of moisture by covering with wet cloths or polyethylene sheets. After edge finishing is completed, the grout shall be wet cured for at least 3 days and then an acceptable membrane-curing compound shall be applied.

3.2 EPOXY GROUT:

A. Epoxy grout shall consist of a two-component liquid epoxy adhesive of viscosity appropriate to the location and application, and an inert aggregate filler component, if recommended by the adhesive manufacturer. Components shall be packaged separately at the factory and shall be mixed immediately before use. Proportioning and mixing of the components shall be done in accordance with the manufacturer’s recommendations.

B. Preparation

1. Where indicated on the drawings, anchor bolts, threaded rod anchors, and reinforcing bars shall be epoxy grouted in holes drilled into hardened concrete. Diameters of holes shall be as follows:

<u>Item</u>	<u>Diameter of Hole</u>
Reinforcing Bars and Threaded Rod Anchors	1/8 inch larger than the outside diameter of the bar of the rod
Headed Anchor Bolts	Bolt diameter plus 2 inches

2. The embedment depth for epoxy grouted anchor bolts, threaded rod anchors, and reinforcing bars shall be at least 15 bolt, rod, or bar diameters, unless otherwise indicated on the drawings.
3. Holes shall be prepared for grouting as recommended by the grout manufacturer.

C. Installation

1. Anchor bolts, threaded rod anchors, and reinforcing bars shall be clean, dry, and free of grease and other foreign matter when installed.

2. The bolts, rods, and bars shall be set and positioned and the epoxy grout shall be placed and finished in accordance with the recommendations of the grout manufacturer.
3. Care shall be taken to ensure that all spaces and cavities are filled with epoxy grout, without voids.
4. During assembly of all threaded stainless steel components, anti-seize thread lubricant shall be liberally applied to the threaded portion not embedded in concrete.

*******END OF SECTION*******

SECTION 04200
UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY:

- A. Building masonry shall be constructed of units of the types, dimensions, arrangements, and coursing indicated on the drawings and specified herein, complete with all materials, accessories, and appurtenances indicated, specified, or required.
- B. All block and mortar shall be supplied with an integral water repellent. Surface sealer (silane or siloxane penetrant repellent) shall be applied to all exterior masonry in accordance with this section.
- C. Non-grouted masonry cells shall be insulated in accordance with this section.
- D. Furnish and install complete single-wythe concrete masonry drainage system in accordance with the construction documents.

1.2 REFERENCES:

- A. Comply with applicable requirements of the following standards and those others referenced in this Section.
 - 1. American Concrete Institute (ACI): ACI 530.1 – Specifications for Masonry Structures.
 - 2. ASTM A 82 – Steel Wire, Plain, for Concrete Reinforcement.
 - 3. ASTM A 153 – Zinc Coating (Hot – Dip) on Iron and Steel Hardware.
 - 4. ASTM A 615 – Deformed and Plain Billet-Steel Bar for Concrete Reinforcement.
 - 5. ASTM C 90 – Load-Bearing Concrete Masonry Units.
 - 6. ASTM C 144 – Aggregate for Masonry Mortar.
 - 7. ASTM C 150 – Portland Cement.
 - 8. ASTM C 207 – Hydrated Lime for Masonry Purposes.
 - 9. ASTM C 270 – Mortar for Unit Masonry.
 - 10. ASTM C 387 – Packaged, Dry, Combined Materials, for Mortar and Concrete.
 - 11. ASTM C 1019 – Method of Sampling and Testing Grout.
 - 12. ASTM C 1072 – Method for Measurement of Masonry Flexural Bond Strength.
 - 13. ASTM E 119 – Fire Tests of Building Construction and Materials.
 - 14. ASTM E 447 – Compressive Strength of Masonry Prisms.
 - 15. ASTM E 488 – Strength of Anchors in Concrete and Masonry Elements.
 - 16. American National Standards Institute Building Code requirements.
 - 17. MCAA – Hot and Cold Weather Masonry Construction.

1.3 QUALITY CONTROL:

- A. Installer: Company specializing in performing the masonry work of this section with minimum of 10 years documented experience. Work shall be done by skilled workmen, fully instructed as to the requirements of this specification and adequately supervised during the work.
- B. Single-source responsibility for concrete masonry units: Obtain concrete masonry units for the project from a single manufacturer.
- C. Single-source responsibility for mortar materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.
- D. Refer to PART 3.00 of this specification for additional quality control requirements.

1.4 SUBMITTALS:

- A. Before masonry construction is begun, the following drawings, data, specimens, and samples shall be submitted in accordance with the submittals section. If the source of a material is changed during the course of the work, the tests and reports required for preliminary review of that material shall be resubmitted.
 - 1. Specimens of the masonry units which will be used in project construction, showing range of finishes and dimensions.
 - 2. One sample, at least 6 inches long, of each type of non-masonry joint material required.
 - 3. Manufacturer's data sheets for integral water repellent to be used in masonry units and mortar.
 - 4. Manufacturer's data sheets for penetrant repellent (surface sealer) to be used along the exterior of the masonry units. Provide documentation that indicates repellent are compatible with block and mortar containing an integral water repellent.
 - 5. Manufacturer's data sheets and samples of drainage pans and drainage mats for single wythe concrete masonry drainage system.
 - 6. Results of tests conducted on masonry units in accordance with ASTM C140.
 - 7. Types and proportions of the ingredients of grout and mortar mixtures.
 - 8. Shop drawings or manufacturers' literature showing details of anchors, ties, and metal accessories to be used in masonry construction.
 - 9. Manufacturer's literature and data for any admixture added to the block, grout, and/or mortar.
 - 10. Hot or cold weather construction procedures per ACI 530.1 requirements.
 - 11. Manufacturer's data sheets for block insulation inserts.
- B. The manufacturer of the masonry units shall submit a letter of certification at the time of, or prior to, delivery of the units to the jobsite to verify the units comply with the requirements of this section.

- C. The supplier of the grout shall submit a letter of certification at the time of, or prior to, delivery of the grout to the jobsite to verify the grout complies with the requirements of this section.
- D. The supplier of the mortar shall submit a letter of certification at the time of, or prior to, delivery of the mortar to the jobsite to verify the mortar complies with the requirements of this section.

1.5 DELIVERY, STORAGE AND HANDLING:

- A. All masonry units shall be handled in a manner which will prevent soiling, chipping, or damage of any kind. Broken, chipped, or otherwise damaged units will be rejected and shall be replaced with undamaged units.
- B. Masonry units shall be stored on pallets, shall be protected against contamination and staining, and shall be kept covered and dry at all times. Lime and cement shall be stored under cover in a dry place.
- C. Sand shall be stored so that the inclusion of foreign materials is prevented. Whenever sand is piled directly on the ground, the surface beneath the sand shall be smooth, well drained, and free from dust, mud, and debris. The bottom 6 inches of each pile shall not be used in mortar. Insulation shall be stored under cover in a dry place, and shall be protected from the weather at all times.
- D. Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or which show other evidence of damage, unless Engineer specifically authorizes correction thereof and usage on project.

1.6 COORDINATION:

- A. Coordinate work with that of other trades which require placement and building-in of as work progresses including, but not limited to: anchor bolts, wood blocking, hollow metal frames, louver units, and anchorage items.
- B. Examine all Drawings as to requirements for the accommodation of work of other trades. Provide all required recesses, chases, slots, and cutouts. Place anchors, bolts, sleeves and other items occurring in the masonry work. Take every precaution to minimize future cutting and patching. Closely coordinate the location and placement of such items.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS:

- A. Load bearing hollow and solid, normal weight concrete masonry units: Conform to ASTM C90, Type 1, normal weight, 2-core

1. Exterior walls: Split-faced units of nominal thickness indicated on the Drawings, nominal 8 by 16 inch face dimension sound, true to plane and line, and free from chips, cracks and other defects. Color to be selected by Engineer/Owner from manufacturer's standard color palette.
 2. Recycled content: Use maximum available percentage of recycled materials. Concrete masonry units incorporated into the work shall contain not less than 3 percent of recycled content.
- B. Aggregate: sand and gravel: conform to ASTM C 331.
- C. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2,800 psi.
- D. Moisture content for average of 3 units, when delivered, not exceeding 35 percent of the total absorption, when tested in accordance with ASTM C 140.
- E. Use open end high strength concrete masonry units and slot type strength concrete masonry units as required for reinforced masonry construction. Conform to all requirements for load-bearing units specified above.
- F. Integral Water Repellent: Provide units made with integral water repellent for all exterior walls.
1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514 as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen. Subject to compliance with requirements of the construction documents, provide one of the following:
 - a. "RainBloc"; ACM Chemistries.
 - b. "MasterPel 240"; BASF Aktiengesellschaft.
 - c. "Dry-Block"; Grace Construction Products.
 - d. Or approved equivalent.

2.2 MORTAR:

- A. Mortar: Site-mixed Portland cement mortar complying with ASTM C270 as specified herein.
- B. Mortar materials for site mixed mortar:
1. Portland cement for masonry conforming to ASTM C150, Type 1, non-staining, without air entrainment. Use type III as necessary for laying masonry in cold weather. For exterior walls, mortar color shall be selected by the Engineer/Owner from the manufacturer's standard color palette. For interior partitions, use gray color Portland cement.
 2. Aggregates for grout: Conforming to ASTM C 144 for fine aggregate and ASTM C 404, Size 8 or 89.

3. Aggregate for concrete masonry mortar: Clean, washed uniformly well graded sand conforming to ASTM C 144, with the following gradation, and having a fineness modulus between 2.15 and 2.35:

<u>Sieve Size</u>	<u>Percentage Passing</u>
#4	100%
#8	95 to 100%
#16	70 to 100%
#30	40 to 75%
#50	10 to 35%
#100	2 to 15%
#200	0 to 5%

4. Mortar pigments: Commercial alkali-resistant, non-fading mortar pigments, oxides of iron where feasible, synthetic type, equal to products of:

Davis Colors, Beltsville, MD.

Solomon Grind-Chem Service, Inc., Springfield, IL.

Landers Segal Color, Inc., Passaic New Jersey.

5. Lime: Approved brand plastic hydrated lime, conforming to ASTM C 207, Type "S".
6. Water: Clean and fresh without contaminants.
7. Water-Repellent Admixutre: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent by same manufacturer. Subject to compliance with requirements of the construction documents, provide one of the following:
- "RainBloc for Mortar"; ACM Chemistries
 - "Rheopel Mortar Admixture"; BASF Aktiengesellschaft.
 - "Dry-Block Mortar Admixture"; Grace Construction Products.
 - Or approved equivalent.

C. Mortar types:

- Mortar for masonry below grade or in contact with earth: ASTM C 270 type M using the property specification.
- Mortar for load bearing masonry: ASTM C270 type S using the property specifications.
- Mortar for non-load bearing masonry above grade: ASTM C 270 type N using the property specification.

2.3 GROUT MIXES:

- A. Prepackaged grout (ready mix) complying with ASTM C 1107, or site-mixed Portland cement grout complying with ASTM C 476 may be used.

1. "Five Star Grout"; Five Star Products, Inc.
2. "Crystex"; L&M Construction Chemicals Inc.
3. "Symons Multi-Purpose Grout"; Symons Corporation, Des Plaines, IL.

- B. Grout for bond beams and lintels: Fine grout having a comprehensive strength of 2,500 pounds per square inch at 28 days; slump 8 to 10 inches.

2.4 REINFORCEMENT AND ANCHORAGE MATERIALS:

- A. Single wythe longitudinal reinforcement for concrete masonry unit walls in overall width 1-5/8 inches less than the overall wall thickness, as manufactured by Dur-O-Wal, Hohmann, AA Wire, or equal. Size, type, and coating as indicated on the drawings.
- B. Reinforcing steel, additional to rods which are embedded in concrete: Solid steel reinforcing bars, conforming to ASTM A 615, Grade 60, of sizes indicated on the Drawings.

2.5 SINGLE WYTHE CONCRETE MASONRY DRAINAGE SYSTEM:

- A. Provide CMU cell flashing pans, drainage mats, and bug guards as indicated on the Drawings. Flashing pans shall be made from recycled polypropylene with chemical stabilizers that prevent UV degradation. Pans shall be sloped to direct moisture to weep spout. Drainage mat shall be an open weave polyester mesh installed in each CMU cell above the pan.
- B. Single Wythe Concrete Masonry Drainage System Basis-of-Design Product: "BLOCKFLASH" manufactured by Mortar Net Solutions, Burns Harbor, IN. Subject to compliance with the Drawings and these specifications, comparable products may be incorporated into the Work with prior written approval by the Engineer.

2.6 ACCESSORIES:

- A. Compressible filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self-expanding, continuous in length, and in width to fill the joint to a point 3/4 inch back from each face of wall or partition.
- B. Compressible filler for joints at tops of non-load bearing masonry partitions, and for expansion joints in masonry walls: Closed cell Neoprene or PVC foam board, soft grade, 25 percent thicker than joint width, continuous in length, and in width to fill the joint to a point 3/4 inch back from each face of wall or partition.
- C. Premolded control joints for concrete masonry construction: Solid rubber of profile as indicated (to maintain lateral stability of wall), 60-80 shore A hardness.

- D. Cleaning solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.7 MIXING MORTARS AND GROUT:

- A. General: Mix mortar and grout in accordance with the requirements of ASTM C270, ASTM C 94, and ASTM C 476 as applicable.
 - 1. Control batching procedure to ensure proper proportions by measuring materials by volume, Amount of mixing water and mortar consistency shall be controlled by mason.
 - 2. Control batch sizes to allow for use within manufacturer's recommended pot life.
 - 3. Retempering will be permitted only within the first two hours of initial mix or shorter times as directed by manufacturers.
 - 4. Discard all mortar and grout which exceeds the time limits allowed by the manufacturer. Discard mortar that has partially set.
- B. Maintain sand; uniformly damp immediately before mixing process.
- C. Add mortar color and admixtures in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.
- D. Do not use anti-freeze compounds to lower the freezing point of mortar or grout.
- E. Pouring grout shall be fluid consistency (as fluid as possible for pouring without separation of constituent parts).

PART 3 - EXECUTION

1.1 MORTAR JOINTS:

- A. Masonry shall be laid in straight, level, uniform courses, with mortar joints of uniform width. Head joints shall approximately equal the horizontal joints in width.
- B. In laying up concrete block masonry, abutting surfaces of head joints shall be completely and solidly cemented together with mortar. All solid masonry units and hollow units with horizontal cells shall be laid on a full bed of mortar. All unfilled hollow masonry units with vertical cells shall be laid with face shell mortar bedding, except that starter courses shall be laid on a full bed of mortar. Web joints of all cores which will be subsequently filled with grout fill shall be fully mortared.
- C. The filling of masonry joints shall mean that the entire space between abutting surfaces of units is full, and that the body of the mortar is forced against and into the porous surface of each unit.
- D. All exterior and exposed interior mortar joints, except joints which are to be raked, shall be tooled to a smooth uniform surface and shall be finished free of voids using a rounded tool. Mortar joints specified to be caulked shall be raked to a depth of 1/2 inch. Tooling of joints shall be regulated so that the mortar for each wall space has a uniform appearance.

- E. Cement shall be wiped from block edges and the joints shall be saturated with clean water. Joints shall be filled solidly with pointing mortar, using a rubber-faced trowel to spread the mortar and to remove the excess. After all joints are filled flush with the face of the block, excess mortar shall be wiped from the surface with a clean, flat sponge. Joints shall be tooled while the mortar is still workable, using a rounded tool at least 1 inch in diameter. The tooled joints shall be nearly flat, only slightly concave.

3.2 BONDING AND REINFORCING:

- A. All concrete block shall be laid in running bond. All masonry shall be reinforced and anchored as indicated on the drawings and as specified herein.
- B. Unless otherwise specified, all concrete block masonry shall be bonded and reinforced with continuous ladder type joint reinforcement spaced not more than 16 inches apart vertically. The joint reinforcement shall have one longitudinal rod at each face shell of the masonry units.
- C. Except where bond beams are indicated on the drawings, the top three courses of all masonry walls shall have continuous joint reinforcement placed in each joint (8 inches on centers). Joint reinforcement shall be terminated at expansion joints and control joints. Openings in masonry walls shall have the lintel reinforcement extend at least 12 inches beyond each side of the opening. Install continuous joint reinforcement in the mortar joint below the sill. Joint reinforcement shall be continuous between control joints.
- D. The width of joint reinforcement (side rod to side rod) in each case shall be approximately 2 inches less than the nominal overall thickness of the wall in which it is placed. All joint reinforcement shall be fully embedded in mortar and shall be covered with at least 5/8 inch of mortar on the exterior face.
- E. The ends of sections of joint reinforcement shall be lapped at least 8 inches. Joint reinforcement shall be lapped full width at corners and intersections, or prefabricated corners and tees shall be used.
- F. Concrete block bond beam units shall be provided, installed, and reinforced with reinforcing steel where required and as indicated on the drawings. Bond beam units shall be filled with grout fill as specified herein. Reinforcing steel shall be continuous around corners, and all laps shall have a minimum length of 48 bar diameters. At expansion joints, all bond beam reinforcing shall be discontinuous. At control joints, 50 percent of the bond beam reinforcing shall be discontinuous.
- G. Vertically reinforced concrete block cores shall be provided as indicated on the drawings. Reinforcing shall be accurately placed and securely tied to prevent shifting during core filling. All lap splices shall have a minimum length of 48 bar diameters. Mortar fins which project into cores more than 1/2 inch and all loose mortar and debris shall be removed before filling the cores. Cores shall be filled with grout fill as specified herein.

3.3 GROUT FILL:

- A. Unless otherwise acceptable to the Engineer, grout fill shall be placed in lifts not to exceed 5 feet. Pours exceeding 12 inches in height shall be consolidated by mechanical vibration and reconsolidated after initial water loss and settlement. Bond beam fill shall not be mechanically vibrated. Grout fill shall be placed in reinforced block cores, bond beams, lintels, and in other locations indicated on the drawings. All concrete masonry shall be completely filled with grout.

3.4 LAYING MASONRY UNITS:

- A. All masonry units shall be free from dust, dirt, and surface moisture when laid. Concrete blocks shall be dry when laid.
- B. All masonry shall be laid to a line. Walls shall be plumb and straight and in level courses. At no time shall any part of masonry construction project more than 8 feet above adjacent work. When work is suspended, the tops of exterior masonry walls shall be covered and protected from the weather.
- C. Only whole, undamaged units shall be used in corners and at jambs, to maintain uniformity of appearance.
- D. Masonry units laid in running bond in exposed locations shall be so constructed that vertical joints in alternate courses lie in the same vertical lines, midway between the vertical joints in adjacent courses.
- E. Masonry units shall be saw-cut to provide openings and to accommodate embedded items. Anchors shall be securely embedded in mortar. Door and window frames shall be maintained plumb and true. Masonry shall be built tightly against interior doorframes. A caulking space shall be provided between exterior doorframes and masonry in accordance with the details indicated on the drawings. The jambs of built-in hollow metal doorframes shall be completely filled with grout fill or mortar.
- F. Lintels shall be provided over all openings wider than the length of a masonry unit. Lintels shall be of the types and sizes indicated on the drawings or as required, and shall be acceptable to the Engineer. Lintels longer than 3 feet shall bear on solid masonry units or on grout-filled cells of hollow units at least one masonry course in height, unless otherwise indicated on the drawings.
- G. All embedded items shall be set and securely anchored in the masonry work as indicated on the drawings or as acceptable to the Engineer. Joints between masonry and embedded items shall be pointed.
- H. Masonry units shall be selected and laid so that the exposed face of each unit is free of broken corners, chipped edges, or other defects which would be detrimental to the appearance of the wall surface.

3.5 CONTROL JOINTS:

- A. Control joints in masonry walls and in masonry walls abutting concrete wall surfaces shall be constructed as indicated on the drawings. Joint material shall be at least 4 inches wide and shall have a thickness equal to at least 1-1/2 times the nominal width of the joint. The joint material shall be firmly bonded to one joint face by the adhesive backing, held back 1/2 inch for caulking, and placed under compression by the abutting masonry. All joints in filler strips shall be tightly butted.
- B. Control joints shall be placed at locations shown on the drawings.

3.6 ANCHORS AND INSERTS:

- A. All necessary ties, anchors, bolts, inserts, bucks, flashings, sleeves for piping, conduits of every kind, window and door frames, and other work shall be accurately set and securely held in the masonry work as indicated on the drawings or in a manner acceptable to the Engineer. Sleeves shall be provided where small piping passes through the masonry.

3.7 MASONRY-CELL INSULATION:

- A. Install molded-polystyrene insulation units into non-grouted masonry unit cells in accordance with manufacturer's specifications and before laying units.

3.8 INSTALLATION OF SINGLE WYTHE DRAINAGE SYSTEM:

- A. Lay solid-grouted bottom CMU course on concrete foundation wall as indicated on the Drawings.
- B. Install pans by placing two units on each block. The drip edge (weep spout) on the pan should extend slightly beyond the face of the CMU, a molded reference lip on the bottom of the pan should rest against the edge of the block.
- C. Span the continuous row of pans with attached web spacers/bridge units designed to divert water to the adjoining pans.
- D. Eliminate the pan and bridge at the grouted cells. Remove bridge and cross-bed the webs adjacent to the core to be grouted making sure to overlap the flange to prevent grout from spreading beyond the intended core.
- E. Utilize standard mortar spreading techniques with mortar lapped, first over the inner and second over the outer flanges of the pan units to stabilize the units during installation and help divert moisture into the pan.

- F. Reduce clogging from mortar and grout droppings by installing polyester mesh drainage mats into the core cavity above the pans to suspend mortar droppings in the core and allow moisture to flow down the inside face of the block and into the pan.
- G. Tool all head and bed joints and remove any obstruction from the weep spouts.

3.9 LOW TEMPERATURES:

- A. When the temperature of the surrounding air is below 40°F, or when the outdoor temperature is likely to fall below freezing at any time during the 24 hour day, the following precautions shall be taken to prevent freshly laid masonry from freezing:
 - 1. In addition to the protection specified for ordinary conditions, masonry materials shall also be kept from contact with snow, ice, or dampness of any kind.
 - 2. The temperature of the mixed mortar shall be between 70 and 120°F. Mixing water shall be warm, but not above 165°F. If necessary, sand shall be heated also. Mortar mixing equipment shall be heated before it is used. The use of salt or calcium chloride is not acceptable.
 - 3. Masonry units shall be free of ice and snow and shall be above freezing when laid. If the outdoor temperature is below 30°F, units shall be heated to at least 40°F. If the temperature is below 0°F, units shall be heated to at least 60°F. Heating shall be done so that the units are not damaged.
 - 4. Masonry units shall not be laid on surfaces that are frozen or covered with snow or ice.
 - 5. Masonry laid during freezing weather shall be kept warm for at least 3 days after laying. The air temperature at the masonry surface shall be kept between 45 and 90°F, using heating methods that will not unduly dry out or otherwise damage the masonry. Heat shall be applied to both sides of the wall, with provisions for proper circulation of air. The masonry shall be suitably housed or covered.

3.10 HIGH TEMPERATURES:

- A. When the ambient air temperature exceeds 99°F in the shade and the relative humidity is less than 50 percent, masonry shall be protected from direct exposure to wind and sun during and for 48 hours after erection.

3.11 FINISH POINTING:

- A. On completion of the work, all exposed masonry shall be pointed where necessary and all voids and holes in the mortar shall be filled to match adjacent joint surfaces. Defective joints shall be cut out and repointed with mortar. Care shall be taken to produce a uniform overall appearance. Spottiness due to variations in either materials or workmanship will not be acceptable.

3.12 PROTECTION FROM DAMAGE:

- A. Masonry and all embedded or built-in items shall be carefully protected from damage. Masonry walls discolored by paint, mortar, or concrete shall be rebuilt with new materials.
- B. Where concrete is placed adjacent to previously constructed masonry, the masonry shall be adequately protected against splashing of concrete paste and from other damage.
- C. Where concrete is placed on top of previously constructed masonry, the masonry shall be protected from splashing and spilling of concrete and penetration of water with polyethylene film or Sisalkraft paper placed on top of the masonry and extended down each side of the wall as required. The protective covering shall be neatly trimmed away at face of the wall after form removal.

3.13 CLEANING:

- A. Following finish pointing, all exposed masonry surfaces shall be cleaned to remove all surface stains and smears.
- B. Mortar smears or droppings on concrete blocks shall be removed with a steel trowel after they have hardened to the extent that removal will not cause additional smearing. Any remaining mortar shall be removed to the extent possible by rubbing with a small piece of block. All surfaces shall then be thoroughly brushed.

3.14 POST-APPLIED PENETRANT REPELLENT (SURFACE SEALER):

- A. Penetrant repellent shall be applied to clean, dry walls. Clean wall surfaces prior to application of the repellent in accordance with manufacturer's recommendations. In general, the wall should be allowed to dry for 3 to 5 days between cleaning or rain and application of the repellent. All cracks and large voids should be repaired prior to applying the repellent. If caulk is used in the repair, the caulk should be compatible with the surface treatment repellent and fully cured before treatment application.
- B. Penetrant repellent shall be applied in accordance with manufacturer's recommendations. Apply repellent to a test area (inconspicuous area) to determine acceptability of appearance to Owner and Engineer. Once accepted, repellent shall be applied to remainder of exterior walls.

3.15 SOURCE AND FIELD QUALITY CONTROL:

- A. Material source and field inspection shall be performed under the provisions of Section 01400 – Quality Control.
- B. Testing frequency: Material source (source quality control) tests shall be required for each different material indicated or proposed for use at the site. Field Quality Control tests and

evaluations listed in this article shall be performed during construction for each 500 square feet of wall area or portion thereof.

- C. Concrete Masonry Unit Tests: For each different concrete masonry unit indicated, units shall be tested for: strength, absorption, and moisture content per ASTM C140.
- D. Mortar properties shall be tested per property specification of ASTM C 270.
- E. Mortar composition and properties shall be evaluated per ASTM C 780.
- F. Grout compressive strength shall be sampled and tested per ASTM C 1019.
 - 1. Prior to grouting, request inspection of all voids to be grouted.
- G. Reinforcement installation and placement shall be verified for conformance with the construction documents.
- H. Evaluation of Quality Control tests: In absence of other indications of noncompliance with requirements, masonry will be considered satisfactory if results from construction quality control tests comply with minimum requirements indicated.

3.16 TOLERANCES:

- A. Maximum variation from true surface level for exposed to view walls and partitions:
 - 3.2 Unit-to-unit tolerance: 1/16 inch.
 - 3.3 Surface, overall tolerance: 1/4 inch in 10 feet in any direction and 1/2 inch in 20 feet or more.
- B. Maximum variation from plumb: For lines and surfaces of walls do not exceed 1/4 inch in 10 feet, 3/8 inch in any story up to 20 feet maximum. At expansion joints and other conspicuous lines, do not exceed 1/4 inch in 20 feet.
- C. Maximum variation from level: For lines of sills, tops of walls and other conspicuous lines, do not exceed 1/8 inch in 3 feet, or 1/4 inch in 10 feet and 1/2 inch in 30 feet.
- D. Maximum variation of linear building line: For position shown in plan relating to columns, walls and partitions, do not exceed 1/2 inch in 20 feet or 3/4 inch in 40 feet.
- E. Maximum variation in specified height: 1/2 inch per story.
- F. Maximum variation of joint thickness: 1/8 inch in 3 feet.

*****END OF SECTION*****

SECTION 05120
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS:

- A. All of the Contract Documents, including General and Supplementary Conditions apply to the Work of this Section.

1.2 SCOPE:

- A. Provide structural steel and related appurtenances as indicated and specified. The term "Structural Steel" is used as defined in accordance with the AISC Code of Standard Practice. For steel decking systems, refer to the steel decking specification.

1.3 REFERENCES:

- A. American Institute of Steel Construction AISC:
1. Specification for Structural Steel Buildings
 2. AISC Manual of Steel Construction, Allowable Stress Design
 3. AISC Code of Standard Practice for Steel Buildings and Bridges
 4. AISC Specification for Structural Joints using ASTM A 325 or A 490 Bolts approved by the Research Council on Structural Connections.
 5. AISC Structural Steel Detailing Manual
- B. American Welding Society AWS.
1. AWS D1.1: Structural Welding Code - Steel
- C. Steel Structures Painting Council (SSPC) Surface Preparation Specifications
- D. American Society for Testing and Materials (ASTM) Publications:
1. A 6/A 6M: Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
 2. A 36/A36M: Specification for Carbon Structural Steel.
 3. A 194/A 194M: Specification for Carbon and Alloy-Steel Nuts for Bolts for High-Pressure and High-Temperature Service
 4. A 307: Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
 5. A 325: Specification for Structural Bolts, Steel Heat Treated, 120/105 ksi Minimum Tensile Strength
 6. A 449: Specification for Quenched and Tempered Steel Bolts and Studs
 7. A 563: Specification for Carbon and Alloy Steel Nuts
 8. F 436: Specification for Hardened Steel Washers

1.4 DESIGN REQUIREMENTS:

- A. Structural Performance: Engineer structural steel connections required by the Contract Documents to be selected or completed by the fabricator to withstand design loadings indicated.

Engineering Responsibility: Engage a fabricator who utilizes a qualified professional engineer registered in the State of Rhode Island to prepare calculations, Shop Drawings, and other structural data for structural steel connections.

1.5 SUBMITTALS:

- A. Submit the following shop drawings:
1. Manufacturer's Literature: Provide manufacturer's literature describing standard items.
 2. Shop drawings prepared under the supervision of a licensed Structural Engineer registered in Rhode Island, showing materials, sizes, finishes, locations, attached hardware and fittings, designs of connections not specifically shown on the drawings, and details for manufactured items and fabricated metalwork, including field erection details showing cuts, copes, connections, holes, thread fasteners and welds. Indicate welds, both shop and field, by symbols conforming to AWS standards. Indicate coatings or other protection against corrosion.
 3. Setting diagrams, erection plans, templates, and directions for installation of backing plates, anchors, and other similar items.
 4. Material compliance certification with standards designated.
 5. Samples of materials proposed for use.
 6. Test reports conducted on shop and field bolted and welded connections. Include data on type(s) of tests conducted and test results.
 7. Certified copy of each survey conducted by a licensed Land Surveyor showing elevations and locations of base plates and anchor bolts to receive structural steel and final elevations and locations of major structural elements. Indicate discrepancies between actual installation and contract drawings.
 8. Mill Certificates: Provide certificates signed by manufacturers certifying compliance of materials with standards designated.
 9. Welding Certificates: Submit copies of certificates for welding personnel and procedure for each type of weld prior to welding.
 10. The Contractor shall maintain records of test results of welding procedures and records of welders employed, date of qualification, and identification symbol or mark. Such records shall be available for examination by the Structural Engineer of Record and testing agency or submit certified copies.

1.6 QUALITY ASSURANCE:

- A. Tolerances:
1. Maintain tolerances conforming to AISC Code of Standard Practice.
 2. Permissible variation tolerances conforming to ASTM A 6.
- B. Tension Calibrator:
1. Employ an independent testing laboratory to calibrate and confirm the accuracy of the tension-measuring device when slip-critical connections and connections subject to direct tension are being used.

2. The calibrating device for setting calibrated torque wrenches shall be checked for accuracy by quality personnel not more than 30 days prior to its first use on the project, and at intervals not more than six months thereafter.
3. If the Engineer has reason to question the accuracy of the calibrating device, he may require that it be returned to the manufacturer for certification of its accuracy.
4. Provide tension calibrator measuring device at the job site when high-strength bolts in slip-critical connections and connections subject to direct tension are being installed and tightened.
5. Frequency and number of confirmation tests to be performed and the test procedure to be employed to conform to the AISC Specification for Structural Joints.
6. Return tension calibrator measuring device to the independent laboratory for certification if the Engineer questions its accuracy.
7. Use the tension calibrator-measuring device to tighten high-strength bolts in slip-critical connections and connections subject to direct tension in conformance with Table 051200-1 (Section 8(d). AISC Specification for Structural Joints using ASTM A325 or A490 bolts).

Table 051200-1.
Fastener Tension Required for Slip-Critical Connections and Connections
Subject to Direct Tension

Nominal Bolt Size (inches)	Minimum Tension	
	A 325 Bolts (kips)	A 490 Bolts (kips)
½	12	15
5/8	19	24
¾	28	35
7/8	39	49
1	51	64
1 1/8	56	80
1 ¼	71	102
1 3/8	85	121
1 ½	103	148

C. Fabricator Qualifications:

1. Engage a firm experienced in fabricating structural steel similar to that indicated for this project and with a record of successful in-service performance, as well as, sufficient production capacity to fabricate structural steel without delaying the work.
2. Fabricator must participate in the AISC Quality Certification Program and be designated an AISC-Certified Plant as follows:
 - a. Category: Standard for Steel Building Structures (STD).
 - b. Fabricator shall be registered with and approved by authorities having jurisdiction.

D. Welding Qualification and Certification

1. Furnish written welding procedure for all welds in conformance with AWS Structural Welding Code.
2. Each welder, tacker and welding operator shall be certified by test within the past six months to perform type of work required in conformance with AWS Structural Welding Code. Testing shall be conducted and witnessed by an independent testing laboratory.
3. Maintain duplicate qualification and certifications records at the job site readily available for examination.

E. Test and Inspection

1. Inspection, Testing and Quality Control: A statement of special inspections will be established by the registered design professional in responsible charge who will prepare a schedule of tests to be carried out by an independent testing agency. All costs for inspection and testing shall be borne by the Owner.
2. The materials and workmanship to be finished under this Section shall be subject to inspection and testing in the mill, shop, and field by the Registered design professional in responsible charge and/or Testing Agency. Such inspection and testing shall not relieve the contractor of his responsibility to perform his own inspection and quality control and to furnish materials and workmanship in accordance with the requirements of the contract documents.
3. The Contractor and Testing Agency shall examine the contract documents and become thoroughly acquainted with detailed inspection and testing requirements as outlined by the Registered design professional in responsible charge.
4. The Contractor shall cooperate with and facilitate inspection and testing by the Registered design professional in responsible charge and/or Testing Agency. The Contractor shall, at his own expense, furnish the registered design professional in responsible charge and/or the Testing Agency upon request, with the following:
 - a. A complete set of reviewed erection drawings, detailed shop drawings, schedules, and corrective work procedures at the fabricating shop or shops in the field.
 - b. Cutting list, order lists, material bills, and shipping lists.
 - c. Information as to time and place of all rollings and shipment of material to shops.
 - d. Representative sample pieces requested for testing.
 - e. Assistance for testing materials and proper facilities for inspection of the work, in the mill, shop, and field.
5. The Testing Agency shall inspect and test, as required by the registered design professional in responsible charge, all welded and bolted work.
 - a. Shop-Bolted Connections: Inspect or test in accordance with AISC Specifications.
 - b. Shop Welding: Inspect and test during fabrication of structural steel assembled, as follows:
 - 1) Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 - 2) Perform visual inspections of all welds.
 - 3) perform test welds as follows. Inspection procedures listed are to be used at Contractor's option.

- a) Liquid Penetrate Inspection: ASTM E 165
 - b) Magnetic particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not acceptable.
 - c) Radiographic Inspection: ASTM E94 and ASTM E 142; minimum qualify level "2-2T."
 - d) Ultrasonic Inspection ASTM E 164.
6. Weldments and bolted connections that are required by the registered design professional in responsible charge and/or the Testing Agency to be corrected shall be corrected without delay at the Contractor's expense and to the satisfaction of the registered design professional in responsible charge of the Testing Agency shall require drawings showing proposed corrective work to be submitted for review.
 7. Any material or workmanship which is rejected by the registered design professional in responsible charge and/or the Testing Agency either in the mill, shop, or field shall be replaced promptly by the Contractor to the satisfaction of the registered design professional in responsible charge and/or the Testing Agency.
 8. The fact that steel work has been accepted at the shop shall not prevent its final rejection at the job site, even after it has been erected, if found to be defective in any way.

1.7 DELIVERY, STORAGE AND HANDLING:

- A. Provide in accordance with the general equipment stipulations section and as specified herein.
- B. The General Contractor, Sub-Contractors, and suppliers are all individually to furnish their own staging, scaffolding, and hoisting equipment necessary to get workers, materials, and equipment from the point of delivery at the project site to the point of use or installation within the building and project site. All crane and rigging services are the responsibility of each individual trade.
- C. Identify and match-mark, materials, items and fabrications, for installation and field assembly.
- D. Deliver items to job site as complete units, wherever practicable, ready for installation or erection, with anchors, hangers, fasteners and miscellaneous metal items required for installation. Items shall be delivered at such intervals to ensure uninterrupted progress of work.
- E. Carefully handle and store materials, protected from weather, high heat, rusting corrosion and other damage.
- F. Store material off the ground by using pallets, platforms, or other useable supports with webs of flanged shapes vertical. Materials shall be stored to allow easy access for inspection and identification. Cover and protect steel from erosion and deterioration from snow, rain, and ground splatter.
- G. Ship small parts, such as rivets, bolts, nuts, washers, pins, fillers, and small connecting plates and anchors, in boxes crates, or barrels. Pack separately each length and diameter of bolt and each size of nut and washer. Plainly mark and itemized list and description of the contents on the

outside of each container. If bolts and nuts become dry and rusty, clean and relubricate before use.

PART 2 - PRODUCTS

2.1 STRUCTURAL STEEL:

- A. Structural Steel Shapes:
 - 1. High-Strength, Low-Alloy Steel: ASTM A 992 (ASTM A992M), Grade 50.
- B. Miscellaneous Plates and Bars:
 - 1. Carbon Steel: ASTM A 36 (ASTM A36M).
- C. Cold-Formed Steel Tubing: ASTM A500, Grade B.
 - 1. Items to be galvanized shall be hot-dip galvanized after fabrication in accordance with ASTM A123 or ASTM A153 as applicable.

2.2 FASTENERS:

- A. Carbon Steel Bolts, Nuts and Washers: ASTM A 307, Grade A.
- B. High-Strength Carbon Steel Bolts, Nuts and Washers: ASTM A 325, Type 1.
- C. Hot-Dipped Galvanized Bolts, Nuts, and Washers in conformance with ASTM A 153 and A 385.
 - 1. High-strength carbon steel bolts, Type 1.
 - 2. Grade DH, ASTM A 563 or Grade 2H, ASTM A 194 nuts.
 - 3. Hardened washers in conformance with ASTM F 436.
 - 4. Bees wax lubrication for threaded parts of bolts and nuts.
 - 5. Purchase bolts, nuts and washers from a single supplier.
- D. Do not use high-strength tension control bolts when bolts are galvanized.

2.3 WELDING:

- A. Class E70XX electrodes.
- B. Provide equipment for welding, electrodes, welding wire and fluxes capable of producing indicated welds when used by certified welders under AWS welding procedures. Provide welding materials that comply with requirements of AWS Structural Welding Code.

2.4 PRIMERS:

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another. GC shall submit certification demonstrating compatibility.
- B. Primer: Comply with Division 9 painting Sections. Apply in accordance with manufacturer's written instructions and recommendations.

2.5 GALVANIZING REPAIR PAINT:

- A. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.

PART 3 - EXECUTION**3.1 FABRICATION:**

- A. Fabricate each element and connection as indicated on the fabrication shop drawings approved by the Engineer. Fabricate and shop assemble work to the greatest extent practical in conformance with the following publications:
 - 1. AISC Manual
 - 2. AISC Specification for Structural Joints
 - 3. AISC Detailing Manual
 - 4. AWS Structural Welding Code
- B. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.
- C. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings burrs, and other defects.
- D. Insure that shearing, manual flame cutting with mechanically guided torch and chipping will not induce residual stress in metal being cut the Radii of re-entrant corners shall not be less than $\frac{3}{4}$ inch and perform flame cutting so that metal being cut is not carrying stress. Finish exposed edges.
- E. Fabricate bearing stiffeners and stiffeners intended as supports for concentrated loads as indicated. Mill or grind bearing surfaces at stiffener ends.
- F. Insure full cross section bearing on milled ends of columns, crane rails, monorails and bearing stiffeners.
- G. Connections: Weld or bolt shop connections, as indicated. Bolt field connections, except where welded connections or other connections are indicated.
 - 1. Provide high strength threaded fasteners for principal bolted connections, except where unfinished bolts are indicated.
 - 2. Provide unfinished threaded fasteners for only bolted connections of secondary framing members to primary members (including purlins, girts, and other framing members taking only nominal stresses) and for temporary bracing to facilitate erection.
- H. Connect all members with ASTM A 325 high strength bolts unless otherwise indicated or specified. Install in accordance with AISC "Specifications for structural Joints using ASTM A325 or ASTM A490 Bolts". Provide holes without torn or ragged edges and remove all outside burrs.
- I. Welded Connections:
 - 1. Connections indicated or specified shall be welded in accordance with AWS D1.1.

2. Provide complete weather seal weldments made with 1/16-inch minimum continuous fillets to all members having Type S and E service and to all welded connections that will be galvanized.
- J. Weld or bolt shop connections in conformance with specified AWS Structural Welding Code and AISC publications.
- K. Provide ASTM A 36 anchor bolts with washer and heavy hex nuts. Provide hot-dip galvanized anchor bolts, washers and heavy hex nuts with galvanized steel.
- L. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final shop drawings.
- M. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work.
- N. Cut, drill or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes for bearing plates.
- O. Corrective Work: Structural steel members or assemblages having fabrication errors, which exceed permissible tolerances, shall be corrected only if permitted by the SER. All corrective work shall be in accordance with AISC and AWS requirements. When requested by the SER or Testing Agency, the Contractor shall submit to the Architect and/or SER for approval, drawings showing details of proposed corrective work and shall receive approved drawing prior to performing the corrective work. All corrective work shall be solely at the Contractor's expense.

3.2 ERECTION:

- A. Survey: GC shall employ a licensed Land Surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceed. Report any discrepancies to the Architect and do not proceed with erection until corrections have been made or until adjustments to the structural steel work has been agreed upon the Architect.
- B. Prior to setting column bases and bearing plates, clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates. Align column bases and bearing plates for beams and similar structural members with steel wedges or shims. Tighten anchor bolts after alignment and positioning members and fill entire area under bearing plates with non-shrink, non-metallic grout in accordance with grout section. Do not remove steel wedges or shims but if protruding, cut off flush with edge of base or bearing plate prior to grounding voids solids.
- C. Provide anchor bolts and anchors with templates for correct placement into concrete, masonry or other supporting materials.
- D. Hold steelwork securely in place with temporary bracing and stays to resist all vertical and lateral loads, until members are permanently fastened and floors and roofs completed. Provide

temporary guy lines to achieve proper alignment of structures as erection proceeds. Provide temporary planking or working platforms as necessary to effectively complete the work.

- E. Use only calibrated wrenches for tensioning high-strength bolts for slip-critical joints and connections subjected to direct tension.
- F. Inspect and torque test field-assembled bolted construction in conformance with AISC Specification for Structural Joints.
- G. High-strength tension control bolting may be substituted for calibrated wrench bolting of slip-critical joints and connections subject to direct tension. Do not use high-strength tension control bolts when bolts are galvanized.
- H. Set structural frames accurately to lines and elevations indicated. Align and adjust members forming parts of a complete assembly before permanent fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
- I. Fasten splices (only where indicated and accepted on shop drawings) of compression members and members having milled ends after the abutting surfaces have been brought completely into contact.
- J. Report errors in shop fabrication or deformation resulting from handling or transpiration immediately to Engineer. Replace and remove from job site incorrect fabricated or deformed material at no additional cost to the Owner.
- K. Perform temporary bracing and bolting of work to support construction live load and combined dead, wind, earthquake and erection loads as erection progresses. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds. Leave bracing in place as long as necessary to provide safety.
- L. Insure that holes are not enlarged and that metal in vicinity of holes is not damaged by drift pins during assembly.
- M. Enlarge holes to admit bolts for connections only if approved in writing by the Engineer. Make enlargements only by drilling, avoid burning or hand reaming. Refinish enlarged holes with paint to match the shop coat. Use specific galvanize touch-up for galvanized members.
- N. Flame cut bolt holes are not permitted.
- O. Where erection bolts are abandoned in place, remove bolts, completely plug weld holes, grind smooth with adjacent surfaces and paint to match shop coat.

3.3 HIGH STRENGTH BOLTING:

- A. Provide workmanship and techniques for bolted construction in conformance with requirements of AISC Specification for Structural Joints and as indicated or specified.

- B. Install ASTM A 325 bolts with hardened washer under element being turned in tightening. Install plate washers in both outer plies when using oversize and slotted holes. Install galvanized washer under bolt head and nut when using galvanized bolts.
- C. Do not reuse high-strength bolts, nuts and washers.

3.4 WELDING:

- A. Provide workmanship and techniques for welded construction to conform to requirements of AWS Structural Welding Code and as indicated or specified.
- B. No field welding permitted unless indicated on Engineer approved fabrication shop drawings.
- C. No field welding permitted on galvanized steel.

3.5 REPAIRS AND PROTECTION:

- A. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- B. Touchup Painting: Cleaning and touchup painting are specified in Division 09 painting Sections. Use specific galvanize touch-up for galvanized members.

*****END OF SECTION*****

SECTION 06100
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 GENERAL PROVISIONS:

- A. All of the Contract Documents, including General and Supplementary Conditions apply to the Work of this Section.

1.2 SCOPE:

- A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:
1. Framing with dimensional lumber or timber.
 2. Framing with engineered wood products.
 3. Wood nailers and blocking.
 4. Rough hardware and fasteners.
 5. Roof Trusses: Refer to the structural drawings for wood truss requirements.

1.3 REFERENCES:

- A. Comply with applicable requirements of the following standards and those others referenced in this Section. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
1. EWA – applicable grades and specifications.
 2. EWA PRB-108 Performance Standards and Policies for Structural-Use Panels.
 3. AWPA Standards and references for preservative treated wood including Standards C1, C9, C15, and P5.
 4. AWPA M4 – Care of Preservative Treated Wood Products.
 5. ICBO ER-2981: ACQ Preserve Wood Preservative Treatment, ICBO Evaluation Service.
 6. NeLMA: Northeastern Lumber Manufacturer's Association.
 7. SDI 122 – Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
 8. SPIB Grading Rules, current edition.
 9. UL – Building Materials Directory.
 10. 10. U.S. Department of Commerce Voluntary Product Standard PS-1 for Construction and Industrial.
 11. U.S. Department of Commerce Voluntary Product Standard PS-2 for Wood-Based Structural-Use Panels.
 12. U.S. Department of Commerce Voluntary Product Standard PS-20 – American Softwood Lumber Standard.
 13. U.S. Department of Commerce Simplified Practice Recommendation R-16, for sizes and use classifications of lumber.

14. American Lumber Standards Committee, National Lumber Grades Authority for Canadian Lumber, and applicable grading rules and standards of the various lumber associations whose species are being used for grades specified.

1.4 QUALITY CONTROL:

- A. All lumber used for structural framing shall:
 1. Be new, dressed four sides (S4S), clear and free from warping and other defects.
 2. Have a moisture content not exceeding 19 percent when delivered to the project.
 3. Be in accordance with the grading rules of the lumber manufacturer's association under whose jurisdiction the lumber is produced and bear the mark of grade and mill identification.
 4. All plywood panels (sheathing) shall be identified with the appropriate trademark of the American Plywood Association (APA), and shall meet the requirements of the latest edition of voluntary product standard PS-1, voluntary product standard PS-2 or APA PRP-108 Performance Standards. Panel thickness, grade, and group number or span rating shall be at least equal to that shown on the plans. Application shall be in accordance with recommendations of APA.
- B. Special Tests and Inspections: Refer to Specification Section 01 45 33 – Code Required Special Inspections and Procedures.

1.5 SUBMITTALS:

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plan that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
 4. For metal framing anchors, hangers, hold-downs, and strapping shown on the drawings, submit data sheet indicating the device to be used. Provide indication it will meet or exceed loads specified on the drawings.
- B. Fastener Patterns: Full-size templates for fasteners in exposed framing.
- C. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- D. Research/Evaluation Reports: For the following, showing compliance with the Rhode Island State Building Code (IBC 2012):
 1. Wood-preservative-treated wood.
 2. Power-driven fasteners.

3. Powder-actuated fasteners.
4. Expansion anchors.
5. Metal framing anchors, hangers, hold-downs, and strapping.

1.6 DELIVERY, STORAGE AND HANDLING:

- A. Lumber shall be protected and kept under cover, both in transit and at jobsite. Lumber shall be carefully stacked on suitable supports in a manner which will ensure proper ventilation and drainage.
- B. All lumber shall be segregated by grades. Extreme care shall be exercised in unloading the lumber to prevent damage, splitting, or breaking of materials.

PART 2 - PRODUCTS

2.1 BOARD AND SHEET MATERIALS:

- A. Lumber for Blocking, Nailers, and Curbs as Indicated or Required: Hem-Fir, Douglas Fir, Southern Pine, Spruce-Pine-Fir or better surface dried No.2 or better. Wood members shall be of sizes indicated on the drawings or of the same size as the members being braced.
- B. Lumber for structural framing, including, but not limited to, roof framing, wall studs, and wall plates shall be in accordance with the Rhode Island State Building Code. Lumber shall be Spruce-pine-fir No.1/2 or better with sizes and spacing as shown on the Drawings.
- C. Engineered wood products for structural framing shall be as indicated on the Drawings.
- D. Pressure-treated lumber shall be Southern Yellow Pine No. 2 or better with sizes and spacing as shown on the Drawings.
- E. Plywood and Sheet Products:
 1. Roof Sheathing: Provide minimum thickness and span rating as indicated on the Drawings.
 2. Wall Sheathing: Provide minimum thickness and span rating as indicated on the Drawings.

2.2 WOOD TREATMENTS:

- A. Treated wood products shall be produced by a single treatment plant, fully licensed by the chemical manufacturers, and conforming to the requirements specified herein.
 1. Dye wood or otherwise color code all treated wood at treatment plant to clearly distinguish the different treatments in the field.
 2. Kiln dry all treated lumber and plywood to the following maximum moisture content after treatment.

Lumber for structural framing: 19 percent.

Lumber for interior finishes: 15 percent

Pressure-treated lumber: 19 percent.

Plywood: 15 percent.

Discard pieces with defects which might impair quality of work.

3. Quality Marks: Each piece of lumber and plywood shall be permanently affixed with a quality mark, containing the following information:

Identification of the inspection agency.

Standard to which material was treated.

Identification of the treating plant.

Fire retardant treated wood shall include: stamp signifying a FR-S rating.

Preservative treated wood shall include: Retention and end use for which product is suitable.

- B. Pressure preservative treated wood. Designated as "PT".
 1. Chemical Manufacturer: Subject to compliance with the requirements specified herein. Products which may be incorporated in the work include:
 - a. Chemical Specialties, Inc., Charlotte NC (telephone 704-522-0825).
 2. Treatment: Arsenic and chromium free chemical "ACQ Preserve" in accordance with AWWA C1 and P5.
 3. Minimum preservative retention: 0.40 pounds per cubic foot (6.4 kg/m³) of ACQ chemical, rated for "Ground Contact", in accordance with AWWA C-9, C-15, or ICBO ER-4981 as appropriate.
 4. Fixation of Chemical: Treated wood shall not be shipped from treatment plant until fixation of the preservative has occurred in the wood.

2.3 ACCESSORIES:

- A. Metal framing anchors, hangers, hold-downs, and strapping: Provide size and capacity as shown on the Drawings, manufactured by Simpson Strong-Tie or engineer-approved equivalent. Galvanize in accordance with the Drawings.
- B. Nails: Galvanized common nails, of size and type to suit application and as indicated on the drawings. Galvanized box nails may be used where indicated on the Drawings.
- C. Screws:
 1. Screws for interior applications: Flat head electroplated-galvanized wood screws of the appropriate sizes.
 2. Screws for exterior applications:
- D. For pressure preservative treated wood: Flat head stainless steel, wood screws, of the appropriate sizes. Aluminum and coated metals are prohibited.
- E. For general application (non-pressure preservative treated wood): Flat head hard aluminum, or stainless steel, wood screws, of the appropriate sizes.
- F. Anchor Bolts, Expansion bolts and Lag Screws: Hot-dipped galvanized steel, of the following types:

1. Diameter and lengths shall be as shown on the drawings. If not shown on the drawings, sizes shall conform to minimums specified below. Anchor rods shall conform to ASTM A307 and galvanized in accordance with ASTM A153.
2. For lumber having actual thickness of 1-1/2 inches or greater to masonry and concrete: Anchor bolts or expansion bolts, as most applicable for the specific receiving surface material, 3/8-inch minimum diameter, spaced as shown on drawings, and staggered as far as practicable. Countersink all bolt heads, and provide head washers of matching material.
3. For lumber having actual thickness of greater than 7/8-inch but less than 1-1/2 inches to masonry and concrete: Anchor bolts or expansion bolts, as most applicable for the specific receiving surface material, at least 1/4-inch diameter of the most appropriate lengths for the specific application, space as shown, and staggered as far as practicable. Countersink all bolt heads, and provide head washers of matching material.
4. For lumber having actual thickness of 7/8-inch and less: Anchor bolts or expansion bolts, at least 1/4-inch in diameter; or screws, of the most appropriate sizes; in lengths most suitable for the specific application, countersunk, spaced, and staggered.

PART 3 - EXECUTION

3.1 GENERAL:

- A. Rough carpentry shall include lumber work generally, except finish work.
- B. Framing Standards: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Metal framing anchors, hangers, hold-downs, and strapping: Install to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. The Contractor shall install all wood framing, blocking, and nailers as indicated on the drawings or required to complete a finished building. In addition to all framing indicated on the drawings, nailers, blocking, and other backing required for other work and trades shall be installed.
- F. At all times during execution of this portion of the contract, sufficient workmen and supervisors shall be present who are thoroughly familiar with rough carpentry construction and the materials and techniques specified or indicated on the drawings.
- G. All rough carpentry shall produce joints true, tight, and well nailed, with all members assembled in accordance with the drawings and with the Rhode Island State Building Code and all other pertinent codes and regulations.
- H. Individual pieces of lumber shall be selected so that obvious defects will not interfere with the placement of bolts, proper nailing or making of joints. All pieces with defects which render them

unusable shall be discarded. Individual pieces of lumber which are too small to use in fabricating the Work with minimum joints shall be discarded.

- I. Framing shall not be cut, bored, or notched for pipes, ducts, conduits, or for any other reasons without written authorization by the Engineer.
- J. Whether or not lumber has been installed, it may be rejected by the Engineer for excessive splits, warp, twist, bow, crook, mildew, or fungus, as well as for improper cutting and fitting.
- K. Carpentry work shall be set to required levels and lines, with members plumb and true.
- L. Carpentry shall be securely attached to substrates by anchoring and fastening as indicated and as required for strength and by recognized standards.
- M. The premises shall be kept in a neat, safe, and orderly condition at all times during the execution of this portion of the Work and shall be free from accumulation of sawdust, cut ends, and other debris.
- N. Connections between members shall be tight. Washers shall be provided under all bolt heads and nuts in contact with lumber. Installation of fasteners shall not cause splitting of wood.
- O. Structural lumber in exterior locations; lumber in contact with concrete, masonry, earth, or water; and all wood nailers shall be pressure treated unless otherwise specified.
- P. Nailers shall be provided where indicated on the drawings. The nailers shall be continuous and shall be installed level and straight. Each section of nailer shall be secured by at least two anchor bolts.
- Q. Provide continuous horizontal blocking at mid-height of partitions more than 8'-0" high, using members of 2-inch nominal thickness and of same width as wall or partitions.

3.2 ROOF AND WALL SHEATHING:

- A. Rough carpentry shall include lumber work generally, except finish work.
- B. Framing Standards: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Metal framing anchors, hangers, hold-downs, and strapping: Install to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. The Contractor shall install all wood framing, blocking, and nailers as indicated on the drawings or required to complete a finished building. In addition to all framing indicated on the drawings, nailers, blocking, and other backing required for other work and trades shall be installed.

*****END OF SECTION*****

SECTION 26210
ELECTRIC INSTALLATION

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Work included:
1. Provide properly engineered installation and all necessary electrical components as called for on the Drawings, specified herein, and in other provisions of the Contract Documents.
 2. Provide engineered stamped drawings, displaying all necessary elements, for submission to the appropriate governing agencies to achieve an electrical permit to complete the effort.
- B. Related work:
1. Documents affecting work of the Section include, but are not necessarily limited to General Conditions, and Supplementary Conditions.

1.2 QUALITY ASSURANCE:

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

1.3 SUBMITTALS AND SUBSTITUTIONS:

- A. Comply with pertinent provisions of Section 01340, Submittals and Substitutions.
- B. Product data: Within 30 calendar days after the Contractor has the Owner's Notice to Proceed, submit:
1. Materials list of items proposed to be provided under this Section;
 2. Manufacturers' specifications and other data needed to prove compliance with the specified requirements;
 3. Manufacturers' certifications and laboratory tests reports as required;
 4. Shop Drawings, prepared in accordance with pertinent provisions of these Specifications and showing complete information on performance and installation of the work of this Section including, but not necessarily limited to:
 - a. Complete wiring schematic including all system components;
 - b. Installation procedures, sequence of erection, and required handling equipment;
 - c. Layout and dimensions;
 - d. All plans and specifications shall be stamped by a Rhode Island registered Professional Engineer (Electrical) upon submission for approval.

PART 2 - PRODUCTS**2.1 ELECTRICAL SYSTEM REQUIREMENTS:**

- A. Electrical Delivery System: (Conduit, conductors, and panel supplying power to the shooting shelter shed)
 - 1. The system shall be designed to adequately power the projected electric load from the following electronic devices and components:
 - a. Range safety lighting consisting of ten LED lights as specified below
 - b. Mini-fridge
 - c. Microwave Oven
 - d. 1000 Watt PA System
 - e. Minor other miscellaneous devices plugged into receptacles
- B. Receptacles and switches:
 - 1. Provide outdoor receptacles at the proposed shooting shelter, and the shooting range storage building;
 - 2. Provide indoor receptacle at the range storage building;
 - 3. Provide switches to control safety lighting at the shooting shelter;
- C. Range Safety Lighting:
 - 1. Provide seven Streamline Modular Multifunctional Low Profile LED Status Indicator lights such as that manufactured by Federal Signal Corporation, 2645 Federal Signal Dr. University Park, IL. 60484; Tel.(708) 534-4756.
 - a. Model # SLM400
 - b. Mounting Base: Shallow Base (SLMBS-012-024GY)
 - 2. Provide all necessary mounting fixtures, conduit, wiring, and switches to properly operate the safety lighting.
- D. Generator Connection
 - 1. Provide all necessary mounting fixtures, conduit, wiring, and switches to properly operate emergency generator. Minimum 8000 Watt generator.
 - 2. Provide 8000 Watt generator and install properly with all associated safety switches per RI Building Code
- E. Other requirements:
 - 1. All wiring must be below grade in electrical conduit

PART 3 - EXECUTION**3.1 EXAMINATION:**

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FIELD MEASUREMENT:

- A. Make necessary measurements in the field to assure precise fit of items in accordance with the approved design.

3.3 INSTALLATION:

- A. Install and test accessories in accordance with manufacturer's instructions.

3.4 ADJUST AND CLEAN:

- A. Adjust components for proper operation.
- B. Leave project site clean and free of debris.

*******END OF SECTION*******



RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

235 Promenade Street, Providence, RI 02908-5767

TDD 401-222-4462

May 2, 2016

Department of Environmental Management
Bureau of Natural Resources
Attn: Larry Mouradjian, Associate Director
235 Promenade Street
Providence, RI 02908

Re: Application No. 16-0062 & RIPDES No. RIR101382 in reference to the property and proposed project located:

At the Great Swamp Shooting Range, approximately 1,185 feet east of Great Neck Road, and approximately 0.7 miles south of the intersection of Great Neck Road and Liberty Lane, South Kingstown, RI

Dear Mr. Mouradjian:

Kindly be advised that the Department of Environmental Management's ("DEM") Freshwater Wetlands Program, ("Program") has completed its review of your proposed shooting range expansion, including new 50 yard shooting range, parking area enlargement, and associated landscaping as illustrated and detailed on site plans submitted with your application. The site plans referenced by this letter and on file with this Program were received on March 21, 2016.

Our inspection reveals that freshwater wetlands regulated by the DEM are present on the subject property. Review of your proposed project, however, reveals that this project does not represent an alteration to these freshwater wetlands. It is our determination therefore that a permit for this project pursuant to the Freshwater Wetland Act (Rhode Island General Law Section 2-1-18 et seq.) or the Rules and Regulations Governing the Administration and Enforcement of the Freshwater Wetlands Act is not required. This Determination is **specific to the proposed site alterations illustrated and detailed on site plans on file with this Program** and is further predicated on the following:

1. Adequate measures are employed during and after site alterations to control soil erosion and to prevent any sediment from such erosion being deposited in any freshwater wetlands. You should consult the Rhode Island Soil Erosion and Sediment Control Handbook for appropriate methods to control erosion and prevent sediment from leaving your project site.
2. This determination does not authorize you to modify your project in such a way as to result in the following:
 - a. An increase in the rate and/or volume of surface water runoff flowing into, or draining or diverting from these wetlands; or
 - b. A diversion of groundwater into or away from these wetlands; or
 - c. A modification to the quality of water reaching these wetlands, which could change their natural character.

3. This Program has made a specific revision to the reviewed site plans. This revision is clearly marked in red on the reviewed plans. This project must take place in compliance with this revision. Specifically, per the RI Soil Erosion and Sediment Control Handbook, baled hay is no longer permissible, but straw, coconut fiber or filter-sock products or are allowed.

Please note that this Determination is specific to this proposed project as illustrated on the reviewed site plans, is valid until July 1, 2020, and does not remove your obligation to obtain any local, state or federal approvals or permits required by ordinance or law.

Kindly be advised that this determination is not equivalent to a determination of the type or extent of freshwater wetlands on the subject property. Should you wish to obtain such verification, you may submit an application in accordance with the Rules.

The Program has also 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.RIR101382.

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 are 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 responsible for the proper installation, operation, maintenance and stability of any mitigative features, facilities, and systems of treatment and control which are installed or used in compliance with this permit to prevent harm to adjacent wetlands until such time that you document that this responsibility has been assumed by another person or organization. You are also responsible for ensuring that your project complies at all times with the RIPDES GP.

In authorizing the proposed alterations, the DEM assumes no responsibility for damages resulting from faulty design or construction.

Any modification to your project that would result in an alteration to freshwater wetlands, or allowing your project to result in an alteration to freshwater wetlands, requires a permit from this Program. Unauthorized alterations to freshwater wetlands are subject to enforcement action.

Enclosed please find one (1) copy of your site plans stamped REVIEWED by this Program. Please contact Andrew Charpentier of this Office (telephone: 401-222-6820, ext. 7414) should you have any questions.

Sincerely,



Charles A. Horbert, Program Supervisor
Freshwater Wetlands Program
Office of Water Resources
CAH/AC/ac

Enclosure: Reviewed Site Plan

cc: Traci Pena, RIPDES Program



SHORT-TERM RESPONSE ACTION APPROVAL LETTER

May 10, 2016

File No. SR-32-1808

Lisa Primiano, Chief
Division of Planning & Development
R.I. Department of Environmental Management
235 Promenade Street, Room 320
Providence, Rhode Island 02908

RE: Great Swamp Shooting Range
Great Swamp Management Area
South Kingstown, Rhode Island
Plat Map 37 / Lot 1 and Plat 29-2, Lot 2

Dear Ms. Primiano:

On November 9, 2011, the Rhode Island Department of Environmental Management's (the Department) Office of Waste Management (OWM) amended the Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (the Remediation Regulations). The purpose of these regulations is to create an integrated program requiring reporting, investigation and remediation of contaminated sites in order to eliminate and/or control threats to human health and the environment in a timely and cost-effective manner. A Short-Term Response Action Approval Letter is a document used by the Department to approve limited remedial actions pursuant to Section 6.00 of the Remediation Regulations at contaminated sites that do not involve the use of complex engineered systems or techniques (i.e., groundwater pump and treat systems, soil vapor extraction systems, etc.).

In the matter of the above-referenced property (the Site), the OWM is in receipt of the following final documentation submitted pursuant to the Remediation Regulations in response to the reported release at the Site:

1. **Shooting Range Expansion, Great Swamp Management Area**, South Kingstown, R.I. received by the Department on May 3, 2016, prepared by RIDEM Planning & Development staff.

This document fulfills the requirements of Section 6.00 (Emergency or Short-term Response) of the Remediation Regulations.

This Short Term Response Action Approval requires the Division of Planning and Development to provide the Office of Waste Management with a copy of the plans and specifications being sent out for public bidding, a copy of the public bidding notice, a copy of the wetlands approval,

and upon selection of the contractor, require the contractor to provide a remedial plan for the reclamation of lead based materials in the existing soil berm and proper recycling and/or disposal.

At this time, the OWM offers its concurrence with the proposed remedial action for the property. The OWM approves the proposal provided that all activities and procedures detailed by the contractor in the remedial plan are strictly adhered to.

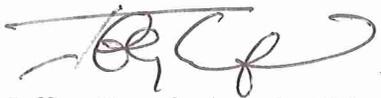
The Department's Division of Planning and Development shall notify all abutting property owners, tenants, easement holders, the municipality, and any community well suppliers associated with any well head protection areas which encircle the site, that the Short-Term Remedial Action is complete and make available to them the findings of the Short-Term Response Report submitted in accordance with Rule 6.06 II of the Remediation Regulations. Please submit a draft public notification to the Office of Waste Management via E-mail for review and approval prior to distribution.

Within sixty (60) days of completion of all the abovementioned remedial work outlined in the remedial plan for reclamation of the lead based materials, please submit a STRA Closure Report in accordance with Rule 6.09 inclusive of any disposal documentation and laboratory sampling analysis to the OWM for review and approval. Upon approval of the Closure Report, the OWM shall issue a No Further Action Letter for the Site.

This Short Term Response Action Approval Letter does not remove your obligation to obtain any other necessary permits from other local, State, or Federal agencies. The OWM shall require at least forty-eight (48) hours notice in advance of any remedial work.

If you have any questions regarding this letter or would like the opportunity to meet with Department personnel, please contact me by telephone at (401) 222-2797, ext. 7102, or by E-mail at jeff.crawford@dem.ri.gov.

Sincerely,



Jeffrey Crawford, Project Manager
Principal Environmental Scientist
Office of Waste Management

Authorized by,



Kelly Owens
Supervising Engineer
Office of Waste Management

cc: L. Mouradjian
J. McGinn

THE STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
Departments of Administration
DIVISION OF CAPITAL ASSET MANAGEMENT & MAINTENANCE
BUILDING CODE COMMISSION
One Capitol Hill, Providence, Rhode Island 02908-5859



July 20, 2017

Project Approval Letter

**RISBC Project
Number and Name**

663 DEM Great Swamp Shooting Range Expansion
2017
Location: 277 Great Neck Road

DESIGNER

Name: DAVID B MCCOMBS
Company: PARE CORPORATION
Address: 121 PLEASANT STREET REHOBOTH MA
02769

DESCRIPTION

Demolition, Reconstruction, and Expansion of the Great Swamp Shooting Range in West Kingston, RI. The work includes the construction of a new 50 yard and 100 yard shooting range with new shooting pavilion and storage building.

AGENCY

Agency Contact Name: Andres Aveledo
Agency/Department Name: RI Department of Environmental Management
Agency Address: 235 Promenade Street; Providence, RI 02909

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/16323

