BREWSTER THORNTON GROUP ARCHITECTS LLP

COMMUNITY COLLEGE OF RHODE ISLAND

PROJECT MANUAL

CCRI Entry Ramp Enclosure

Community College of Rhode Island
Knight Campus

November 1, 2018

150 Chestnut Street, Providence, RI 02903 • 401.861.1600 • Fax: 401.861.5588
mail@brewsterthornton.com • http://www.brewsterthornton.com

USER AGENCY

COMMUNITY COLLEGE OF RHODE ISLAND
400 EAST AVENUE
WARWICK, RI 02886

DESIGN AGENT

BREWSTER THORNTON GROUP ARCHITECTS, LLP
150 CHESTNUT STREET
PROVIDENCE, RI 02903

STRUCTURAL ENGINEER

C.A. PRETZER ASSOCIATES
50 FREEWAY DRIVE
CRANSTON, RI 02920

MEP, FA/FP ENGINEER

WOZNY BARBAR & ASSOCIATES
161 EXCHANGE ST. 3RD FLOOR
PAWTUCKET, RI 02860

CIVIL ENGINEER

PARE CORPORATION
8 BLACKSTONE VALLEY PLACE
LINCOLN, RI 02865

LANDSCAPE ARCHITECT

TRAVERSE LANDSCAPE ARCHITECTS
150 CHESTNUT STREET
PROVIDENCE, RI 02903

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CONTRACTING FORMS

PART 1 GENERAL

1.1 Contractor is responsible for obtaining a valid license to use all copyrighted documents specified or included in the Project Manual.

1.2 AGREEMENT AND CONDITIONS OF THE CONTRACT

A. See Section 00 5200 for the Agreement form to be executed.

B. See Section 00 7200 for the General Conditions.

1.3 FORMS

A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in the Contract Documents.

B. Bond Forms:

1. Performance Bond and Payment Bond Forms: AIA A312

C. Release of Lien:

1. Release of Liens Form: AIA G706A

D. Insurance certificate, supplementary attachment:

1. ACORD Certificate of Insurance Form: AIA G715

1.4 REFERENCE STANDARDS

A. AIA G706A – Release of Liens: 1994.

B. AIA A312 - Performance Bond: 2010 and Payment Bond: 2010.

C. AIA G715 – ACORD Certificate of Insurance: 1991.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 00 5200
AGREEMENT FORM

PART 1 – GENERAL

1.1 The Agreement Form to be utilized on this project is AIA Document A101-2007 as amended, a copy of which follows this page.

END OF DOCUMENT

AIA® 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)*
(Paragraph deleted)
BETWEEN the Owner:

The State of Rhode Island, acting by and through the Department of Administration
Division of Purchases, on behalf of the User Agency
One Capitol Hill, Second Floor
Providence, Rhode Island 02908-5855
(401) 574-8100 (telephone)
(401) 574-8387 (facsimile)
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)*

The User Agency:
(Name of user agency, address, telephone and facsimile numbers, and web address)

CCRI Community College
400 East Ave
Warwick, RI 02886

The Design Agent:
(Name, legal status, address, telephone and facsimile numbers, and web address)

Brewster Thornton Group Architects
150 Chestnut Street
Providence, RI 02903

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

ARTICLE 2 THE WORK OF THIS CONTRACT

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

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work
(Paragraphs deleted)
will be stipulated by the User Agency. The Contractor shall be authorized to commence the 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 ( ) 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.)

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Portion of Work	Substantial Completion Date

, subject to adjustments of this Contract Time as provided in the Contract Documents.
(Paragraphs deleted)
§ 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: _____($____) 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 Dollars ($), 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 Design Agent by the Contractor and Certificates for Payment issued by the Design Agent and approved by the Owner in writing, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents, and in accordance with the provisions of "Prompt Payment by Department of Administration," R.I. Gen. Laws §§ 42-11.1-1 et seq..

§ 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 working day following written 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 Design Agent and Owner may require.

§ 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:

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.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 Design Agent 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 Design Agent shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and

.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)
Intentionally omitted.

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

§ 5.2 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 Design Agent and approved in writing by the Owner; and

.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 working days after the issuance of the Design Agent's final Certificate for Payment and written approval by the Owner, and in accordance with the provisions of "Prompt Payment by Department of Administration," R.I. Gen. Laws §§ 42-11.1-1 et seq..
.

§ 5.3 OWNER'S 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.

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ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 INITIAL DECISION MAKER

§ 6.1.1 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.
§ 6.1.2 For any Claim (as defined in Section 15.1.1 of AIA Document A201-2007) not resolved by the procedures set forth in § 6.1.1, the parties shall use their best efforts to resolve such Claim by mediation in Providence, Rhode Island. Any party may apply in writing to the Presiding Justice of the Providence County Superior Court, with a copy to the other parties, with a request for the court to appoint a mediator, and the costs of the mediator shall be borne equally by all of the parties. In the event that the parties are unable to resolve any and all Claims through mediation, then any party may pursue the legal remedies provided in § 6.2

§ 6.2 BINDING DISPUTE RESOLUTION

For any Claim not resolved by the Initial Decision Maker procedures set forth in § 6.1.1or the mediation procedures pursuant to § 6.1.2, 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 Contract may also be terminated by the Owner: (i) in the event of the unavailability of appropriated funds; (ii) in the absence of a determination of continued need; or (iii) as otherwise provided in the State of Rhode Island Procurement Regulations General Conditions of Purchase or other applicable law.

§ 7.2 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)

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

§ 8.6 Neither the Owner's, nor the Contractor's, nor the Design Agent's representative shall be changed without ten days written notice to the other parties.

§ 8.7 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 or other Modifications must be approved in writing by the Owner.

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§8.6.4 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 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for 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.

§ 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:
(Row deleted)

Document
State of Rhode Island
Procurement
Regulations

§ 9.1.4 The Specifications:
(Paragraphs deleted)
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:
(Paragraphs deleted)
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 by the Owner, including without limitation, the Invitation to Bid, the Instructions to Bidders, the Specifications and Drawings, any Addenda, and the Bid Checklist (with applicable forms)

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

3. The Purchase Order issued by the Owner.

§ 9.1.8 This Agreement and the Contract Documents are subject to, and governed by, the laws of the State of

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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 BENEFITS OF AGREEMENT

§ 11.1 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)

§ 11.2 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)*

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SECTION 00 7200
GENERAL CONDITIONS

PART 1 GENERAL

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

END OF SECTION

Document A201™ – 2007

General Conditions of the Contract for Construction

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

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

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

THE OWNER:

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

THE USER AGENCY
(Name, legal status, address, telephone and facsimile numbers, and web address)
Community College of Rhode Island
400 East Ave
Warwick, RI 02886

THE ARCHITECT:
(Name, legal status, address, telephone and facsimile numbers, and web address)
Brewster Thornton Group Architects
150 Chestnut Street
Providence, RI 02903

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(Paragraphs deleted)

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

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

§ 1.1.2 THE CONTRACT

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

§ 1.1.3 THE WORK

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

§ 1.1.4 THE PROJECT

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

§ 1.1.5 THE DRAWINGS

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

§ 1.1.6 THE SPECIFICATIONS

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

§ 1.1.7 INSTRUMENTS OF SERVICE

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

§ 1.1.8 INITIAL DECISION MAKER

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

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

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

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

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

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

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

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

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

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

§ 1.3 CAPITALIZATION

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

§ 1.4 INTERPRETATION

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

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

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

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

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

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

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ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Design Agent does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 Intentionally omitted.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Intentionally omitted.

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

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

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

§ 2.2.5 Intentionally Omitted

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

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

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

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

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

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

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

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

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

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

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

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

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

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

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

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

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite

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safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Design Agent and shall not proceed with that portion of the Work without further written instructions from the Design Agent. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

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

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

§ 3.4 LABOR AND MATERIALS

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

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

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

§ 3.5 WARRANTY

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

§ 3.6 TAXES

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

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

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

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§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections required by the Rhode Island State Building Code necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded. The Contractor shall be responsible for obtaining the Certificate of Occupancy from the appropriate governmental authorities.

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

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

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

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

§ 3.8 ALLOWANCES

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

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

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

§ 3.9 SUPERINTENDENT

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

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

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

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

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

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

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

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

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

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

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

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

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

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design

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concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Design Agent is subject to the limitations of Section 4.2.7. Informational submittals upon which the Design Agent is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Design Agent without action.

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

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

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

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

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

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

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

§ 3.13 USE OF SITE

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

§ 3.14 CUTTING AND PATCHING

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

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

§ 3.15 CLEANING UP

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

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

§ 3.16 ACCESS TO WORK

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

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

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

§ 3.18 INDEMNIFICATION

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

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

ARTICLE 4 DESIGN AGENT

§ 4.1 GENERAL

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

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

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

§ 4.2 ADMINISTRATION OF THE CONTRACT

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

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

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

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

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

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

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

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

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

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

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

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

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

§ 4.2.12 Interpretations and decisions of the Design Agent will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Design Agent will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

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

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

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ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

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

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

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

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

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

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

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

§ 5.2.5 MANUFACTURERS AND FABRICATORS

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

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

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

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

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§ 5.3 SUBCONTRACTUAL RELATIONS

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

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

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

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

(Paragraph deleted)

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

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

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

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§ 6.2 MUTUAL RESPONSIBILITY

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

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

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

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

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

§ 6.3 OWNER'S RIGHT TO CLEAN UP

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

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

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

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

§ 7.2 CHANGE ORDERS

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

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

§ 7.2.2 Subsequent to the approval of a Change Order as provided in § 7.1.2, whether such Change Order changes the Contract Sum or Contract Time or both, no additional claim related to such Change Order will be considered by the Owner. Any change, once incorporated into a Change Order, is all inclusive, and includes all factors that could have been considered at the time of the Change Order such as Project impact or schedule "ripple" effect..

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Design Agent and signed by the Owner and Design Agent, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or

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Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

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

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

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

§ 7.3.4 Intentionally omitted.

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

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

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Design Agent shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Design Agent may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

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

(Paragraph deleted)

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

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Design Agent will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Design Agent determines, in the Design Agent's professional judgment, to be reasonably justified. The Design Agent's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Design Agent concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such

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agreement shall be effective immediately and the Design Agent will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

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

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

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

§ 8.1.2 The date of commencement of the Work is the date established pursuant to § 3.1 of the Agreement.
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§ 8.1.3 The date of Substantial Completion is the date certified by the Design Agent in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean working day, excluding weekends and legal holidays.

§ 8.2 PROGRESS AND COMPLETION

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

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

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

§ 8.3 DELAYS AND EXTENSIONS OF TIME

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

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

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

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

§ 9.2 SCHEDULE OF VALUES

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

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§ 9.3 APPLICATIONS FOR PAYMENT

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

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

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

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

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

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

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work. The Contractor shall immediately satisfy any lien, claim, or encumbrance against the site where the Project is located and indemnify the Owner from and against all resulting costs and expenses, including without limitation, attorneys' fees

§ 9.4 CERTIFICATES FOR PAYMENT

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

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

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made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

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

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

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

.1 defective Work not remedied;

.2 third-party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials, or equipment;

.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

.5 damage to the Owner or a separate contractor;

.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;

.7 failure to carry out the Work in accordance with the Contract Documents; or.

.8 any other failure to comply with the obligations of the Contractor under the Contract Documents.

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

§ 9.5.3 If the Design Agent withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Design Agent and the Design Agent will reflect such payment on the next Certificate for Payment .

§ 9.6 PROGRESS PAYMENTS

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

§ 9.6.2 The Contractor shall pay each Subcontractor no later than 7 days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

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

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. The Owner shall have the right to withhold payment(s) to the Contractor in the event that any Subcontractors or material and equipment suppliers have

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not been properly paid. Neither the Owner nor Design Agent shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

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

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

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

§ 9.7 FAILURE OF PAYMENT

If the Design Agent does not issue a Certificate for Payment, through no fault of the Contractor, within 7 days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within 7 days after the date established in the Contract Documents the amount certified by the Design Agent or awarded by binding dispute resolution, then the Contractor may, upon 7 additional days' written notice to the Owner and Design Agent, make a claim for payment as provided under the provisions of "Prompt Payment by Department of Administration," R.I. Gen. Laws §§ 42-11.1-1 et seq.

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§ 9.8 SUBSTANTIAL COMPLETION

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

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

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

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

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

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§ 9.9 PARTIAL OCCUPANCY OR USE

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

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

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

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

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

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Design Agent (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

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

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portion of the Work fully completed and accepted shall be submitted by the Contractor to the Design Agent prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

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

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

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

§ 9.11 The Contractor and the Contractor's surety shall be liable for and shall pay the Owner as liquidated damages the sums specified in the Solicitation and Bid Form.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

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

§ 10.2 SAFETY OF PERSONS AND PROPERTY

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

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

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

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

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

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

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

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under

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Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Design Agent or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

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

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

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS

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

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Design Agent the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Design Agent will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Design Agent has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Design Agent have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

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

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

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

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§ 10.3.6 Intentionally omitted.

§ 10.4 EMERGENCIES

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

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

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

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

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

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

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

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elected and appointed officials, members, employees, and agents, as additional insureds for claims caused in whole or in part by the Contractor's acts or omissions during the Contractor's completed operations.

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

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

§ 11.3 PROPERTY INSURANCE

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

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

§ 11.3.1.2 Intentionally omitted.

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

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

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

§ 11.3.2 Intentionally omitted.

(Paragraphs deleted)

§ 11.3.3Intentionally omitted.

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§ 11.3.4 Intentionally omitted.

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

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

§ 11.3.7 WAIVERS OF SUBROGATION

The Contractor waives all rights against the Owner and the User Agency and any of their subcontractors, sub-subcontractors, agents and employees, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged. **§ 11.3.8** A loss insured under this property insurance shall be adjusted by the Contractor as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

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

§ 11.3.10 The Contractor as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Contractor's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Contractor as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

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

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

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ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

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

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

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

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

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Design Agent, the Owner may correct it in accordance with Section 2.4.

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

§ 12.2.2.3 The one-year period for correction of Work shall be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

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

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

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

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents

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may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

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

§ 13.2 SUCCESSORS AND ASSIGNS

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

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

§ 13.3 WRITTEN NOTICE

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

§ 13.4 RIGHTS AND REMEDIES

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

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

§ 13.5 TESTS AND INSPECTIONS

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

§ 13.5.2 If the Design Agent, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Design Agent will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the

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Design Agent of when and where tests and inspections are to be made so that the Design Agent may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

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

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

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

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

§ 13.6 INTEREST

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

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped; or

.3 Because the Design Agent has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1

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(Paragraph deleted)

§ 14.1.Intentionally omitted.

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

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

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§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

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

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

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

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

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

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

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

§ 14.3.2 Intentionally omitted. 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.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

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

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

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

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

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ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

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

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Design Agent. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

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

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

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

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

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

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

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

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

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor waives Claims against the Owner for consequential damages arising out of or relating to this Contract. This waiver includes

(Paragraphs deleted)

damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work. This wiver is applicable, without limitation, to all consequential damages due to the Owner's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

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§ 15.2 INITIAL DECISION

§ 15.2.1 Claims shall be referred to the Initial Decision Maker for initial decision. 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 the Initial Decision Maker in accordance with the provisions of the State Purchases Act, State of Rhode Island Procurement Regulations, and this Section 15.2.An initial decision shall be required as a condition precedent to mediation and binding dispute resolution of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Design Agent of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may apply for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, apply in writing to the Presiding Justice of the Providence County Superior Court, with a copy to the other parties, with a request for the court to appoint a mediator, and the costs of the mediator shall be borne equally by all of the parties.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 Intentionally omitted.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which shall be administered by the Presiding Justice of the Providence County Superior Court. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the court. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant

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to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Intentionally Omitted.
(Paragraphs deleted)
§ 15.4.4 CONSOLIDATION OR JOINDER
§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

§ 16 COMPLIANCE WITH APPLICABLE LAW

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

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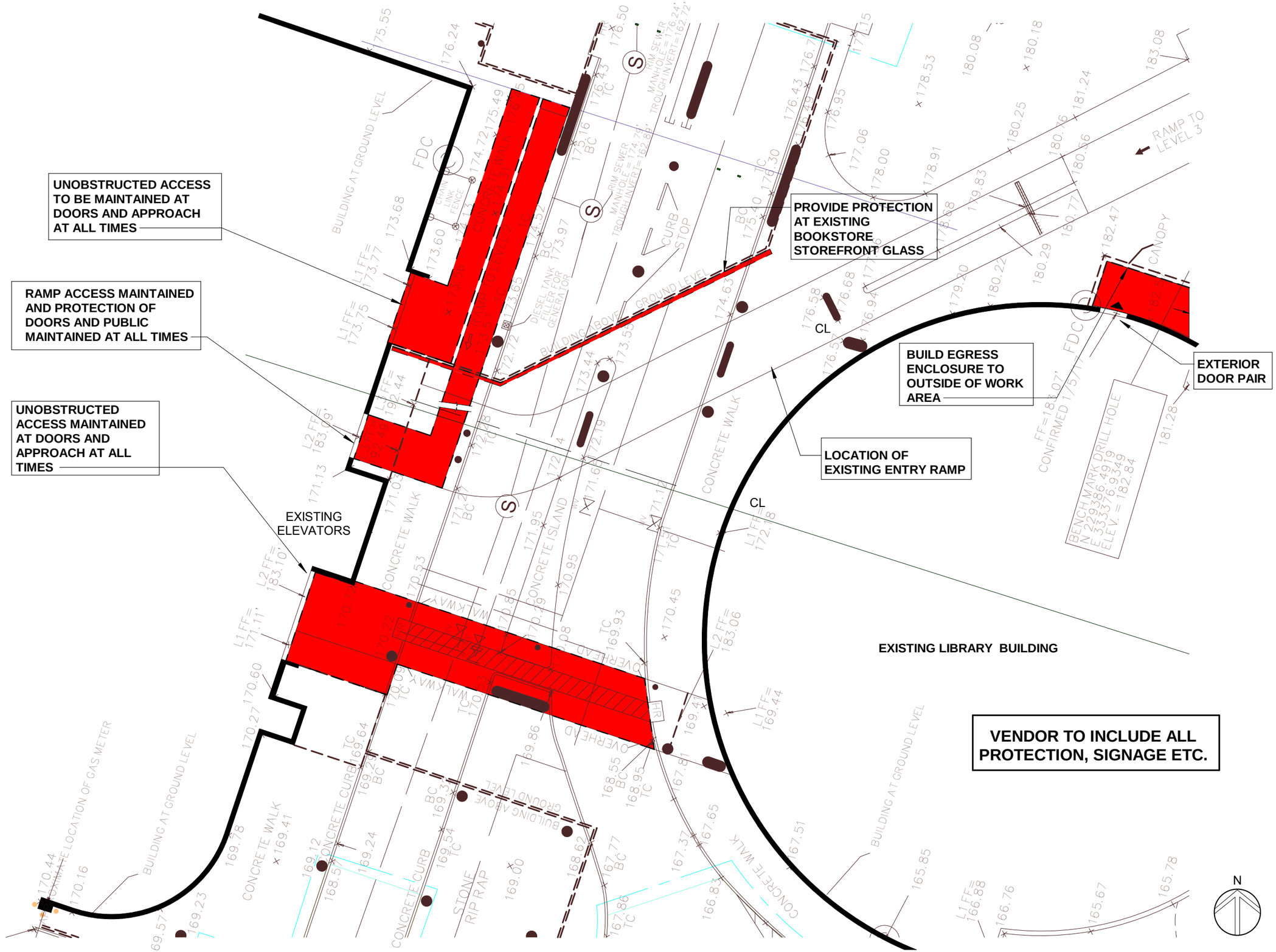

01 1000
ATTACHMENT A

1609A

SCALE: 1" = 20'-0"

SITE ACCESS PLAN

CCRI ENTRY RAMP ENCLOSURE

DATE:11/01/18

KNIGHT CAMPUS
400 EAST AVENUE, WARWICK, RI

BREWSTER THORNTON GROUP ARCHITECTS LLP
150 Chestnut Street
Providence, RI 02903
Tel: 401.861.1600
Fax: 401.861.5588

SECTION 01 1000
SUMMARY OF WORK

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Overview: Contractor to provide all labor, materials and equipment required to renovate and enclose the entry ramp at the CCRI Warwick Campus, construct a vestibule addition, and make minor modifications to the entry plaza, adjacent and under-building site conditions in accordance with the CCRI Entry Ramp Enclosure Documents, including the specifications and/or drawings listed in this Project Manual. Work shall include, but is not limited to, the following:

1. Concrete repairs to the existing entry ramp, including removal of the existing steel guardrail system and concrete guard wall;
2. New construction to turn the ramp into interior conditioned space.
3. New construction to create an entry vestibule, ramp and stairs with planting areas at the end of the ramp.
4. Selective demolition and utility work to connect to the existing building and existing utilities.
5. Demolition of existing site elements and re-construction with lighting and site walls of the new entry approaches and HVAC pad/drainage work;
6. Protection of adjacent egress ways and existing construction to remain, including access to and egress from the Library Building exit door pair at all times.
7. Complete all work within 365 calendar days from date of CCRI PO issuance regardless of weather, product delivery constraints, or season start date. The generous time schedule has been established to allow the Contractor the option of working through the winter or not, and including winter conditions or summer overtime if required, or both, in order to meet the schedule within the Base Bid price.

B. General Requirements:

1. Contractor shall perform the Work of the Contract under a stipulated sum Contract with the Owner in accordance with the Conditions of Contract.
2. Vendor is responsible for obtaining and paying for any required Local and State licenses, Permits and inspections, other than State Fire Plan Review fees, which are pre-paid.
3. Contractor to include all Bond costs in their Bid.
5. Before starting work, all Contractor workers and Subs are required to obtain and submit a current (within 6 months) State BCI and State-approved picture ID. CCRI College Police reserves the right to deny Campus access to any worker based on information provided on the submitted BCI.
6. All onsite workers are to be OSHA 10 certified. Copies of this certification along with driver licenses are required on the first day of work.
7. The Contractor is responsible for providing their workers with all personal protection equipment. At a minimum, this includes hard hats, reflective vests, eye protection, harnesses and ear protection.
8. All completed work must be inspected and approved by the College and the Design Agent.
9. There will be mandatory bi-weekly progress meetings onsite with four week look-ahead schedules to be furnished to the Design Agent and College.

10. Contractor and/or its subcontractors are to be licensed as required by RI Department of Labor.
11. All contractors and subcontractors to sign in each employee at the CCRI Security Office located on the lower level at the start of each shift.
12. Deliveries to be coordinated with the college and to occur at convenient times for the college.
13. The Successful Bidder is to submit the names and resumes of the onsite supervisors for review and acceptance to work on campus by the College team. The College reserves the right to reject any proposed onsite supervisors.
14. The College is not responsible for security of materials, tools, etc.
15. Contractors are not permitted to display a project sign anywhere on the campus grounds.
16. Contractor must come to terms with all vendors and subcontractors prior to submitting their bid.
17. Contractor shall provide protection draping from sides of ramp while working on the underside of the ramp to contain debris.
18. Contractor shall provide safety netting to protect glass of adjacent Bookstore and building windows/doors during the Work.
19. Contractor will provide barricades and signage closing the underside of the ramp to all vehicle and pedestrian traffic in both directions while working on the underside of the ramp.
20. Contractor will provide all signage closing the ramp and redirecting pedestrian traffic while work on the ramp is ongoing.
21. All demolition and concrete rehabilitation work requiring the use of loud tools (i.e. concrete saws, grinders & hammer drills) shall be performed during 3rd shift hours.
22. Contractor shall perform all work from movable aerial lifts or permanent staging.

1.02 ALTERNATES

A. Alternate #1 – Collapsible Bollards: Provide add alternate price to purchase and install bollards as described on drawing A7.2. Include roadway/sidewalk cutting, setting, concrete and miscellaneous work required to complete installation.

B. Alternate #2 – Extended Storm Drainage: Provide add alternate price to extend civil work to provide overflow drainage system as detailed. Base Bid includes connection for new roof drainage and drywell. Alternate adds a second connection from well to storm drain at Library building and extends system to connect to existing catch basin in road below plaza. Include all additional earthwork, road opening, lawn repair, and road/sidewalk/plaza reconstruction to complete alternate work.

1.03 CONTRACTOR'S USE OF SITE AND PREMISES

A. Owner intends to fully occupy the adjacent facility during the period of construction.

B. Construction Operations: Limit work areas within the building as agreed with the College. Coordinate with Owner to insure delivery and completion per the schedule identified on the Bid Form. Include all costs of this coordination, including all premium time wages that may be required to meet these requirements, in the Base bid.

C. Provide access to and from site as required by law and by Owner:

1. Building Entrance and Emergency Exits During Construction: Ramp will be closed during the project. Provide appropriate detour signage. Keep all other exits open during construction period; provide temporary exit signs if exit routes are temporarily altered. See Attachment A plan at end of this section for areas to protect in accordance with Section 01 5000. Update egress plans as required for College approval.

2. Do not obstruct roadways, sidewalks, or other public ways without permission from the Owner.

D. Utility Outages and Shutdown:

1. Do not disrupt or shut down life safety systems, including but not limited to fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
2. Prevent accidental disruption of utility services to other facilities. Any and all shutdowns to occur during third shift.
3. Do not disrupt building control wiring or fire alarm wiring passing through the area of work.

E. Protect all existing surfaces from damages. Any damages to the existing surfaces requiring replacement and or repair will be at this vendor's expense.

F. At all times and at the completion of the Project, construction areas are to be kept in a clean, safe and acceptable condition on a daily basis.

G. Vendor is responsible for removing all project debris off site daily including all costs associated with waste containers and proper disposal of waste. The College will provide an exterior location for the temporary placement of a waste container.

H. Vendor is to have all equipment necessary to perform the installation and service including, tools, staging, lift truck, etc. No CCRI equipment or tools will be available.

I. Any work that affects the fire suppression and fire alarm systems is to be coordinated with the College contracted maintenance companies to insure warranty continuity with all costs included in the base bid. Encore is the vendor for Sprinkler work, and FSI is the vendor for fire alarm work.

1.04 ITEMS PROVIDED BY OWNER INSTALLED BY CONTRACTOR

A. Phones for call box locations.

1.05 WORK BY OWNER

A. Items noted NIC (Not in Contract) will be supplied and installed by Owner before Substantial Completion. Some items include:

1. None.

1.06 OWNER REQUIRED SUBCONTRACTORS

A. Warranty holders on fire alarm and sprinkler systems.

1.07 ITEMS TO BE SALVAGED

A. None.

1.08 HAZARDOUS MATERIALS

A. No hazardous materials were discovered in the preconstruction investigation.

1.09 ALLOWANCES

A. Allowance #1: Include a $20,000 allowance for additional concrete repairs not described in Contract Document areas of work at the stipulated unit price.

B. Allowance #2: Include a $50,000 allowance for repair of unknown or concealed conditions encountered during the project.

C. Allowance #3: Include a $20,000 allowance for additional sitework modifications that the College directs be accomplished during the project. This may include relocation or modification of underground utilities encountered or foundation/building changes required by subsurface conditions.

D. Allowance #4: Include a $10,000 allowance to cover costs via unit price for rock or unsuitable soils removal and replacement according to stipulated unit prices. Unit prices are described fully in Section 31 0000 Earthwork.

E. Allowance #5: Include a $40,000 allowance for additional interior work as directed by the College to be accomplished during this project.

F. Allowance #6: Include a $10,000 allowance for investigation of routing of existing storm drain lines serving the round Library building. Line paths and outlet need to be determined.

G. Please note that overhead and profit associated with Allowances are to be included within the Base Bid per RI Purchasing requirements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2000
PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Schedule of values.

B. Applications for payment.

C. Warranty Inspection Retainage.

D. Sales Tax Exemption.

E. Change procedures and mark-up.

F. Defect assessment.

G. Alternates

H. Unit Prices

I. Allowances

1.02 SCHEDULE OF VALUES

A. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet

B. Submit Schedule of Values in duplicate, one copyrighted original and one copy, within 15 days after date of receipt of a Purchase Order from the State Division of Purchases.

C. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the major specification Section. Identify site mobilization, bonds and insurance.

D. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.

E. Revise schedule to list approved Change Orders, with each Application for Payment.

1.03 APPLICATIONS FOR PAYMENT

A. Submit each application on an original copyrighted AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet, accompanied by three copies.
   1. Individually sign and notarize, and emboss with notary's official seal, the original and each of the three copies.
   2. Applications not including original copyrighted AIA G702, and G703 Forms, will be rejected, and returned for resubmittal.
   3. Applications not properly signed and notarized will be rejected and returned for re-submittal.

B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.

C. Provide one copy of the updated construction schedule with each Application for Payment submission.
   1. Provide a statement signed by the Contractor's firm principal certifying that there are no unidentified outstanding claims for delay.

D. Include with each monthly Application for Payment, following the first application, one copy of the Certified Monthly Payroll Record for the previous month's pay period.

E. Payment Period: Submit at intervals stipulated in the Agreement.

F. Submit with transmittal letter as specified for Submittals in Section 01 3300.

G. Beginning with the second Application for Payment, Contractor's right to payment must be substantiated by documenting, on a copy of the Waiver of Lien Form referenced in Document 00 5000 – Contracting Forms in this Project Manual, that payment monies due, less retainage not exceeding ten percent, have been paid in full to subcontractor and suppliers for work, materials, or rental of equipment billed for under specific line item numbers in the immediately preceding application.

H. Substantiating Data: When the Design Agent requires substantiating information, submit data justifying dollar amounts in question. Include the following with the Application for Payment:
   1. Record Documents as specified in Section 01780, for review by the Owner which will be returned to the Contractor.
   2. Affidavits attesting to off-site stored products.
   3. Construction progress schedules, revised and current as specified in Section 01 3000.

I. As a condition of payment, a monthly MBE report with cancelled checks shall be attached to each invoice. This is a College requirement and is in addition to the State MBE Office Requirements.

1.04 SALES TAX EXEMPTION

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

1.05 CHANGE PROCEDURES AND MARK-UP

A. Submittals: Submit name of the individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

B. The Design Agent will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time by issuing supplemental instructions on AIA Form G710

C. The Design Agent may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor will prepare and submit an estimate within 15 days.

D. The Contractor may propose changes by submitting a request for change to the Design Agent, describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation, and a statement describing the effect on Work by separate or other Contractors. Document any requested substitutions in accordance with Section 01 6000.

E. Stipulated Sum Change Order: Based on Proposal Request, and Contractor's fixed price quotation, or Contractor's request for a Change Order as approved by Design Agent.

F. Unit Price Change Order: For contract unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of work which are not

pre-determined, execute the Work under a Construction Change Directive. Changes in the Contract Sum or Contract Time will be computed as specified for a Time and Material Change Order.

G. Construction Change Directive: Design Agent may issue a directive, on AIA Form G713 Construction Change Directive signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in the Contract Sum or Contract Time. Promptly execute the change.

H. Time and Material Change Order: Submit an itemized account and supporting data after completion of the change, within the time limits indicated in the Conditions of the Contract. The Design Agent will determine the change allowable in the Contract Sum and Contract Time as provided in the Contract Documents.

I. Maintain detailed records of work done on a Time and Material basis. Provide full information required for an evaluation of the proposed changes, and to substantiate costs for the changes in the Work.

J. Document each quotation for a change in cost or time with sufficient data to allow an evaluation of the quotation. Provide detailed breakdown of costs and estimates for labor and materials including a detailed breakdown for subcontractor's or vendor's Work. Include copies of written quotations from subcontractors or vendors.

K. Change Order Forms: AIA G701 Change Order.

L. Execution of Change Orders: The Design Agent will issue Change Orders for signatures of the parties as provided in the Conditions of the Contract.

M. Markup of Change Order Work: The maximum allowable mark up for change order work is 5% for **the general contractor and for subcontractors.**

N. Correlation of Contractor Submittals:
   1. Promptly revise the Schedule of Values and the Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
   2. Promptly revise progress schedules to reflect any change in the Contract Time, revise sub-schedules to adjust times for any other items of work affected by the change, and resubmit.
   3. Promptly enter changes in the Project Record Documents.

1.06 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of the Design Agent, it is not practical to remove and replace the Work, the Design Agent will direct an appropriate remedy or adjust payment as follows:
   1. The defective Work may remain, but the unit sum will be adjusted to a reduced sum at the discretion of the Design Agent.
   2. The defective Work will be partially repaired to the instructions of the Design Agent, and the unit sum will be adjusted to a reduced sum at the discretion of the Design Agent.

C. The individual Specification Sections may modify these options or may identify a specific formula or percentage sum reduction.

D. The authority of the Design Agent to assess the defect and identify a payment adjustment, is final.

E. Non-Payment For Rejected Products: Payment will not be made for rejected products for any of the following:
   1. Products wasted or disposed of in a manner that is not acceptable.

2. Products determined as unacceptable before or after placement.
3. Products not completely unloaded from the transporting vehicle.
4. Products placed beyond the lines and levels of the required Work.
5. Products remaining on hand after completion of the Work.
6. Loading, hauling, and disposing of rejected products.

1.07 ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected in numerical order at the Owner's option. Accepted Alternates will be identified in the Purchase Order. Coordinate related work and modify surrounding work as required.

B. Refer to Section 01 1000 Summary of Work for a description of Alternates.

1.08 UNIT PRICES

A. Unit prices as included on the Bid Form will be used to adjust the quantities of work to be compensated in the Contract based on actual field conditions. Impacted scope must be viewed by the Owner or Design Agent and documented photographically to allow accurate quantity estimates.

B. Unit prices are described on the bid form and in Section 31 0000 Earthwork.

1.09 ALLOWANCES

A. See bid form and Section 01 1000 Summary of Work for allowances. All unused funds within the allowances at the conclusion of the project shall be returned to the Owner via credit change order.

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Site Administration.

B. Coordination and project conditions.

C. Preconstruction meeting.

D. Site mobilization meeting.

E. Progress meetings.

F. Preinstallation meetings.

1.02 SITE ADMINISTRATION

A. Maintain a daily attendance log to include the names of all project employees and guests to the site. The log sheet, or sheets, must clearly indicate the Project Name, and the name of the General Contractor. Each line in the log should allow for the name of that employee, the employee's job title (use terminology used by prevailing wage job title), and the name of that employee's employer. Each quest signing the log should indicate a brief description of the reason for the visit, the quest's employer or organization.

1.03 COORDINATION AND PROJECT CONDITIONS

A. Coordinate the scheduling, submittals, and the Work of the various Sections of the Project Manual to ensure an efficient and orderly sequence of the installation of interdependent construction elements.

B. Verify that the utility requirements and characteristics of the operating equipment are compatible with the building utilities. Coordinate the Work of the various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate the space requirements, weight, supports, and installation of the structural and electrical Work, which are indicated diagrammatically on the Drawings. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. Coordinate the completion and clean up of the Work of the separate Sections in preparation for Substantial Completion.

1.04 PRECONSTRUCTION MEETING

A. The Design Agent will schedule a meeting after a Purchase Order is issued to the Contractor by the CCRI Department of Purchasing.

B. Attendance Required: Owner, Design Agent, and Contractor, including on-site Supervisor.

C. Agenda:
   1. Distribution of the Contract Documents.
   2. Submission of a list of Subcontractors, a list of products, schedule of values, and a progress schedule.
   3. Designation of the personnel representing the parties in the Contract, and the Design Agent.
   4. The procedures and processing of the field decisions, submittals, substitutions, applications for payments, proposal requests, Change Orders, and Contract closeout

procedures.
5. Scheduling.
6. Record the minutes and distribute copies within two days after the meeting to the participants, with electronic copies to the Design Agent, the Owner, the participants, and those affected by the decisions made.

1.05 SITE MOBILIZATION MEETING

A. The Design Agent will schedule a meeting at the Project site prior to the Contractor's occupancy.
   1. Attendance Required: The Owner, Design Agent, Special Consultants, and, Contractor, the Contractor's Superintendent, and major Subcontractors.
   2. Agenda:
      a. Use of the premises by the Owner and the Contractor.
      b. The Owner's requirements and occupancy.
      c. Security and housekeeping procedures.
      d. Schedules.
      e. Application for payment procedures.
   3. Record the minutes and distribute the copies within two days after the meeting to the participants, with electronic copies to the Design Agent, Owner, participants, and those affected by the decisions made.

1.06 PROGRESS MEETINGS

A. Schedule and administer the meetings throughout the progress of the Work at bi-weekly intervals.

B. Make arrangements for the meetings, prepare the agenda with copies for the participants, and preside at the meetings.

C. Attendance Required: The job superintendent, major subcontractors and suppliers, the Owner, Design Agent, as appropriate to agenda topics for each meeting.

D. Agenda by Contractor:
   1. Review the minutes of previous meetings.
   2. Review of the Work progress.
   3. Field observations, problems, and decisions.
   4. Identification of the problems which impede the planned progress.
   5. Review of the submittals schedule and status of the submittals - **Note that all submittals are required within 14 calendar days of receipt of P.O.**
   6. Review of the off-site fabrication and delivery schedules.
   7. Maintenance of the progress schedule.
   8. Corrective measures to regain the projected schedules.
   9. Planned progress during the succeeding work period.
   10. Coordination of the projected progress.
   11. Maintenance of the quality and work standards.
   12. Effect of the proposed changes on the progress schedule and coordination.
   13. Other business relating to the Work.
   14. Record the minutes and distribute the copies within two days after the meeting to the participants, with two copies to the Design Agent, Owner, participants, and those affected by the decisions made.

1.07 PREINSTALLATION MEETINGS

A. When required in the individual specification Sections, convene a preinstallation meeting at the site prior to commencing the Work of the Section.

B. Require attendance of the parties directly affecting, or affected by, the Work of the specific

Section.

C. Notify the Design Agent four days in advance of the meeting date.

D. Prepare an agenda and preside at the meeting:
   1. Review the conditions of installation, preparation and installation procedures.
   2. Review coordination with the related work.
   3. Record the minutes and distribute the copies within two days after the meeting to the participants, with electronic copies to the Design Agent, Owner, participants, and those affected by the decisions made.

END OF SECTION

SECTION 01 3300
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Submittal procedures.

B. Construction progress schedules.

C. Proposed products list.

D. Product data.

E. Shop drawings.

F. Samples.

G. Design data.

H. Test reports.

I. Certificates.

J. Manufacturer's instructions.

K. Manufacturer's field reports.

1.02 SUBMITTAL PROCEDURES

A. Master List Submittal:
   1. Submit a master list of the required submittals with a proposed date for each item to be submitted.
   2. Show the date submittal was sent, days since submittal was sent, status of submittal, date submittal was received in return, and any date associated with re-submittals.
   3. Update Master List with each submission and response.
   4. Transmit each submittal with a dated Design Agent accepted transmittal form.
      a. Sequentially number the transmittal form. Mark the revised submittals with an original number and a sequential alphabetic suffix.
      b. Identify the Project, Contractor, subcontractor and supplier; the pertinent drawing and detail number, and the specification Section number, appropriate to the submittal.
      c. Apply a Contractor's stamp, signed or initialed, certifying that the review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of the information is in accordance with the requirements of the Work and the Contract Documents.
      d. Schedule submittals to expedite the Project and deliver to the Design Agent at their business address. Coordinate the submission of related items.
      e. For each submittal for review, allow 15 days excluding the delivery time to and from the Contractor.
      f. Identify the variations from the Contract Documents and the Product or system limitations which may be detrimental to a successful performance of the completed Work.
      g. Allow space on the submittals for the Contractor's and the Design Agent's review stamps.
      h. When revised for resubmission, identify the changes made since the previous submission.
      i. Distribute copies of the reviewed submittals as appropriate. Instruct the parties to

promptly report an inability to comply with the Contract requirements.

j. Submittals not requested will not be recognized or processed.

k. Submittals Prepared Using Copyrighted AIA Forms:

1) Use only original copyrighted forms for the first typed copy of each submission. Do not use unauthorized duplications of copyrighted forms for the first typed copy.

2) Proceed to reproduce one or more copies of the first typed copy as may be required.

3) Copyrighted forms are those printed forms purchasable through an authorized outlet, or reproduced electronically under license from the AIA Electronic Document Service.

5. Submittals once approved cannot be resubmitted with alternate products unless the product is discontinued.

1.03 CONSTRUCTION PROGRESS SCHEDULES

A. Submit preliminary outline Schedules within 5 days after the date of receipt of a Purchase Order from CCRI Department of Purchasing for coordination with the Owner's requirements. After a review, submit detailed schedules within 5 days modified to accommodate the revisions recommended by the Design Agent.

B. Show a complete sequence of construction by activity, identifying the Work of separate stages and other logically grouped activities. Indicate the early and late start, the early and late finish, float dates, and the duration.

1.04 PRODUCT DATA

A. Product Data: Submit to the Design Agent for review for the limited purpose of checking for conformance with the information given and the design concept expressed in the Contract Documents. Provide copies and distribute in accordance with the SUBMITTAL PROCEDURES article and for the record documents purposes described in Section 01 7800.

B. Submit the number of copies which the Contractor requires, plus two copies the Design Agent will retain.

C. Mark each copy to identify the applicable products, models, options, and other data. Supplement the manufacturers' standard data to provide the information specific to this Project.

D. Indicate the product utility and electrical characteristics, the utility connection requirements, and the location of utility outlets for service for functional equipment and appliances.

E. After a review distribute in accordance with the Submittal Procedures article above and provide copies for record documents described in Section 01 7800.

1.05 SHOP DRAWINGS

A. Shop Drawings: Submit to the Design Agent for review for the limited purpose of checking for conformance with the information given and the design concept expressed in the Contract Documents. Produce copies and distribute in accordance with the SUBMITTAL PROCEDURES article and for the record documents purposes described in Section 01 7800.

B. Indicate the special utility and electrical characteristics, the utility connection requirements, and the location of utility outlets for service for functional equipment and appliances.

C. Submit in electronic form for review and then 4 copies for record.

1.06 SAMPLES

A. Samples: Submit to the Design Agent for review for the limited purpose of checking for conformance with the information given and the design concept expressed in the Contract Documents. Produce duplicates and distribute in accordance with the SUBMITTAL PROCEDURES article and for the record documents purposes described in Section 01 7800.
   1. Submit samples to illustrate the functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate the sample submittals for interfacing Work.
   2. Include an identification on each sample, with the full Project information.
   3. Submit the number of samples specified in the individual specification Sections; the Design Agent will retain one sample.
   4. Reviewed samples, which may be used in the Work, are indicated in the individual specification Sections.
   5. Samples will not be used for testing purposes unless they are specifically stated to be in the specification Section.

1.07 DESIGN DATA

A. Submit simultaneously to the Design Agent for their knowledge as contract administrator and to the Owner.

B. Submit for information for the limited purpose of assessing conformance with the information given and the design concept expressed in the Contract Documents.

1.08 TEST REPORTS

A. Submit simultaneously to both the Owner and Design Agent.

B. Submit test reports for information for the limited purpose of assessing conformance with the information given and the design concept expressed in the Contract Documents.

1.09 CERTIFICATES

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

1.10 MANUFACTURER'S INSTRUCTIONS

A. When specified in the individual specification Sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to the Design Agent for delivery to the Owner in the quantities specified for Product Data.

B. Indicate the special procedures, and the perimeter conditions requiring special attention, and the special environmental criteria required for application or installation.

1.11 MANUFACTURER'S FIELD REPORTS

A. Submit reports simultaneously to the Design Agent's benefit as contract administrator and to the Owner.

B. Submit the report in duplicate within 30 days of observation to the Design Agent for information.

C. Submit for information for the limited purpose of assessing conformance with the information given and the design concept expressed in the Contract Documents.

PART 2 – PRODUCTS

PART 3 – EXECUTION

END OF SECTION

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Quality control and control of installation.

B. Verification of Credentials and Licenses.

C. Tolerances

D. References

E. Testing

1.02 QUALITY CONTROL AND CONTROL OF INSTALLATION

A. Monitor a quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of the specified quality.

B. Comply with the manufacturers' instructions, including each step in sequence.

C. When the manufacturers' instructions conflict with the Contract Documents, request a clarification from the Design Agent before proceeding.

D. Comply with the specified standards as a minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform the Work by persons qualified to produce the required and specified quality.

F. Verify that field measurements are as indicated on the Shop Drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

H. See individual sections for mock-up requirements. Rebuild until accepted as a standard for the work.

1.03 VERIFICATION OF CREDENTIALS AND LICENSES

A. The Owner has implemented a project management oversight process and is applying it to current construction projects at CCRI.

B. An element of this oversight process is the verification that persons employed on the project site have appropriate and current credentials and licenses in their possession at the project site for the work they are performing.

C. Those persons without the appropriate credentials and licenses will be subject to dismissal from the project site.

1.04 TOLERANCES

A. Monitor the fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with the manufacturers' tolerances. When the manufacturers' tolerances conflict with the Contract Documents, request a clarification from the Design Agent before proceeding. Include the more rigorous tolerance requirements in the Base Bid.

C. Adjust products to appropriate dimensions; position before securing products in place.

1.05 REFERENCES

A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by the date of issue current on the date of the Contract Documents, except where a specific date is established by code.

C. Obtain copies of the standards where required by the product specification Sections.

D. When the specified reference standards conflict with the Contract Documents, request a clarification from the Design Agent before proceeding.

E. Neither the contractual relationships, duties, or responsibilities of the parties in the Contract, nor those of the Design Agent, shall be altered from the Contract Documents by mention or inference otherwise in reference documents.

1.06 TESTING

A. Contractor to include all testing required by the work in connection with specification section requirements.

B. Contractor to include all testing or permit verifications required by local officials in order to complete the work.

PART 2 – PRODUCTS

PART 3 – EXECUTION

END OF SECTION

SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Temporary Utilities:
   1. Temporary electricity
   2. Temporary heat and winter conditions.
   3. Temporary lighting for construction purposes.
   4. Telephone service.
   5. Temporary water service.
   6. Sanitary facilities.

B. Construction Facilities:
   1. Hoisting.
   2. Parking/Traffic.
   3. Progress cleaning and waste removal.
   4. Traffic and Pedestrian regulation.

C. Temporary Controls:
   1. Barriers.
   2. Security.
   3. Fire detection.
   4. Dust control.
   5. Noise control.
   6. Pollution control.

1.02 TEMPORARY ELECTRICITY

A. Generators will be required by the Contractor; electrical extension cords will not permitted to run across the ground from the building.

B. Provide flexible power cords as required for portable construction tools and equipment. All flexible power cords shall be suspended with hangers to eliminate trip hazards.

C. Provide distribution equipment, wiring, and outlets to provide single-phase branch circuits for power. Provide 20-ampere duplex outlets, single-phase circuits for power tools.

1.03 TEMPORARY HEAT AND WINTER CONDITIONS

A. The Contractor may schedule work through the winter as long as all costs of doing so are included in the Base Bid. All costs of winter enclosures, high strength additives, low-temp construction methods, heating equipment, fuel, fire watches that may be required and other winter conditions costs shall be borne by the Contractor at no additional cost to the Owner.

B. Once work begins, activity must be maintained until complete. Contractor may not demobilize once work has started. The loss of ramp access is a large inconvenience to the College community and must be justified by visible and ongoing construction activity.

1.04 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Provide and maintain incandescent lighting for construction operations to achieve a minimum lighting level of 2 watt/sq ft (21 watt/sq m). 24 hours/7 days

B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

C. Maintain lighting and provide routine repairs.

1.05 TELEPHONE SERVICE

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

1.06 TEMPORARY WATER SERVICE

A. The Owner will pay the cost of water used during construction. Exercise measures to conserve water. Utilize the Owner's existing water system. Extend and supplement with temporary devices as needed to maintain the specified conditions for construction operations.

B. Extend branch piping with outlets located so that water is available by hoses with threaded connections. Provide temporary pipe insulation if needed to prevent freezing.

1.07 TEMPORARY SANITARY FACILITIES

A. Provide Port-O-Johns and potable water for use of Contractor’s personnel within the limit of work. Secure at end of each work day. Construction personnel may not use College facilities.

1.08 HOISTING

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

B. Contractor may use scaffolding in lieu of lifts during the project at its own no cost option. If scaffolding is used, Contractor shall include the cost of providing concrete jersey barrier protection both sides to defeat traffic that might enter the work area under the ramp.

1.09 PARKING/TRAFFIC

A. Workers must park where directed by the College. Work trucks will not be allowed to park on the concrete plaza apron. Areas damaged by traffic or parking use must be restored to original condition at project completion.

B. Use of designated existing on-site streets and driveways for construction traffic is permitted. Tracked vehicles are not allowed on paved areas.

C. Do not allow heavy vehicles or construction equipment in parking areas.

D. Do not allow vehicle parking on existing sidewalks. Contractor shall conduct a pre-mobilization photo survey of existing sidewalk conditions and submit to Owner and Design Agent as a record for evaluating damaged areas after construction. Contractor is responsible for replacing sidewalks, roadway sections, and curbing to match that are damaged during construction.

E. Provide and maintain access to fire hydrants and control valves free of obstructions.

F. Remove mud from construction vehicle wheels before entering streets. Clean up dirt, rocks, and debris left on street from construction vehicles.

G. Maintenance:
1. Maintain the traffic and parking areas in a sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
2. Maintain existing and permanent paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain the paving and drainage in original, or specified, condition.

1.10 PROGRESS CLEANING AND WASTE REMOVAL

A. Maintain areas free of waste materials, debris, and rubbish. Maintain the site in a clean and orderly condition.

B. Collect and remove waste materials, debris, and rubbish from the site daily, as necessary to prevent an on-site accumulation of waste material, debris, and rubbish, and dispose off-site.

C. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

D. Lay-down areas under the ramp and main building will be permitted that do not interfere with pedestrian access to the building.

E. All snow removal to provide access to enclosures, maintain detoured egress, and within work area, shall be by forces of the Contractor within the Base Bid.

1.11 TRAFFIC AND PEDESTRIAN REGULATION

A. Signs, Signals, And Devices:
1. Post Mounted and Wall Mounted Traffic Control and Informational Signs: As approved by CCRI.
2. Traffic Cones and Drums, and Lights: As approved by CCRI.
3. Flag person: Is required when interrupting traffic flow.
4. Police Details: Provide all police details as required, including payment directly to officers for Town.
5. Interior and exterior signage to direct egress around the work area. Revise and relocate as condition change in agreement with the College.

B. Flag Persons: Provide trained and equipped flag persons to regulate the traffic when construction operations or traffic encroach on the public traffic lanes.

C. Lights: Use lights during the hours of low visibility to delineate the traffic lanes and to guide traffic.

D. Haul Routes:
1. Consult with the authority having jurisdiction, establish the public thoroughfares to be used for haul routes and site access.

E. Signs and Signals:
1. At approaches to the site and on site, install at crossroads, detours, parking areas, and elsewhere as needed to direct the construction and affected public traffic and pedestrians.
2. Relocate as the Work progresses, to maintain effective traffic and pedestrian control.

F. Removal:
   1. Remove equipment and devices when no longer required.
   2. Repair damage caused by installation.

1.12 BARRIERS

A. Provide barriers to allow for the Owner's use of the site, safe travel by the public into and out of the buildings and to protect existing facilities and adjacent properties from damage from the construction operations, or demolition.

B. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

C. Protect egress paths below the ramp construction at all times to maintain egress to first floor ramp and door and Ground floor doors along entire building south face. Provide positive overhead protection and spark protection.

1.13 ENCLOSURES AND FENCING

A. Provide barriers to allow for the Owner's use of the site and to protect existing facilities and adjacent properties from damage from the construction operations, or demolition. Separate the top of the ramp where doors are being removed from the building interior with secure stud wall with locked door panel for construction access only. Gasket as required to eliminate dust transfer.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way, or for public access to the building.

C. Provide protection for plants in and adjacent to the work area. Replace damaged plants.

D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

E. Provide 6-ft. high commercial grade chain link fence around on-site equipment or areas of site disturbance for the period required to protect work and the public. Equip with vehicular and pedestrian gates with locks if required for access. Provide one set of keys to all gates and door locks to the Owner. Weight fencing to withstand high winds.

F. Perform adjustment to the proposed layout as may be directed by the Owner.

G. Construct temporary egress enclosure for Library Building stair exit of wood studs, joists, rafters, and plywood sheathing sized sufficiently to withstand windloading and protect occupants. Maintain until plaza connection is restored.

1.14 SECURITY

A. Security Program:
   1. Protect the Work, and the existing premises from theft, vandalism, and unauthorized entry.
   2. Initiate the program in coordination with the Owner's existing security system at mobilization.
   3. Maintain the program throughout the construction period until Owner occupancy of each designated area.
   4. Contractor is responsible for all security within the work area and of the constructed enclosures and fencing serving it.

B. Entry Control: Coordinate the access of the Owner's personnel to the area in coordination with the Owner's security forces.

1.15 FIRE DETECTION

A. Before beginning any construction operation that can potentially trigger the existing fire alarm detection system, notify the Owner.

B. Failure to so notify the Owner will subject the Contractor to a monetary fine for each occurrence, should the fire detection system be activated inadvertently by a construction activity.

C. Comply with State underwriting standards and insurer recommendations for Hot Work, sprinkler impairment, and site maintenance.

D. Fire Protection system wok must be coordinated with CCRI's warrantee vendor and those costs included in the Base Bid.

1.16 DUST CONTROL

A. Execute the Work by methods to minimize raising dust from construction operations.

B. Provide positive means to prevent air-borne dust from dispersing into the building.

1.17 NOISE CONTROL

A. Provide methods, means, and facilities to minimize noise produced by the construction operations. Work only during agreed days and hours.

B. Concrete removal operations requiring power tools, such as rotary saws, grinders or hammer drills shall be performed during 3rd shift hours, defined at 10:30PM to 6AM.

1.18 POLLUTION CONTROL

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

1.19 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, and materials, prior to Substantial Completion.

B. Clean and repair the damage caused by installation or use of temporary work.

C. Restore the existing and new facilities used during construction to their original condition.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Transportation, handling, storage and protection.

B. Product option requirements.

C. Substitution limitations and procedures.

1.02 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents.

B. Use only sustainably Harvested Wood products:
   1. Definition: Wood-based materials include but are not limited to structural framing, dimension lumber, flooring, wood doors, finishes, and furnishings that are permanently installed in the project. Wood and wood-based products not permanently installed in the project are not included in the definition.
   2. Specific Wood-Based Fabrications: Fabricate of sustainably harvested wood when so specified elsewhere.
   3. Certification: Provide wood certified or labeled by an organization accredited by one of the following:
      a. The Forest Stewardship Council, The Principles for Natural Forest Management; for Canada visit http://www.fsccanada.org, for the USA visit http://www.fscus.org.

2.02 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

PART 3 EXECUTION

3.01 TRANSPORTATION AND HANDLING

A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

B. Transport and handle products in accordance with manufacturer's instructions.

C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.02 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

G. Prevent contact with material that may cause corrosion, discoloration, or staining.

H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

3.03 SUBSTITUTION PROCEDURES

A. Requests for substitutions must be submitted during the bidding period.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

C. A request for substitution constitutes a representation that the submitter:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
2. Will provide the same warranty for the substitution as for the specified product.
3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
4. Waives claims for additional costs or time extension that may subsequently become

apparent.

5. Will reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.

D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

E. Substitution Submittal Procedure:

1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
3. The Architect will notify Contractor in writing of decision to accept or reject request.

END OF SECTION

SECTION 01 7000
EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Examination.

B. Preparation.

C. Field Engineering.

D. Protection of adjacent construction.

E. Cutting and patching.

F. Special procedures.

G. Starting and adjusting of systems.

H. Demonstration and Instructions.

I. Testing, adjusting and balancing.

J. Protecting Installed Construction.

1.02 EXAMINATION

A. Acceptance of Conditions:

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

1.03 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply substrate primer, sealer, or conditioner, required or recommended by manufacturer, prior to applying any new material or substance in contact or bond.

D. Prior to the application, installation, or erection of any products and product components, performs any other preparatory operations, or surface or substrate modifications, as may be specified or directed by product manufacturers.

1.04 FIELD ENGINEERING

A. Employ a Land Surveyor registered in the State of Rhode Island and acceptable to Design Agent and the Owner if required by subgrade work.

B. Locate and protect survey control and reference points. Promptly notify Design Agent of any discrepancies discovered.

C. Control Datum for survey is to be agreed to with the Design Agent.

D. Verify setbacks and easements, if any; confirm drawing dimensions and elevations.

E. Provide field-engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

F. Submit a copy of site drawings and certificate signed by the Land Surveyor that the elevations and locations of the Work are in conformance with the Contract Documents.

G. Maintain a complete and accurate log of control and survey work as it progresses.

H. If required by the Owner, on completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

I. Protect survey control points prior to starting site work; preserve permanent reference point during construction.

J. Promptly report to Design Agent the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

K. Replace dislocated survey control point based on original survey control. Make no changes without prior written notice to Design Agent.

1.05 PROTECTION OF ADJACENT CONSTRUCTION

A. Protect existing adjacent properties and provide special protection where specified in individual Specification Sections.

B. Provide protective coverings at wall, projections, jambs, sills, and soffits of existing openings.

C. Protect existing finished floors, stairs, and other existing surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

D. Cover and protect furnishings, materials and equipment within the spaces receiving new work. Move items as necessary to install new work and return them to original locations at the close of construction in that area.

E. Repair adjacent properties damaged by construction operations to original condition to the satisfaction of the Owner.

F. Prohibit unnecessary traffic from existing landscaped areas.

G. Restore grassed landscaped areas damaged by construction operations to full healthy growth, by installing loam and sod to the requirements, and under the supervision of the maintenance staff at CCRI.

1.06 CUTTING AND PATCHING

A. Employ skilled and experienced installers to perform cutting and patching in the trades involved.

B. Provide cutting and patching work to properly complete the work of the project, complying with project requirements for:
1. Structural work.
2. Finish concrete (visible patching at PIV valve obsolete location).
3. Mechanical/electrical systems.
4. Visual requirements, including detailing and tolerances.
5. Operational and safety limitations.
6. Inspection, preparation, and performance.
7. Cleaning.

C. Do not cut and patch in a manner that would result in a failure of the work to perform as intended, decrease energy performance, increase maintenance, decrease operational life, or decrease safety performance.

D. Submit written request in advance of cutting or altering elements which affect:
1. Structural integrity of element.
2. Integrity of weather-exposed or moisture-resistant elements.
3. Efficiency, maintenance, or safety of element.
4. Visual qualities of sight-exposed elements.
5. Existing construction, or Work of separate contractor.

E. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
1. Fit the several parts together, to integrate with other Work.
2. Uncover Work to install or correct ill-timed Work.
3. Remove and replace defective and non-conforming Work.
4. Remove samples of installed Work for testing.
5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.
6. Fill and repair obsolete openings of relocated utilities.

F. Inspect conditions prior to work to identify scope and type of work required. Protect adjacent work. Notify Owner of work requiring interruption to building services or Owner's operations.

G. Execute Work by methods that will avoid damage to other Work, and provide proper surfaces to receive patching and finishing.
1. Cutting: Use cutting tools, not chopping tools. Make neat holes. Minimize damage to adjacent work. Inspect for concealed utilities and structure before cutting.
2. Patching: Make patches, seams, and joints durable and inconspicuous. Comply with tolerances for new work. Match adjacent existing materials for fit and finish.

H. Cut masonry, concrete, and other rigid materials using masonry saw or core drill.

I. Remove ceiling material as necessary to access areas of work. Store and replace carefully to avoid damage. Replace all ceiling areas damaged during the work with new material to match.

J. Restore Work with new Products in accordance with requirements of Contract Documents.

K. Fit Work tight to pipes, sleeves, ducts, conduits, and other penetrations through surfaces.

L. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

M. At penetration of fire rated partitions, ceiling, or floor construction, completely seal voids with fire rated or fire resistant material in accordance with Specifications, to full thickness of the penetrated element.

N. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

O. Identify any hazardous substance or conditions exposed during the Work to the Owner and Design Agent for decision or remedy.

P. Clean work area and areas affected by cutting and patching operations.

Q. See General Conditions for additional requirements.

1.07 SPECIAL PROCEDURES

A. Materials: As specified in product Sections; match existing with new products, or salvaged products as appropriate, for patching and extending work.

B. Employ skilled and experienced installer to perform alteration work.

C. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.

D. Remove unsuitable material not marked for salvage, such as rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.

E. Remove debris and abandoned items from area and from concealed spaces.

F. Prepare surface and remove surface finishes to provide installation of new Work and finishes.

G. Close openings in exterior surfaces to protect existing Work from weather and extremes of temperature and humidity.

H. Remove, cut, and patch Work in a manner to minimize damage and to provide means of restoring products and finishes to original or specified condition.

I. Refinish existing visible surfaces to remain in renovated rooms and spaces to specified condition for each material, with a neat transition to adjacent finishes.

J. Where new Work abuts or aligns with existing, provide a smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.

K. When finished surfaces are cut so that a smooth transition with new Work is not possible, terminate existing surface along a straight line at a natural line of division and submit recommendation to Design Agent for review.

L. Where a change of plane of 1/4 inch or more occurs, submit recommendation for providing a smooth transition to Design Agent for review.

M. Trim existing doors as necessary to clear new floor finish. Refinish trim as required.

N. Patch or replace portions of existing surfaces which are damaged, or showing other imperfections.

O. Finish surfaces as specified in individual product Sections, or as indicated on the Drawings.

1.08 STARTING AND ADJUSTING OF SYSTEMS

A. Coordinate schedule for starting and adjusting of various equipment and systems.

B. Notify Design Agent and Owner seven days prior to starting and adjusting of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions which may cause damage.

D. Verify that tests, meter readings and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute starting and adjusting under supervision of responsible Contractor's personnel or manufacturer's representative, in accordance with manufacturer's instructions.

G. Adjust operating Products and equipment to ensure smooth and unhindered operation.

H. When specified in individual specifications Section, require manufacturer to provide authorized representative to be present at the site to inspect, check, and approve equipment or system installation prior to starting, and to supervise placing of equipment or system in operation.

I. Submit a written report in accordance with Section 01 4000 that equipment or system has been properly installed and is functioning correctly.

1.09 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of Substantial Completion.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manuals with Owner's personnel in detail to explain all aspects of operation and maintenance.

D. Demonstrate start-up, operation, control, adjustment, trouble shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled or agreed upon times, at equipment or system location.

E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

1.10 TESTING, ADJUSTING, AND BALANCING

A. Submit, for the Owner's approval, the name of an independent firm to perform testing of fire systems. The independent firm's services will be paid for by the Contractor.

B. The independent firm will perform services specified in individual specifications Sections.

C. Reports will be submitted by the independent firm to the Design Agent and the Owner indicating observations and test results, indicating compliance or non-compliance with specified requirements and with the requirements of the Contract Documents.

1.11 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

E. Repair or replace installed Work damaged by construction operations, as directed by the Design Agent.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION

SECTION 01 7320
WASTE MANAGEMENT

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

D. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:

1. Aluminum and plastic beverage containers.
2. Corrugated cardboard.
3. Wood pallets.
4. Clean dimensional wood: May be used as blocking or furring.
5. Land clearing debris, including brush, branches, logs, and stumps.
6. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
7. Glass.
8. Gypsum drywall and plaster.
9. Plastic buckets.
10. Paper, including wrapping, newsprint, and office.
11. Concrete.

E. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, incineration, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports. Submit in accordance with Section 01 3300.

F. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.

G. Methods of trash/waste disposal that are not acceptable are:

1. Burning on the project site.
2. Burying on the project site.
3. Dumping or burying on other property, public or private.
4. Other illegal dumping or burying.

H. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. Section 01 5000 - Temporary Facilities and Controls: Additional requirements related to trash/waste collection and removal facilities and services.

C. Section 01 6000 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.

D. Section 01 7000 - Execution Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

1.03 DEFINITIONS

A. Clean: Untreated and unpainted; Not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.04 SUBMITTALS

A. See Section 01 3300 for submittal procedures.

B. Waste Management Plan: Include the following information:

1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.

C. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.

1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
2. Submit Report on a form acceptable to Owner.
3. Landfill Disposal: Include the following information:
   a. Identification of material.
   b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
   c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
   d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
4. Incinerator Disposal: Include the following information:
   a. Identification of material.
   b. Amount, in tons or cubic yards, of trash/waste material from the project delivered to incinerators.
   c. State the identity of incinerators, total amount of fees paid to incinerator, and total disposal cost.
   d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
5. Recycled and Salvaged Materials: Include the following information for each:
   a. Identification of material, including those retrieved by installer for use on other projects.
   b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.
   c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.

d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.

e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.

6. Material Reused on Project: Include the following information for each:

a. Identification of material and how it was used in the project.

b. Amount, in tons or cubic yards.

c. Include weight tickets as evidence of quantity.

7. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 2 PRODUCTS – Not used.

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

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

B. See Section 01 3000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

C. See Section 01 5000 for additional requirements related to trash/waste collection and removal facilities and services.

D. See Section 01 6000 for waste prevention requirements related to delivery, storage, and handling.

E. See Section 01 7000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Design Agent.

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Meetings: Discuss trash/waste management goals and issues at project meetings.

1. Pre-bid meeting.

2. Pre-construction meeting.

3. Regular job-site meetings.

E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.

1. Provide containers as required.

2. Provide adequate space for pick-up and delivery and convenience to subcontractors.

3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

1.2 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Individual Product Sections: Specific requirements for operation and maintenance data.

C. Individual Product Sections: Warranties required for specific products or Work.

1.3 SUBMITTALS

A. Project Record Documents: Submit documents to Design Agent with claim for final Application for Payment.
   1. Submit (2) electronic copies and (3) print copies of all documents.

B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Design Agent will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Design Agent comments. Revise content of all document sets as required prior to final submission.
   4. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Changes made by Addenda and modifications.

F. Record Drawings: Legibly mark each item to record actual construction including:
   1. Field changes of dimension and detail.
   2. Details not on original Contract drawings.

3.2 MAINTENANCE DATA

A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

3.3 MAINTENANCE MANUALS

A. Prepare data in the form of an owner's manual.

B. Binder: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size.

C. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Design Agent, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   3. Part 3: Project documents and certificates, including the following:
      a. Shop drawings and product data.
      b. Photocopies of warranties and bonds.

3.4 WARRANTIES AND BONDS

A. Warranty period shall commence at date of substantial completion.

B. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.

C. Verify that documents are in proper form, contain full information, and are notarized.

D. Co-execute submittals when required.

E. Retain warranties and bonds until time specified for submittal.

F. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

END OF SECTION

SECTION 02 4100
SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of built site elements.

B. Selective demolition of building elements for alteration purposes.

C. Abandonment and removal of existing utilities.

1.02 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.

B. Section 01 1000 - Summary: Sequencing and staging requirements.

C. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

D. Section 01 6000 - Product Requirements: Handling and storage of items removed for salvage and relocation.

E. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring, cutting and patching.

F. Section 01 7320- Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.

1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Site Plan: Showing:
   1. Vegetation to be protected.
   2. Areas for temporary construction and field offices.
   3. Areas for temporary and permanent placement of removed materials.
   4. Location of loading area for removal of materials to be disposed.

C. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

PART 3 EXECUTION

2.01 SCOPE

A. Remove portions of existing building as required for installation of new work and/or as shown on the Contract Documents.

B. See sitework sections for site demolition and earthwork.

C. Remove other items indicated, for salvage, relocation, and recycling.

2.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with other requirements specified in Section 01 7000.

B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.

3. Provide, erect, and maintain temporary barriers and security devices.
4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
6. Do not close or obstruct roadways or sidewalks without permit.
7. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.

C. Do not begin removal until receipt of notification to proceed from Owner.

D. Do not begin removal until built elements to be salvaged or relocated have been removed.

E. Do not begin removal until vegetation to be relocated has been removed and specified measures have been taken to protect vegetation to remain.

F. Protect existing structures and other elements that are not to be removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

G. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

H. If hazardous materials are discovered during removal operations, stop work and notify Design Agent and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

I. Perform demolition in a manner that maximizes salvage and recycling of materials.
   1. Comply with requirements of Section 01 7419 7320 - Waste Management.
   2. Dismantle existing construction and separate materials.
   3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

J. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

2.03 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

I. Patch in wall openings to match where utilities are removed.

2.04 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Design Agent before disturbing existing installation.
   3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Separate areas in which demolition is being conducted from other areas that are still occupied.
   1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 5000 in locations indicated on drawings.

C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.

D. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.

E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. See Section 01 1000 for other limitations on outages and required notifications.
   4. Verify that abandoned services serve only abandoned facilities before removal.
   5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.

F. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch as specified for patching new work.

2.05 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Remove from site all materials not to be reused on site; comply with requirements of Section 01 7320 - Waste Management.

C. Leave site in clean condition, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings.
2. Foundation walls.
3. Slabs-on-grade.
4. Suspended slabs.
5. Concrete toppings.
6. Building frame members.
7. Building walls.

B. Related Sections:

1. Division 03 Section "Design Agent Concrete" for general building applications of specially finished formed concrete.
2. Division 03 Section "Concrete Topping" for emery- and iron-aggregate concrete floor toppings.
3. Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.
4. Division 32 Section "Concrete Paving" for concrete pavement and walks.
5. Division 32 Section "Decorative Concrete Paving" for decorative concrete pavement and walks.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, and other pozzolans that do not retard short term strength of concrete; ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

B. Fly-Ash: Fly-ash is not allowed for this project.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.

1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.

E. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Design Agent.

F. Samples: For waterstops, vapor retarder

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For [Installer] [manufacturer] [testing agency].

B. Welding certificates.

C. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Fiber reinforcement.
6. Waterstops.
7. Curing compounds.
8. Floor and slab treatments.
9. Bonding agents.
10. Adhesives.
11. Vapor retarders.
12. Semirigid joint filler.
13. Joint-filler strips.
14. Repair materials.

D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

E. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

F. Field quality-control test and inspection reports.

G. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

H. Mockups: Cast concrete slab-on-grade and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.

1. Build panel approximately 200 sq. ft. for slab-on-grade and 100 sq. ft. for formed surface in the location indicated or, if not indicated, as directed by Design Agent.

2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

I. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete subcontractor.
e. Special concrete finish subcontractor when work is indicated.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.]

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.

2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

   a. High-density overlay, Class 1 or better.
   b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
   c. Structural 1, B-B or better; mill oiled and edge sealed.
   d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.

E. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

F. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

G. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

H. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

   1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

I. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

   1. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
   2. Furnish ties with integral water-barrier plates to walls indicated to receive waterproofing.

2.3 STEEL REINFORCEMENT

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

2.4 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.5 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I/II. Supplement with the following:

a. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Water: ASTM C 94/C 94M and potable.

2.6 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
3. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
4. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
5. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include:

a. Euclid Chemical Company (The), an RPM company; EUCON CIA.
b. Grace Construction Products, W. R. Grace & Co.; DCI.
c. Sika Corporation; Sika CNI.
d. Master Builders, Inc., Rheocrete, CNI
e. Boral Material Technologies, Boral BCN

D. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include:

a. BASF Construction Chemicals - Building Systems; Rheocrete 222+.
b. Cortec Corporation; MCI- 2000 and/or 2005NS.
c. Grace Construction Products, W. R. Grace & Co.; DCI-S.
d. Sika Corporation; FerroGard 901.
e. Axim Concrete Technologies, Gatexol 1000CI
f. Boral Material Technologies, Inc., Boral BCN2

E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include:

a. ChemMasters.
b. Davis Colors.
c. Dayton Superior Corporation.
d. Hoover Color Corporation.
e. Lambert Corporation.
f. QC Construction Products.
g. Rockwood Pigments NA, Inc.
h. Scofield, L. M. Company.
i. Solomon Colors, Inc.

2. Color: As selected by Design Agent from manufacturer's full range and.or as indicated on drawings.

2.7 WATERSTOPS

A. Flexible Rubber Waterstops: CE CRD-C 513, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include:

a. Greenstreak.
b. Williams Products, Inc.

2. Profile: Flat, dumbbell with center bulb or as indicated on drawings.
3. Dimensions: 4 inches by 3/16 inch thick; nontapered or as indicated on drawings.

B. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Carlisle Coatings & Waterproofing, Inc.; MiraSTOP.
b. CETCO; Volclay Waterstop-RX.
c. Concrete Sealants Inc.; Conseal CS-231.
d. Greenstreak; Swellstop.
e. Henry Company, Sealants Division; Hydro-Flex.
f. JP Specialties, Inc.; Earth Shield Type 20.

2.8 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A, except with maximum perm rating of 5 mils. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Fortifiber Building Systems Group; Moistop Ultra 15.
b. Meadows, W. R., Inc.; Perminator 15 mil.
c. Raven Industries Inc.; Vapor Block 15.
d. Reef Industries, Inc.; Griffolyn 15 mil Green.
e. Stego Industries, LLC; Stego Wrap 15 mil Class A.

2.9 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, the following:

a. Axim Italcementi Group, Inc.; CATEXOL CimFilm.
b. BASF Construction Chemicals - Building Systems; Confilm.
c. ChemMasters; SprayFilm.
d. Conspec by Dayton Superior; Aquafilm.
e. Dayton Superior Corporation; Sure Film (J-74).
f. Edoco by Dayton Superior; BurkeFilm.
g. Euclid Chemical Company (The), an RPM company; Eucobar.
h. Kaufman Products, Inc.; Vapor-Aid.
i. Lambert Corporation; LAMBCO Skin.
j. L&M Construction Chemicals, Inc.; E-CON.
k. Meadows, W. R., Inc.; EVAPRE.
l. Metalcrete Industries; Waterhold.
m. Nox-Crete Products Group; MONOFILM.
n. Sika Corporation; SikaFilm.
o. SpecChem, LLC; Spec Film.
p. Symons by Dayton Superior; Finishing Aid.
q. TK Products, Division of Sierra Corporation; TK-2120 TRI-FILM.
r. Unitex; PRO-FILM.

s. Vexcon Chemicals, Inc.; Certi-Vex Envio Set.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering. Contractor to coordinate with floor covering manufacturer.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include:

a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
b. BASF Construction Chemicals - Building Systems; Kure 200.
c. ChemMasters; Safe-Cure Clear.
d. Conspec by Dayton Superior; W.B. Resin Cure.
e. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).
f. Edoco by Dayton Superior; Res X Cure WB.
g. Euclid Chemical Company (The), an RPM company; Kurez W VOX; TAMMSCURE WB 30C.
h. Kaufman Products, Inc.; Thinfilm 420.
i. Lambert Corporation; AQUA KURE - CLEAR.
j. L&M Construction Chemicals, Inc.; L&M Cure R.
k. Meadows, W. R., Inc.; 1100-CLEAR.
l. Nox-Crete Products Group; Resin Cure E.
m. Right Pointe; Clear Water Resin.
n. SpecChem, LLC; Spec Rez Clear.
o. Symons by Dayton Superior; Resi-Chem Clear.
p. TK Products, Division of Sierra Corporation; TK-2519 DC WB.
q. Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.

F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering; Contractor to coordinate with floor covering manufacturer and installers.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include:

a. Anti-Hydro International, Inc.; AH Clear Cure WB.
b. BASF Construction Chemicals - Building Systems; Kure-N-Seal WB.
c. ChemMasters; Safe-Cure & Seal 20.
d. Conspec by Dayton Superior; Cure and Seal WB.
e. Cresset Chemical Company; Crete-Trete 309-VOC Cure & Seal.
f. Dayton Superior Corporation; Safe Cure and Seal (J-18).
g. Edoco by Dayton Superior; Spartan Cote WB II.
h. Euclid Chemical Company (The), an RPM company; Aqua Cure VOX; Clearseal WB 150.
i. Kaufman Products, Inc.; Cure & Seal 309 Emulsion.
j. Lambert Corporation; Glazecote Sealer-20.
k. L&M Construction Chemicals, Inc.; Dress & Seal WB.
l. Meadows, W. R., Inc.; Vocomp-20.

m. Metalcrete Industries; Metcure.
n. Nox-Crete Products Group; Cure & Seal 150E.
o. Symons by Dayton Superior; Cure & Seal 18 Percent E.
p. TK Products, Division of Sierra Corporation; TK-2519 WB.
q. Vexcon Chemicals, Inc.; Starseal 309.

G. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include:

a. BASF Construction Chemicals - Building Systems; Kure 1315.
b. ChemMasters; Polyseal WB.
c. Conspec by Dayton Superior; Sealcure 1315 WB.
d. Edoco by Dayton Superior; Cureseal 1315 WB.
e. Euclid Chemical Company (The), an RPM company; Super Diamond Clear VOX.
f. Kaufman Products, Inc.; Sure Cure 25 Emulsion.
g. Lambert Corporation; UV Safe Seal.
h. L&M Construction Chemicals, Inc.; Lumiseal WB Plus.
i. Meadows, W. R., Inc.; Vocomp-30.
j. Metalcrete Industries; Metcure 30.
k. Right Pointe; Right Sheen WB30.
l. Symons by Dayton Superior; Cure & Seal 31 Percent E.
m. Vexcon Chemicals, Inc.; Vexcon Starseal 1315.

2. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.10 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber at exterior condition and ASTM D 1752, cork or self-expanding cork at interior conditions.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.

C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types I and II, non-load bearing and Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Reglets: Fabricate reglets of not less than 0.022-inch thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

1.

2.11 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301. Contractor shall also conform to all material provisions set forth in the Rhode Island Department of Transportation (RIDOT) for roads and bridge construction 2004 Edition with all revisions.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Ground Granulated Blast-Furnace Slag: 40 percent.
2. Combined Pozzolan and Ground Granulated Blast-Furnace Slag: 40 percent portland cement minimum, with pozzolan not exceeding 25 percent.
3. Silica Fume: 10 percent.
4. Combined Pozzolans, and Silica Fume: 35 percent with pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
5. Combine Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

E. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Slump Limit: 4 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
4. Air Content: 6 percent, plus or minus 1.0 percent at point of delivery for 3/4-inch nominal maximum aggregate size.

B. Foundation Walls: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Slump Limit: 4 inches (100 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
4. Air Content: 6 percent, plus or minus 1.0 percent at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.

C. Interior Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
2. Minimum Cementitious Materials Content: 470 lb/cu. yd. (279 kg/cu. m).
3. Slump Limit: 5 inches or 8 inches for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus .
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.
5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

D. Concrete Toppings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
2. Minimum Cementitious Materials Content: 470 lb/cu. yd. (279 kg/cu. m).
3. Slump Limit: 4 inches (100 mm),for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus .
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.
5. Air Content: Do not allow air content of trowel-finished toppings to exceed 3 percent.

E. Exterior Concrete Sidewalks, Concrete Paving (for pedestrians and/or vehicles) and stairs: Proportion normal-weight concrete mixture as follows:

1. Provide concrete walks, paving and exterior steps with one course construction, finish thickness, as detailed. Provide 4,000 psi air-entrained concrete for all exterior concrete.
2. Provide a subgrade of undisturbed natural soil or thoroughly compacted fill. Remove all loose material and test subgrade for slope and grade before proceeding. Maintain all subgrade in satisfactory condition, protected against traffic and properly drained until the surfacing is placed. Place concrete only on moist subgrade; place no concrete on muddy or frozen subgrade. Do not concrete pouring until the subgrade has been approved.
3. Apply the specified clear curing and sealing compound to these surfaces immediately after final finishing.
4. Provide grade stakes not more than 25 feet apart for all walk and terrace construction. Check tops of forms for grade before placing concrete. Introduce short vertical curves at points where change in grade exceeds 2 percent. Provide slope across sidewalks, as shown. Make slight adjustments as necessary in slopes at intersection of walks.
5. Reinforce all walks with welded wire fabric 6x6/1.4x1.4 W.W.F. unless noted otherwise on drawings.
6. Provide expansion joints in sidewalks and paving of pre-moulded joint filler, 1/2 " thick and the full depth of the slab, located as indicated and generally not over 20'-0" apart. Between expansion joints, cut grooves 1/8" to 1/4" wide at least one-half inch deep as indicated; fill expansion joints with approved traffic-proof joint sealer.

F. Concrete Bases, Curbs, Etc.:

1. provide bases, curbs, and special foundations required for mechanical and electrical equipment. Verify the final sizes, details and locations with the equipment to be furnished.
2. Where indicated, attach bases, curbs, etc., to the supporting structural concrete by use of specified epoxy adhesive. Prepare surface to receive adhesive, mix and apply materials in strict accordance with the manufacturers recommendations.
3. Use interior slab on grade concrete design mix. A contractor option may use 6x6/1.4x1.4 W.W.F. in lieu of fiber reinforcing.

2.13 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

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

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.

2. Class B, 1/4 inch (6 mm) for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer (unless specifically noted on drawings “do not chamfer”), exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated on drawings.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 75 percent of its 28-day design compressive strength.

B. 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 for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Design Agent.

3.4 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

F. Epoxy-Coated Reinforcement (when required by drawings): Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

3.6 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Design Agent.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
6. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.7 WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.8 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Design Agent.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.9 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, to be covered with a coating or covering material applied directly to concrete.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, 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.
2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match

adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed 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 unformed surfaces unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:

   a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.
   b. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs.

3. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch (4.8 mm).

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Design Agent before application.

F. Slip-Resistive Finish: Before final floating, apply slip-resistive aluminum granule finish where indicated and to concrete stair treads, platforms, and ramps without applied covering. Apply according to manufacturer's written instructions and as follows:

1. Uniformly spread 25 lb/100 sq. ft. (12 kg/10 sq. m) of dampened slip-resistive aluminum granules over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
2. After broadcasting and tamping, apply float finish.
3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aluminum granules.

G. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces according to manufacturer's written instructions and as follows:

1. Uniformly apply dry-shake floor hardener at a rate of 100 lb/100 sq. ft. (49 kg/10 sq. m) unless greater amount is recommended by manufacturer.
2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader, and embed by power floating. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
3. After final floating, apply a trowel finish. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

3.11 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.12 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

   a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor and/or traffic covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS – NEW CONCRETE WORK

A. Defective Concrete: Repair and patch defective areas when approved by Design Agent. Remove and replace concrete that cannot be repaired and patched to Design Agents approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Design Agent.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Design Agent’s approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Design Agent's approval.

3.15 FIELD QUALITY CONTROL

A. Testing and Inspecting: As part of the Base Bid, Contractor will engage a qualified testing and inspecting agency subject to approval by the Design Agent and Owner to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

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

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.

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

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
6. Compression Test Specimens: ASTM C 31/C 31M.

   a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
   b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

   a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
   b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
10. Test results shall be reported in writing to Design Agent, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Design Agent but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Design Agent. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Ar.

13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 48 hours of finishing.

3.16 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 03 30 00

SECTION 03 4500
PRECAST ARCHITECTURAL CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Architectural precast concrete panels. All precast at ramp and vestibule sidewalls.

B. Architectural precast concrete accessories.

C. Supports, anchors, and attachments.

D. Grouting under panels.

1.02 RELATED REQUIREMENTS

A. Section 07 2100 - Thermal Insulation: Integral insulation.

B. Section 07 6200 - Sheet Metal Flashing and Trim: Reglets recessed in units.

C. Section 07 9200 - Joint Sealants: Sealing perimeter and intermediate joints.

1.03 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2017).

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

D. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts; 2007a (Reapproved 2014).

E. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts [Metric]; 2007.

F. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2016.

G. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2016.

H. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2016, with Editorial Revision (2016).

I. ASTM C150/C150M - Standard Specification for Portland Cement; 2017.

J. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2017a.

K. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.

L. PCI MNL-117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products; 2013.

M. PCI MNL-120 - PCI Design Handbook - Precast and Prestressed Concrete; 2012.

N. PCI MNL-122 - Architectural Precast Concrete; 2007.

O. PCI MNL-123 - Design and Typical Details of Connections for Precast and Prestressed Concrete; 1988.

P. PCI MNL-135 - Tolerance Manual for Precast and Prestressed Concrete Construction; 2000.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's information on accessory products, including pigments, admixtures, inserts, plates, etc.

C. Shop Drawings: Indicate layout, unit locations, configuration, unit identification marks, reinforcement, integral insulation, insulated panel system connectors, connection details, support items, location of lifting devices, dimensions, openings, and relationship to adjacent materials. Provide erection drawings. Provide building loading for review by the Structural Engineer of Record. Stamp shop drawings by engineer registered in RI.

D. Samples: For each type of finish indicated on exposed surfaces of architectural precast concrete units, in sets of 3, illustrating full range of finish, color, and texture variations expected; approximately 12 by 12 by 2 inches.
   1. When other faces of precast concrete unit are exposed, include Samples illustrating workmanship, color, and texture of backup concrete as well as facing concrete.

E. Range Samples: After sample panel approval and before fabricating architectural precast concrete units, produce a minimum of 5 sets of samples, approximately 3 sq. ft. in area, representing anticipated range of each color and texture on Project's units. Following range sample, maintain one set of samples at Project site and remaining sample sets at manufacturer's plant as color and texture approval reference.

F. Mockups: After sample panel approval but before production of structural precast concrete units with architectural finish, construct full-sized mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution. Mockups to be representative of the finished work in all respects including sealants and precast concrete complete with anchors, connections, and joint fillers as accepted on the final Shop Drawings. Build mockups to comply with the following requirements, using materials indicated for the completed work:
   1. Build mockups to show a range of finishes in the location and of the size as directed by Design Agent
   2. Notify Design Agent in advance of dates and times when mockups will be constructed.
   3. Obtain Design Agent's approval of mock ups before starting fabrication of precast concrete members.
   4. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   5. Demolish and remove mockups when directed.

G. Fabricator Qualification Statement: Submit industry certification of plant..

1.06 QUALITY ASSURANCE

A. Design Engineer Qualifications: Design precast concrete units under direct supervision of a Professional Structural Engineer experienced in design of precast concrete and licensed in the State of Rhode Island. Stamped shop drawings required.

B. Fabricator Qualifications:
   1. Firm having at least 5 years of documented experience in production of precast concrete of the type required.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Handling: Lift and support precast units only from support points.

B. Protect units to prevent staining, chipping, or spalling of concrete.

PART 2 PRODUCTS

2.01 PRECAST UNITS, GENERAL

A. Precast Architectural Concrete Units: Comply with PCI MNL-120, PCI MNL-122, PCI MNL-123, PCI MNL-135, and ACI 318.
   1. Design Loads: Static loads, anticipated dynamic loading, including positive and negative wind loads, thermal movement loads, and erection forces as defined by applicable code.
   2. Calculate structural properties of units in accordance with ACI 318.

3. Accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
4. Provide connections that accommodate building movement and thermal movement and adjust to misalignment of structure without unit distortion or damage.

B. Finish: Ensure exposed-to-view finish surfaces of precast units are uniform in color and appearance. Panel faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight, and sharp. Finish exposed-face surfaces of architectural precast concrete units to match approved mockups and as follows.
   1. Finish exposed top and bottom of surfaces of architectural precast concrete units to match face-surface finish.

2.02 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi).
   1. Galvanized in accordance with ASTM A767/A767M, Class I.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.

B. Fine and Coarse Structural Aggregates: ASTM C33/C33M.
   1. Face-Mixture-Coarse Aggregates: Selected, hard, and durable;. free of material that reacts with cement or causes staining; to match selected finish sample.
      a. Gradation: Uniformly graded.
   2. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand of same material as coarse aggregate, unless otherwise approved by Designer.

C. Lightweight Structural Aggregate: ASTM C330/C330M.

D. Color Additives: Pure, concentrated mineral pigments specifically intended for mixing into concrete and complying with ASTM C979/C979M.
   1. Color(s): As selected by Design Agent from manufacturer's full range.

E. Surface Retarder: As recommended by casting firm.

F. Water: Clean and not detrimental to concrete.

G. Fiber Reinforcement: Synthetic fiber shown to be resistant to long-term deterioration when exposed to moisture and alkalis; 1/2 inch length.

H. Grout:
   1. Non-shrink, non-metallic, minimum 10,000 psi, 28 day strength.
   2. Epoxy.

2.04 FORM LINERS

A. Manufacturers:
   1. Fitzgerald Formliners: www.formliners.com.
   2. Greenstreak: www.greenstreak.com.
   3. Symons Corporation: www.symons.com.

B. Material: Glass fiber reinforced polyester, Acrylonitrile butadiene styrene, Polyvinyl chloride, Polystyrene, or Polyurethane.

2.05 SUPPORT DEVICES

A. Connecting and Support Devices; Anchors and Inserts: ASTM A36/A36M steel; hot-dip galvanized in accordance with ASTM A153/A153M.
   1. Clean surfaces of rust, scale, grease, and foreign matter.
   2. Prime paint in one coat, except surfaces in direct contact with concrete or requiring field welding.

B. Bolts, Nuts, and Washers: Stainless steel heavy hex structural bolts, nuts, and washers.

2.06 FABRICATION

A. Fabricate in conformance with PCI MNL-117 and PCI MNL-135.

B. Use form liners in accordance with manufacturer's instructions.

C. Maintain consistent quality during manufacture.

D. Fabricate connecting devices, plates, angles, items fit to steel framing members, inserts, bolts, and accessories. Fabricate to permit initial placement and final attachment.

E. Embed reinforcing steel, anchors, inserts plates, angles, and other cast-in items.

F. Place recessed flashing reglets continuous and straight.

2.07 FABRICATION TOLERANCES

A. Conform to PCI MNL-117 and PCI MNL-135, except as specifically amended below.
   1. Maximum Variation From Nominal Face Dimensions: Plus or minus 3/32 in.
   2. Maximum Variation From Square or Designated Skew: Plus or minus 1/8 inch in 10 feet.
   3. Maximum Variation from Thickness: Plus or minus 1/8 in.
   4. Maximum Misalignment of Anchors, Inserts, Openings: Plus or minus 1/8 inch.
   5. Maximum Bowing of Members: Plus or minus length/360.

2.08 ACCESSORIES

A. Bearing Pads: High density plastic; 1/8 inch (3 mm) thick, smooth both sides.

B. Reglets: Specified in Section 07 6200.

2.09 SOURCE QUALITY CONTROL

A. Provide testing and analysis of concrete mix.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that building structure, anchors, devices, and openings are ready to receive work of this section.

3.02 PREPARATION

A. Provide for erection procedures and induced loads during erection. Maintain temporary bracing in place until final support is provided.

3.03 ERECTION

A. Erect units without damage to shape or finish. Replace or repair damaged panels.

B. Erect units level and plumb within allowable tolerances.

C. Align and maintain uniform horizontal and vertical joints as erection progresses.

D. When units require adjustment beyond design or tolerance criteria, discontinue affected work; advise Design Agent.

E. Exposed Joint Dimension: 1/2 inch. Adjust units so that joint dimensions are within tolerances.

3.04 TOLERANCES

A. Erect members level and plumb within allowable tolerances. Conform to PCI MNL-135, except as specifically amended below.
   1. Plan Location from Building Grid Datum: Plus or minus 3/8 in.
   2. Top Elevation from Nominal Top Elevation: Plus or minus 3/8 inch.
   3. Maximum Plumb Variation Over Height of Structure or 100 ft (whichever is less): Plus or minus 1/2 inch.
   4. Exposed Joint Dimension: Plus or minus 3/16 inch.

END OF SECTION

SECTION 03 7300
CONCRETE REHABILITATION

PART 1 - GENERAL

1.01 SUMMARY

A. Removal of damaged concrete, preparation and patching of exterior ramp surface, vertical edges and overhead surfaces with an epoxy-modified, portland cement mortar.

B. Coating of exposed rebar.

C. Cleaning of rust stains from exposed concrete to remain.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 – Cast-in-Plase Concrete for repair of new concrete.

B. Section 09 8000 - Special Coatings for rebar

C. See structural repair drawings for additional specification information.

1.03 QUALITY ASSURANCE

A. Contractor qualifications: Contractor shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. Contractor shall maintain qualified personnel who have received product training by a manufacturer's representative.

B. Install materials in accordance with all safety and weather conditions required by manufacturer, or as modified by applicable rules and regulations of local, state, and federal authorities having jurisdiction. Consult Material Safety Data Sheets for complete handling recommendations.

1.04 DELIVERY, STORAGE, AND HANDLING

A. All materials must be delivered in original, unopened containers with the manufacturer's name, labels, product identification, and batch numbers. Damaged material must be removed from the site immediately.

B. Store all materials off the ground and protect from rain, freezing, or excessive heat until ready for use.

C. Condition the specified product as recommended by the manufacturer.

1.05 JOB CONDITIONS

A. Environmental Conditions: Do not apply material if it is raining or snowing, or if such conditions appear to be imminent. Minimum application temperature 45°F (5°C) and rising.

B. Protection: Precautions should be taken to avoid damage to any surface near the work zone due to mixing and handling of the specified coating.

1.06 SUBMITTALS

A. Submit two copies of manufacturer's literature, to include: Product Data Sheets and appropriate Material Safety Data Sheets (MSDS).

1.07 WARRANTY

A. Provide a written warranty from the manufacturer against defects of materials for a period of one (1) year, beginning with date of substantial completion of the project.

PART 2 - PRODUCTS

2.01 BASIS OF DESIGN

A. SikaTop 123 Plus, as manufactured by Sika Corporation, is considered to conform to the requirements of this specification. Propose substitutions in accordance with the Contract Documents.

2.02 MATERIALS

A. Polymer-modified portland cement mortar:

1. Component A shall be a liquid polymer emulsion of an acrylic copolymer base and additives.
   a. Ph: 4.5-6.5
   b. Film Forming Temperature: 73°F max.
   c. Tear Strength: 950-psi min.
   d. Elongation at Break: 500% min.
   e. Particle Size: less than 0.1 micron
2. Component A shall contain an organic, penetrating corrosion inhibitor that has been independently proven to reduce corrosion in concrete via ASTM G3 (half-cell potential tests). The corrosion inhibitor shall not be calcium nitrate and shall have a minimum of 5 years of independent field testing to document performance on actual construction projects.
3. Component B shall be a blend of selected portland cements, specially graded aggregates, admixtures for controlling setting time, water reducers for workability, and an organic accelerator.
4. The materials shall be non-combustible, both before and after cure.
5. The materials shall be supplied in a factory-proportioned unit.
6. The polymer-modified, portland cement mortar must be placeable from 1/8" to 1 1/2" in depth per lift for vertical applications and 1/8" to 1" in depth for overhead applications.

B. Cleaner:
   1. Stain remover specifically manufactured for removal of rust stains from concrete surfaces.

C. Rebar Coating:
   1. See Section 09 8000 for material to be used in this section.

D. Accessories:
   1. Use primers and other materials recommended by Sika for use in specific conditions. See drawings for additional materials.

2.03 PERFORMANCE CRITERIA

A. Typical properties of the mixed polymer-modified, portland cement mortar.
   1. Working time: Approximately 15 minutes
   2. Finishing time: 20-60 minutes
   3. Color: concrete gray

B. Typical properties of the cured polymer-modified, portland cement mortar:
   1. Compressive Strength (ASTM C-109 Modified)
      a. 1 day: 3500 psi (24.1 MPa)
      b. 7 day: 6000 psi (44.8 MPa)
      c. 28 day: 7000 psi (48.3 MPa)
   2. Flexural Strength (ASTM C-293) @ 28 days: 2000 psi (13.8 MPa)
   3. Splitting Tensile Strength (ASTM C-496) @ 28 days: 900 psi (6.2 MPa)
   4. Bond Strength (ASTM C-882 Modified) @ 28 days: 2200 psi (15.2 MPa)
   5. The portland cement mortar shall not produce a vapor barrier.
   6. Density (wet mix): 132 lbs. / cu. Ft. (2.2 kg/l)
   7. Permeability - AASHTO T-277 @ 28 days. Approximately 500 Coulombs.

C. Note: Tests above were performed with the material and curing conditions @ 71°F - 75°F and 45-55% relative humidity.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

A. Areas to be repaired must be clean, sound, and free of contaminants. All loose and deteriorated concrete shall be removed by mechanical means. Mechanically prepare concrete substrate to obtain a surface profile of +/- 1 16" (CSP 5 or greater as per ICRI Guidelines) with a new exposed aggregate surface. Area to be patched shall not be less than 1/8" in depth.

B. Where reinforcing steel with active corrosion is encountered, remove concrete to expose all sides of rebar including minimum1/2” clear behind bar to allow coating. Sandblast the steel to a white metal finish to remove all contaminants and rust. Where corrosion has occurred due to the presence of chlorides, the steel shall be high pressure-washed after mechanical cleaning. Coat steel in accordance with Section 09 8000.

3.02 MIXING AND APPLICATION

A. Mechanically mix in an appropriate sized mortar mixer or with a Sika mud paddle and low speed (400-600 rpm) drill. Pour approximately 4/5 gal Component A into the mixing container. Add Component B while continuing to mix. Mix to a uniform consistency for a maximum of three minutes. Add remaining Component A to mix for desired consistency. Should smaller quantities be needed, be sure the components are measured in the correct ratio and that the Component B is uniformly blended before mixing the components together. Mix only that amount of material that can be placed in 10-15 minutes. Do not retemper material.

B. Placement Procedure: At the time of application, the substrate shall be saturated surface dry with no standing water. Mortar must be scrubbed into substrate, filling all pores and voids. While the scrub coat is still plastic, force material against edge of repair, working toward center. If repair area is too large to fill while scrub coat is still wet, use Sika Armatec 110 EpoCem in lieu of scrub coat. (See spec component SC-200-0699) After filling, consolidate then screed. Allow mortar to set to desired stiffness, then finish with trowel for smooth surface. Wood float or sponge float for a rough surface. Areas where the depth of the repair area to sound concrete is greater than 1 1/2" maximum thickness. The top surface of each lift shall be scored to produce a rough surface for the next lift. The preceding lift shall be allowed to reach final set before applying fresh material. The fresh mortar must be scrubbed into the preceding lift.

C. As per ACI recommendations for portland cement concrete, curing is required. Moist cure with wet burlap and polyethylene, a fine mist of water, or a water-based* compatible curing compound. Moist curing should commence immediately after finishing and continue for 48 hours. Protect newly applied material from rain, sun, and wind until compressive strength is 70% of the 28-day compressive strength. To prevent from freezing, cover with insulating material. Setting time is dependent on temperature and humidity.
   1. *Pre-testing of curing compound is recommended.

D. Adhere to all procedures, limitations, and cautions for the polymer-modified portland cement mortar in the manufacturer’s current printed technical data sheet and literature.

3.03 CLEANING

A. Clean uncured epoxy-modified portland cement mortar from tools with water. The cured polymer-modified portland cement mortar can only be removed mechanically.

B. At exposed areas of concrete columns below repaired areas, clean to remove rust stains. Test area for cleaner strength for approval prior to start of work. Use weakest mix that will remove stains.

C. Leave finished work and work area in a neat, clean condition, without evidence of spillovers onto adjacent areas.

END OF SECTION

SECTION 05 12 00 - STRUCTURAL STEEL

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 SUMMARY

A. This Section includes the following:

1. Structural steel.
2. Grout.

B. Related Sections include the following:

1. Division 1 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
2. Division 9 painting for surface preparation and priming requirements.

1.3 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.

1.4 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand ASD-service loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using AISC's "Manual of Steel Construction, Allowable Stress Design," Part 4.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, holes, and other pertinent data.
2. Include embedment drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.

4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
5. For structural-steel connections indicated to comply with design loads.

C. Welding certificates.

D. Qualification Data: For testing agency.

E. Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:

1. Structural steel including chemical and physical properties.
2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
3. Direct-tension indicators.
4. Tension-control, high-strength bolt-nut-washer assemblies.
5. Shear stud connectors.
6. Shop primers.
7. Nonshrink grout.

F. Source quality-control test reports.

1.6 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

B. Comply with applicable provisions of the following specifications and documents:

1. AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. AISC's "Seismic Provisions for Structural Steel Buildings" and "Supplement No. 2."
3. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design.
4. AISC's "Specification for the Design of Steel Hollow Structural Sections."
5. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.

1. Store fasteners in a protected place. Clean and re-lubricate bolts and nuts that become dry or rusty before use.
2. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.8 COORDINATION

A. Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. Wide Flange Structural Sections: ASTM A992 Fy = 50 KSI

B. Plate and Bar: ASTM A 36.

C. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B**,** structural tubing.

D. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

a. Finish: Plain**.**

B. Unheaded Anchor Rods: ASTM A 36/A 36M.

1. Configuration: Straight and Hooked, a shown.
2. Nuts: ASTM A 563 (ASTM A 563M) hex carbon steel.
3. Plate Washers: ASTM A 36/A 36M carbon steel.
4. Washers: ASTM F 436 hardened carbon steel.
5. Finish: Plain.

C. Headed Anchor Rods: ASTM A 307.

1. Nuts: ASTM A 563 hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436 (ASTM F 436M) hardened carbon steel.
4. Finish: Plain.

D. Threaded Rods: ASTM A 307, Grade A.

1. Nuts: ASTM A 563 hex carbon steel.
2. Washers: ASTM F 436 hardened carbon steel.
3. Finish: Plain.

2.3 PRIMER

A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."

1. Mark and match-mark materials for field assembly.
2. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces according to SSPC-SP 3, "Power Tool Cleaning."

2.6 SHOP CONNECTIONS

A. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

1. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

2.7 SHOP PRIMING

A. Shop prime steel surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. SSPC-SP 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

D. Painting: Apply a 1-coat, non-asphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils (0.038 mm).

2.8 SOURCE QUALITY CONTROL

A. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Welded Connections: Shop-welded connections will be visually inspected.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify elevations of concrete-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."

B. Base Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base plates. Clean bottom surface of base plates.

1. Set base plates for structural members on wedges, shims, or setting nuts as required.

2. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base plate before packing with grout.
3. Promptly pack grout solidly between bearing surfaces and base plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.

E. Do not use thermal cutting during erection unless approved by Design Agent.

F. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: As part of the Base Bid, engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.

D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

A. Touchup Painting: After installation, promptly clean, prepare, and prime or re-prime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories, base plates, and abutting structural steel.

1. Clean and prepare surfaces by SSPC-SP 3 power-tool cleaning.
2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

END OF SECTION

SECTION 05 31 00 – STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Roof deck.

2. Floor deck.

B. Related Sections include the following:

1. Division 03 Section "Cast-in-Place Concrete" for concrete fill.
2. Division 05 Section "Structural Steel Framing" for shop- and field-welded shear connectors.
3. Division 09 painting Sections for repair painting of primed deck.
4. Division 07 Section ‘Single Ply Membrane Roofing (EFPM)”

1.3 SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

C. Product Certificates: For each type of steel deck, signed by product manufacturer.

D. Welding certificates.

E. Field quality-control test and inspection reports.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

1. Power-actuated mechanical fasteners.

G. Research/Evaluation Reports: For steel deck.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.

B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

C. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.

D. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

E. FMG Listing: Provide steel roof deck evaluated by FMG and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-295 windstorm ratings.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

1.6 COORDINATION

A. Coordinate installation of sound-absorbing insulation strips in topside ribs of acoustical deck with roofing installation specified in Division 07 Section to ensure protection of insulation strips against damage from effects of weather and other causes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Steel Deck:

a. ASC Profiles, Inc.
b. Canam Steel Corp.;The Canam Manac Group.
c. Consolidated Systems, Inc.
d. DACS, Inc.
e. D-Mac Industries Inc.
f. Epic Metals Corporation.
g. Marlyn Steel Decks, Inc.
h. New Millennium Building Systems, LLC.
i. Nucor Corp.; Vulcraft Division.
j. Roof Deck, Inc.
k. United Steel Deck, Inc.
l. Valley Joist; Division of EBSCO Industries, Inc.
m. Verco Manufacturing Co.
n. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

2.2 ROOF DECK

A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:

1. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 80 (550), G60 (Z180) zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.

   a. Color: Manufacturer's standard.

2. Deck Profile: Type WR, wide rib.
3. Profile Depth: 1-1/2 inches (38 mm).
4. Design Uncoated-Steel Thickness: As indicated.
5. Span Condition: Triple span or more.
6. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.4 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness and profile indicated.

G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.

H. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.

I. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck, with 3-inch- (76-mm-) wide flanges and sloped recessed pans of 1-1/2-inch (38-mm) minimum depth. For drains, cut holes in the field.

J. Galvanizing Repair Paint: ASTM A 780.

K. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members with mechanical fasteners as indicated on the structural drawings.

B. Side-Lap and Perimeter Edge Fastening: As indicated on structural drawings.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:

1. End Joints: Lapped 2 inches (51 mm) minimum or butted at Contractor's option.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 6 inches (305 mm) apart with at least two fastener at each corner.

E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. mechanically fasten to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.

F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: As part of the Base Bid, engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Design Agent.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.5 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on top surface of prime-painted deck immediately after installation, and apply repair paint.

1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Division 09 Section “Interior Painting”.

C. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Division 09 Section.

D. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 31 00

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. This Project is seeking LEED certification. The Contractor shall be familiar with and shall adhere to LEED BC+C: V4. Refer to section 01 81 10 SUSTAINABLE DESIGN REQUIREMENTS for additional information and LEED scorecard.

1.2 SUMMARY

A. This Section includes the following:

1. Exterior non-load-bearing wall framing.
2. Exterior load bearing wall framing.
3. Interior load bearing wall framing.
4. Floor framing.
5. Roof rafter framing.
6. Ceiling joist framing.

B. Related Sections include the following:

1. Division 05 Section "Metal Fabrications" for masonry shelf angles and connections.
2. Division 09 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.
3. Division 09 Sections for Gypsum board Shaft Wall Assemblies for interior non-load-bearing metal stud framed, shaft wall assemblies.
4. Division 13 Section ‘Metal Building System’

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated. If not indicated, as required by the State Building Code.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

   a. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/360 of the wall height, unless indicated otherwise.
   b. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height, unless indicated otherwise.
   c. Floor Joist Framing: Vertical deflection of 1/480 for live loads and l/360 for total loads of the span.
   d. Roof Trusses: Vertical deflection of 1/360 of the span.
   e. Roof Rafter Framing: Horizontal deflection of 1/360 of the horizontally projected span.
   f. Ceiling Joist Framing: Vertical deflection of 1/240 of the span.

3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.

4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
   a. Upward and downward movement of 3/4 inch.
   b. Roof structural framing upward and downward movement of 1 ½" minimum at 30 foot span or additional deflection at large span conditions.

B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."

1. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing - Header Design."
2. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
3. Roof Trusses: Design according to AISI's "Standard for Cold-Formed Steel Framing - Truss Design."

1.4 DELEGATED DESIGN AGENT REQUIREMENTS

A. Contract Documents: Concept of work specified by this Section is expressed on the Drawings and in Specifications, however, they may not indicate or specify the full extent of the work that may be required.

B. Delegated Design Agent Responsibility: Required fabricator/manufacturer to employ a delegated structural Design Agent, licensed to practice structural Design Agent in the jurisdiction where the project will be erected, to provide Design Agent design for work of this Section to comply with the concept expressed in the Contract Documents and State Building Codes.

C. Prepare Design Agent calculations, shop drawings and other submittals and affix professional seal according to the respective jurisdictional licensing regulations.

D. Prepare Program of Special Inspection requirements for the required special inspections under the State Building Code requirements. Submit the document to the Coordinator of the Program for Special Inspection prior to commencement of construction work under this Section. Owner will arrange for the Special Inspections that are required by the delegated structural Design Agent.

E. Changes to the Building Structural Frame: If required by the delegated Design Agent, submit request for changes to the building structural frame to the Design Agent. Construction costs associated with change, shall be at no additional cost to the Owner. This includes bracing any structural steel design by the building structural frame Design Agent when wall kickers induce rotation into structural members.

F. Building Structural Frame Movement Design Criteria: Obtain necessary project data from the Structural Design Agent of Record for the building frame and make such provision in the work as may be necessary. Identify movement compliance on Shop Drawings.

G. Exterior Roof [Truss Framing] Cladding:
   1. Wind Resistance Criteria: Withstand load effect of 150 percent of inward positive and outward negative design wind loading design pressures acting inward and outward normal to plane of roof as required the State Building Code. And not less than the cladding system manufacturer requirements or recommendations. Use the most stringent.

H. Exterior Design Agent Finish Cladding or Veneer Deflection Criteria:

1. Wind Resistance Criteria: Withstand load effect of 150 percent of inward positive and outward negative design wind loading design pressures acting inward and outward normal to plane of wall according to ASTM E330.
   a. Masonry Veneer: maximum deflection due to negative or positive wind load pressures l//600 of assembly clear span or 1/16 inch whichever is smaller.
   b. Exterior Manufactured Stone Cladding: maximum deflection due to negative or positive wind load pressures l/360 of assembly clear span or 1/16 inch whichever is smaller.
   c. Exterior Adhered Stone Masonry Veneer Cladding: maximum deflection due to negative or positive wind load pressures l/360 of assembly clear span or 1/16 inch whichever is smaller.
   d. Exterior Insulation Finish System: maximum deflection due to negative or positive wind load pressures l/360 of assembly clear span or 1/16 inch whichever is smaller.
   e. Other Cladding: maximum deflection due to negative or positive wind load pressures as required or recommended by the cladding manufacturer, but not less than l/240 of assembly clear span or 1/16 inch whichever is smaller.

I. Interior Floor Framing Deflection Criteria:
   1. Withstand applied dead and live load total combined effect not to exceed a deflection of l/360 unless a more stringent requirement by the floor finish manufacturer is required, recommended and/or as indicated in the Construction Documents.

J. Interior Wall Framing Deflection Criteria:
   1. Withstand applied dead and live load total combined effect not to exceed a bucking/deflection of l/360 unless a more stringent requirement by the wall finish manufacturer is required, recommended and/or as indicated in the Construction Documents.

1.5 SUBMITTALS

A. Product Data: For each type of cold-formed metal framing product and accessory indicated.

B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

   1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional Design Agent responsible for their preparation.

C. Welding certificates.

D. Qualification Data: For professional Design Agent and testing agency.

E. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:

   1. Steel sheet.
   2. Expansion anchors.
   3. Power-actuated anchors.
   4. Mechanical fasteners.
   5. Vertical deflection clips.
   6. Horizontal drift deflection clips
   7. Miscellaneous structural clips and accessories.

F. Research/Evaluation Reports: For cold-formed metal framing.

1.6 QUALITY ASSURANCE

A. Design Agent Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional Design Agent.

B. Professional Design Agent Qualifications [Delegated Design Agent Design]: A professional Design Agent who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing Design Agent services of the kind indicated. Design Agent services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.

D. Product Tests: Mill certificates or data from a qualified independent testing agency[, or in-house testing with calibrated test equipment] indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, ductility, and metallic-coating thickness.

E. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

F. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

G. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

   1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."

H. Comply with AISI's "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

I. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:

   1. Allied Studco.
   2. AllSteel Products, Inc.
   3. California Expanded Metal Products Company.
   4. Clark Steel Framing.
   5. Consolidated Fabricators Corp.; Building Products Division.
   6. Craco Metals Manufacturing, LLC.
   7. Custom Stud, Inc.
   8. Dale/Incor.

9. Design Shapes in Steel.
10. Dietrich Metal Framing; a Worthington Industries Company.
11. Formetal Co. Inc. (The).
12. Innovative Steel Systems.
13. MarinoWare; a division of Ware Industries.
14. Quail Run Building Materials, Inc.
15. SCAFCO Corporation.
16. Southeastern Stud & Components, Inc.
17. Steel Construction Systems.
18. Steeler, Inc.
19. Super Stud Building Products, Inc.
20. United Metal Products, Inc.

2.2 MATERIALS

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: As required by structural performance.
2. Coating: G60, A60, AZ50, or GF30.

C. Steel Sheet for Vertical Deflection and Drift Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.
2. Coating: G90.

2.3 LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: As indicated on Drawings. If not indicated, not less than 16 gauge.
2. Flange Width: 2 inches (51 mm) minimum.
3. Section Properties: minimum allowable calculated section modulus, moment of inertia, and allowable moment calculated for imposed loadings.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:

1. Minimum Base-Metal Thickness: Minimum of One gauge heavier than wall stud gage.
2. Flange Width: 1-1/4 inches (32 mm) minimum.

C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: As indicated on Drawings. If not indicated, not less than 16 gauge.
2. Flange Width: 2 inches (51 mm) minimum.
3. Section Properties: minimum allowable calculated section modulus, moment of inertia, and allowable moment calculated for imposed loadings.

D. Steel Double-L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths indicated, and as follows:

1. Minimum Base-Metal Thickness: As indicated on Drawings. If not indicated, not less than 16 gauge.
2. Flange Width: 2 inches (51 mm) minimum.
3. Section Properties: minimum allowable calculated section modulus, moment of inertia, and allowable moment calculated for imposed loadings.

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: As indicated on Drawings. If not indicated, not less than 18 gauge.
2. Flange Width: 2” inches.
3. Section Properties: As required to meet performance requirements for imposed loadings.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: Minimum of One gauge heavier than wall stud gage.
2. Flange Width: 1-1/4 inches (32 mm) minimum.

C. Vertical Deflection Clips: Manufacturer's standard bypass or head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dietrich Metal Framing; a Worthington Industries Company.
b. MarinoWare, a division of Ware Industries.
c. SCAFCO Corporation
d. The Steel Network, Inc.

D. Single Deflection Track [Interior Walls to Roof and/or Floor]: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure.

1. Minimum Base-Metal Thickness: Minimum of One stud gauge heavier than wall stud gauge.
2. Flange Width: 1 inch (25 mm) plus the design gap for 1-story structures and 1 inch (25 mm) plus twice the design gap for other applications.

E. Double Deflection Tracks [Interior Walls to Roof and/or Floor]: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:

a. Minimum Base-Metal Thickness: Minimum of One stud gauge heavier than wall stud gauge.

b. Flange Width: 1 inch plus the design gap for 1-story structures and 1 inch plus twice the design gap for other applications.

2. Inner Track: Of web depth indicated, and as follows:

a. Minimum Base-Metal Thickness: 0.0428 inch minimum.
b. Flange Width: Equal to sum of outer deflection track flange width plus 1 inch.

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.

2.5 FLOOR JOIST FRAMING

A. Steel Joists: Manufacturer's standard C-shaped steel joists, of web depths indicated, unpunched, or punched with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch (1.37 mm) minimum.
2. Flange Width: [2 inches (51 mm) minimum.
3. Section Properties: As required to meet performance requirements

B. Steel Joist Track: Manufacturer's standard U-shaped steel joist track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel joists.
2. Flange Width: 2 inches (51 mm) minimum.

2.6 ROOF-RAFTER FRAMING

A. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0538 inch, minimum.
2. Flange Width: 2 inches, minimum.
3. Section Properties: As required to meet performance requirements.

B. Built-up Members: Built-up members of manufacturer's standard C-shaped steel section, with stiffened flanges, nested into a U-shaped steel section joist track, with unstiffened flanges; unpunched; of web depths indicated; and as follows:

1. Minimum Base-Metal Thickness: Matching steel rafters.
2. Flange Width: 2 inches, minimum.

2.7 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers, knee braces, and girts.
9. Joist hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

2.8 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade55, threaded carbon-steel hex-headed bolts or headless, hooked bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.9 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.

B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.

D. Shims: Load bearing, high-density multimonomer plastic, nonleaching.

E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.10 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.

4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

C. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

H. Install insulation, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 LOAD-BEARING WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:

1. Anchor Spacing: 24 inches (610 mm) maximum.

B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch (3 mm) between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:

1. Stud Spacing: 16 inches (406 mm) maximum.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.

D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads.

F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.

1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.

I. Install horizontal bridging in stud system, spaced 48 inches (1220 mm) or as indicated on Shop Drawings. Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of 2 screws into each flange of the clip angle for framing members up to 6 inches (150 mm) deep.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As indicated.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to [bypassing] [infill] studs and anchor to building structure.
4. Connect drift clips to cold formed metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

a. Install solid blocking at centers indicated.

2. Bridging: Cold-rolled steel channel welded or mechanically fastened to webs of punched studs.

3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

3.6 JOIST INSTALLATION

A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.

B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.

1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm).
2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.

C. Space joists not more than 2 inches (51 mm) from abutting walls, and as follows:

1. Joist Spacing 16 inches (406 mm) maximum on center spacing

D. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists if indicated.

E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated on Shop Drawings.

1. Install web stiffeners to transfer axial loads of walls above.

F. Install bridging at intervals indicated on Shop Drawings. Fasten bridging at each joist intersection as follows:

1. Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.

G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.

H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.7 FIELD QUALITY CONTROL

A. Testing: As part of the Base Bid, engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor, Owner and Design Agent.

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 40 00

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel and aluminum items not covered in other sections.

B. Provide all necessary metal anchorage, blocking, and bracing items such as sleeves, plates, and hangers.

1.02 RELATED REQUIREMENTS

A. Section 05 1200 - Structural Steel Framing: Structural steel column anchor bolts.

B. Section 05 3100 - Steel Decking: Bearing plates for metal deck bearing, including anchorage.

C. Section 05 4000 – Cold formed Metal Framing.

D. Section 05 5213 - Pipe and Tube Railings.

1.03 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.

B. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2015.

C. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2008.

D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

E. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

F. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

G. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.

H. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.

I. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.

J. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

K. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.

L. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings; 2014, with Editorial Revision (2015).

M. ASTM B85/85M - Standard Specification for Aluminum-Alloy Die Castings; 2014.

N. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

O. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.

P. ASTM B210 - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2012.

Q. ASTM B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes (Metric); 2012.

R. ASTM B211 - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2012.

S. ASTM B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold-Finished Bar, Rod, and Wire (Metric); 2012.

T. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

U. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.

V. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.

W. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.

X. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2008.

Y. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc; 2011.

Z. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

AA. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

C. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

D. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.05 QUALITY ASSURANCE

A. Design under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in Rhode Island.

B. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

C. Plates: ASTM A283/A283M.

D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

E. Slotted Channel Framing: ASTM A653/A653M, Grade 33.

F. Slotted Channel Fittings: ASTM A1011/A1011M.

G. Fasteners: as appropriate to substrate.

H. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.

I. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.

J. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

K. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

L. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - ALUMINUM

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

B. Sheet Aluminum: ASTM B209 (ASTM B209M), 5052 alloy, H32 or H22 temper.

C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210 (ASTM B210M), 6063 alloy, T6 temper.

D. Aluminum-Alloy Bars: ASTM B211 (ASTM B211M), 6061 alloy, T6 temper.

E. Aluminum-Alloy Sand Castings: ASTM B26/B26M.

F. Aluminum-Alloy Die Castings: ASTM B85/B85M.

G. Bolts, Nuts, and Washers: Stainless steel.

H. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

2.03 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FINISHES - STEEL

A. Prime paint steel items.
   1. Exceptions: Galvanize items to be embedded in concrete, items to be embedded in masonry.
   2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

D. Prime Painting: One coat.

E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.

F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.05 FINISHES - ALUMINUM

A. Interior Aluminum Surfaces: Class I natural anodized.

B. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

2.06 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components as indicated on drawings.

D. Perform field welding in accordance with AWS D1.1/D1.1M.

E. Obtain approval prior to site cutting or making adjustments not scheduled.

F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 05 5213
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Ramp railings and guardrails.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Placement of anchors in concrete.

B. Section 05 7300 – Decorative Metal Railings: Rails at exterior steps.

1.03 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.

D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

E. ASTM B241/B241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube; 2012.

F. ASTM B429/B429M - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube; 2010.

G. ASTM B483/B483M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Tubes for General Purpose Applications; 2013.

H. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2013.

I. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

C. Samples: Submit two, six inch long samples of handrail. Submit two samples of elbow, Tee, escutcheon, and end stop.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.

B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.

C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.

D. Allow for expansion and contraction of members and building movement without damage to connections or members.

E. Dimensions: See drawings for configurations and heights.

F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
   1. For anchorage to concrete, provide inserts to be cast into concrete, for bolting anchors.
   2. For anchorage to stud walls, provide backing plates, for bolting anchors.
   3. Posts: Provide adjustable flanged brackets.

G. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.02 ALUMINUM MATERIALS

A. Aluminum Pipe: Schedule 40; ASTM B429/B429M, ASTM B241/B241M, or ASTM B483/B483M.

B. Aluminum Tube: Minimum wall thickness of 0.127 inch; ASTM B429/B429M, ASTM B241/B241M, or ASTM B483/B483M.

C. Welding Fittings: No exposed fasteners; cast aluminum.

D. Straight Splice Connectors: Welding collars; cast aluminum.

E. Exposed Fasteners: No exposed bolts or screws.

2.03 FABRICATION

A. Accurately form components to suit specific project conditions and for proper connection to building structure.

B. Fit and shop assemble components in largest practical sizes for delivery to site.

C. Fabricate components with joints tightly fitted and secured.

D. Welded Joints:
   1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
   2. Interior Components: Continuously seal joined pieces by continuous welds.
   3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

2.04 ALUMINUM FINISHES

A. Color: Clear Anodized.

B. Touch-Up Materials: As recommended by coating manufacturer for field application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Supply items required to be cast into concrete with setting templates, for installation as work of other sections.

B. Apply one coat of bituminous paint to concealed aluminum surfaces that will be in contact with cementitious or dissimilar materials.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

C. Install railings in compliance with ADA Standards for accessible design at applicable locations.

D. Anchor railings securely to structure.

E. Field weld anchors as indicated on drawings. Touch-up welds with primer. Grind welds smooth.

F. Conceal anchor bolts and screws whenever possible.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 05 7300
DECORATIVE METAL RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Horizontal Stainless Steel Cable Railing System.

1.02 RELATED SECTIONS

A. Section 05 5213 – Pipe and Tube Railings.

1.03 REFERENCES

A. ASTM A36 – Carbon Structural Steel.

B. ASTM A53 – Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless..

C. ASTM A108 – Steel Bars, Carbon, Cold Finished, Standard Quality.

D. ASTM A153 – Zinc Coating (Hot-Dip) on Iron and Steel.

E. ASTM A307 – Low-carbon Steel externally and internally threaded fasterners.

F. ASTM A500 – Cold-Framed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

G. AWS D1.1 – Structural Welding Code.

H. SSPC – Steel Structures Painting Council.

1.04 DESIGN REQUIREMENTS

A. Cable railing system, including top rail, bottom rail, end posts, intermediate posts, intermediate cable braces, cables, and cable hardware shall be designed to conform to building codes and loading requirements.

1. Cable railing system shall withstand a minimum concentrated load of 225 pounds applied from any direction, at any point on the railing.
2. Cable railing system shall withstand a minimum uniform load of 100 pounds per square foot, applied vertically down and horizontally, but not simultaneously, on top rail.

B. Railing frame components and cable hardware shall be designed to withstand loads encountered without excessive deflection or distortion when cables are tensioned to required amounts to conform to building codes.

C. All ferrous railing components shall be hot-dip galvanized and designed to withstand exterior conditions.

1.05 SUBMITTALS

A. Submit under provisions of Section 01 3300.

B. Product Data: Include for each product to be used:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.
4. Available colors, styles, patterns and textures.

C. Shop Drawings:

1. Submit fabricator's shop drawings showing sizes, dimensions, details, and installation of railing frame components, intermediate cable braces, cables, cable hardware, and grommets.
2. Show details of anchoring cable railing system to mounting surface. Indicate welding symbols using AWS A2.0 standards. Indicate net weld lengths.
3. Shop drawings shall be stamped by a Design Agent licensed in RI.

D. Material Samples: Submit 12” long or 3 individual samples of the following:
   1. Railing frame components.
   2. Intermediate cable braces.
   3. Cables.
   4. Cable hardware.

1.06 QUALITY ASSURANCE

A. Single Source Responsibility: Single source shall provide all components required to install the cable railing system.

B. Fabricator’s Quality Assurance: Fabricator shall certify that all materials comply with the requirements of this section and are suitable for the intended application. Submit welders certificates verifying AWS qualifications within the last 12 months. Submit hot-dip applicator’s certification for this specific job.

C. Mockup:
   1. Size: Minimum 5 feet long x full height.
   2. Show: Guard railing components, accessories, attachments, and finishes.
   3. Locate as instructed by the Design Agent.

D. Pre-Installation Meeting: Convene a pre-installation meeting approximately two weeks before the start of construction of railing frame component mounting surfaces. Require attendance of parties directly affecting work of this section, including Contractor, Design Agent, Fabricator, and Installer. Review the following:
   1. Specific method of installation of railing frame components into mounting surfaces.
   2. Installation, adjusting, cleaning, and protection of cable railing system.
   3. Coordination with other work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site with labels or other markings clearly identifying the products and contractor or fabricator.

B. Store materials in a clean, dry area, away from exposure to the weather until they are ready for installation.

C. Protect materials while handling to avoid damage during installation.

1.08 WARRANTY

A. Provide manufacturer’s standard warranty for each product indicated.

PART 2 PRODUCTS

2.01 RAILING FRAME COMPONENTS

A. Framing: Pipe.
   1. Material: Carbon Steel, ASTM A53, Grade A. Minimum tensile strength of 48,000 pounds per square inch (3375 kg/sq cm).

B. Framing: Structural Tubing.
   1. Style: Square.
   2. Style: Round.
   3. Material: Carbon Steel, ASTM A500, Grade A. Minimum tensile strength of 45,000 pounds square inch (3164 kg/sq cm).

C. Post Mounting:
   1. As noted on the Contract Drawings.

D. Intermediate Cable Braces:

1. Type: Single pieces.
2. Size: As noted on the contract drawings.
3. Spacing: As noted on the Contract Drawings. 48” on center if not noted.
4. Material: Cold formed steel.

E. Cable Grommets: For prevention of abrasion of intermediate posts, end posts, and cable braces bored for cables.
   1. Material: Black, UV-resistant Delrin or approved equal.

F. Provide all fasterners and anchoring hardware, plates, and epoxy grout required to complete installation.

2.03 CABLES AND CABLE HARDWARE

A. Cables.
   1. Material: 1 x 19 Type 316 stainless steel strand, left-hand lay, per dimensional properties contained in MIL-DTL-87161.
   2. Finish: Mill.
   3. Diameter: 3/16 inch (4.8 mm) diameter cable with a minimum breaking strength of 4000 pounds (1814.37 kilograms).
   4. Orientation: As indicated on the Contract Drawings.
   5. Spacing: as noted on drawings. Install 3 inches on center if not noted.

B. Cable Hardware Components.
   1. Material: Stainless steel, ASTM A276 and A479, SAE/AMS QQ-S-763, Type 316.

2.04 FINISHES

A. Steel Finishes:
   1. Hot-dip galvanized finish throughout. Handrails must be buffed to removed rough areas and burrs so as to be smooth to the touch.
   2. Apply cold-galv zinc rich touch up material at all welds or damaged areas.
   3. Apply overpaint to touch-up to mimic galvanized sheen to Design Agent’s satisfaction.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas to receive new cable railing system. Notify Design Agent if areas are not acceptable. Do not begin installation until unacceptable conditions have been corrected.

3.02 INSTALLATION

A. Install cable railing system in accordance with RI State Code at locations indicated on the drawings.

B. Install cable railing system plumb, level, square, and rigid.

C. Anchor cable railing system to mounting surface as indicated on approved shop drawings.

D. Clean and strip to bare metal where welding is required. Touch up with zinc compound after welding.

E. Install plumb and level, accurately fitted, free from distortion or defects. Maximum variation from plumb: ¼”. Maximum offset from alignment: ¼”.

F. Tension cables to loads specified in approved shop drawings.

G. Ensure cables are clean, parallel to each other, and without kinks or sags.

H. Replace defective or damaged components as directed by Design Agent.

I. Repair damaged galvanized finish as directed by Design Agent.

3.03 ADJUSTING AND TENSIONING

A. Adjust cables and cable hardware as required to provide properly installed cable railing system as directed by Design Agent.

3.04 CLEANING

A. Clean surfaces with soap and water.

B. Do not use abrasive cleaners.

3.05 PROTECTION

A. Protect cable railing system and finish from damage during construction.

END OF SECTION

SECTION 06 1000
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roofing nailers.

B. Preservative treated wood materials.

C. Fire retardant treated wood materials.

D. Concealed wood blocking, nailers, and supports.

E. Miscellaneous wood nailers, furring, and grounds. Include blocking for:

1. Video LED Display
2. Window sills
3. Fire extinguisher cabinets
4. Fire Alarm devices and exit signs
5. ADA actuators
6. Phone station
7. Wall paneling at vestibule
8. Pendant light supports behind plaster ceiling
9. Bench
10. Other items mounted on wall or plaster ceiling assemblies

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Setting anchors in concrete.

1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

B. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.

C. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

E. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.

F. PS 20 - American Softwood Lumber Standard; 2010.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.

1.05 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.

1. Species: Douglas Fir-Larch, unless otherwise indicated.
2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

B. Lumber fabricated from old growth timber is not permitted.

C. Provide wood harvested within a 500 mile radius of the project site.

D. All concealed wood used below the roof deck must be fire-retardant treated.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: S-dry or MC19.

C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
1. Lumber: S4S, No. 2 or Standard Grade.
2. Boards: Standard or No. 3.
3. Panels: Fire-retardant treated B-C exterior grade plywood

2.03 ACCESSORIES

A. Fasteners and Anchors:
1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.

B. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.

C. Construction Adhesives: PL-100 or equal.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.02 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

F. Provide the following specific non-structural framing and blocking:
1. Handrails.
2. Signage.

3. Wall-mounted door stops.
4. Monitors and screens
5. Wall paneling and trim.
6. Joints of rigid wall coverings that occur between studs.
7. Built-in seating and wall caps.

3.03 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with roofing assembly installation.

3.45 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.05 CLEANING

A. Waste Disposal: Comply with the requirements of Section 01 7320 - Construction Waste Management and Disposal.
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 2000
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wood and plastic work and carpentry items not specified elsewhere.

B. Plastic laminate materials

C. Hardware and attachment accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.

B. Section 09 9123 - Interior Painting: Painting and finishing of finish carpentry items.

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.

C. BHMA A156.9 - American National Standard for Cabinet Hardware; 2010.

D. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

E. PS 1 - Structural Plywood; 2009.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with installation of associated and adjacent components.

B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data:
   1. Provide data on fire retardant treatment materials and application instructions.
   2. Provide instructions for attachment hardware and finish hardware.

C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Provide the information required by AWI/AWMAC/WI (AWS).
   2. Include certification program label.

D. Samples: Submit two samples of finish plywood, 6 by 6 inch in size illustrating wood grain and specified finish.

E. Samples: Submit two samples of plastic laminate 6 inch long.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect work from moisture damage.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS), unless noted otherwise.

B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.

C. Interior Woodwork Items:
   1. Sill construction at curtainwall and borrowed lite areas.
   2. Free-standing and built-in seating as detailed.

2.02 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

B. Provide sustainably harvested wood, certified or labeled as specified in Section 01 6000 - Product Requirements.

C. Provide wood harvested within a 500 mile radius of the project site.

2.03 PLASTIC LAMINATE MATERIALS

A. Plastic Laminate: NEMA LD 3, HGS; color as selected by Design Agent and Owner; finish as selected; Acrovyn Wall Covering manufactured by Construction Specialties, Inc. is Basis of Design. Propose substitutions in accordance with Contract Documents.

B. Laminate Adhesive: Type recommended by laminate manufacturer to suit application; not containing formaldehyde or other volatile organic compounds.

2.04 FASTENINGS

A. Fasteners: Of size and type to suit application;steel finish in concealed locations and stainless steel finish in exposed locations.

B. Fasten closure panel from below - no exposed fasteners. Use material compatible with fire-retardant materials.

2.05 ACCESSORIES

A. Lumber for Shimming and Blocking: Softwood lumber of hem-fir species.

B. Aluminum Edge Trim: Extruded convex shape; smooth surface finish; self locking serrated tongue; of width to match component thickness; natural mill finish.

C. Wood Filler: Solvent base, tinted to match surface finish color.

2.06 HARDWARE

A. Hardware: Comply with BHMA A156.9.

2.07 WOOD TREATMENT

A. Fire Retardant Treatment (FR-S Type): Chemically treated and pressure impregnated; capable of providing flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.

B. Shop pressure treat wood materials requiring fire rating to concealed wood blocking.

C. Provide identification on fire retardant treated material.

D. Redry wood after pressure treatment to maximum 19 percent moisture content.

2.08 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. Fit exposed sheet material edges with 3/8 inch matching hardwood edging. Use one piece for full length only.

C. Cap exposed plastic laminate finish edges with aluminum trim.

D. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

E. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

A. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.

B. Set and secure materials and components in place, plumb and level.

C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

D. Install prefinished paneling with full bed contact adhesive applied to substrate.

3.03 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

SECTION 06 6116
SOLID SURFACING FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Provide solid surfacing fabrications including but not limited to following:
   1. window sills
   2. millwork bench

B. Related Sections: Following description of work is included for reference only and shall not be presumed complete:
   1. Waste management and disposal requirements: Section 01 7320, Waste Management and Disposal.
   2. Provision of carpentry, substrates and blocking: Sections 06 1000 and 06 2000.
   3. Provision of elastomeric joint sealants: Section 07 9205, Joint Sealers.
   4. Provision of wall coverings: Section 09 7200, Wall Coverings.

1.02 REFERENCES

A. Abbreviations and Acronyms:
   1. LEED®: Leadership in Energy and Environmental Design; www.cagbc.org.
   2. MDF: Medium Density Fiberboard.
   3. SCAQMD: South Coast Air Quality Management District; www.aqmd.gov.
   4. VOC: Volatile Organic Compound.

B. Definitions:
   1. Solid Surface: Non-porous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

C. Reference Standards:
   1. ANSI/NPA A208.2-09 - Medium Density Fiberboard (MDF) For Interior Applications
   2. ASTM C920-14a - Standard Specification for Elastomeric Joint Sealants
   3. ASTM D638-10 - Standard Test Method for Tensile Properties of Plastics
   4. ASTM D785-08 - Standard Test Method for Rockwell Hardness of Plastics and
   5. Electrical Insulating Materials
   6. ASTM D790-10 - Standard Test Methods for Flexural Properties of Unreinforced
   7. and Reinforced Plastics and Electrical Insulating Materials
   8. ASTM D5420-10 - Standard Test Method for Impact Resistance of Flat, Rigid
   9. Plastic Specimen by Means of a Striker Impacted by a Falling
   10. Weight (Gardner Impact)
   11. ASTM E84-14 - Standard Test Method for Surface Burning Characteristics of
   12. Building Materials
   13. ASTM E228-11 - Standard Test Method for Linear Thermal Expansion of Solid
   14. Materials with a Push-Rod Dilatometer
   15. ASTM G21-13 - Standard Practice for Determining Resistance of Synthetic
   16. Polymeric Materials to Fungi
   17. ASTM G22-76(96) - Standard Practice for Determining Resistance of Plastics to
   18. Bacteria
   19. ASTM G155-13 - Standard Practice for Operating Xenon Arc Light Apparatus for
   20. Exposure of Non-Metallic Materials
   21. CSA B45.5-11/
   22. IAPMO Z124-2011 - Plastic Plumbing Fixtures
   23. NFPA 255-06 - Standard Method of Test of Surface Burning Characteristics of
   24. Building Materials
   25. NSF/ANSI 51-07 - Food Equipment Materials
   26. SCAQMD Rule 1168 - Adhesive and Sealant Applications (amended January 2005)

27. UL 723 - Standard for Test for Surface Burning Characteristics of
28. Building Materials
29. UL Environment/- Standard for Chemical Emissions for Building Materials,
30. GREENGUARD - Finishes and Furnishings, Section 7.1
31. UL 2818
32. UL Environment/ - Gold Standard for Chemical Emissions for Building Materials,
33. GREENGUARD - Finishes and Furnishings, Section 7.1 and 7.2
34. UL 2818
35. UL 2824 - GREENGUARD Certification Program, Method for Measuring
36. Microbial Resistance from Various Sources Using Static
37. Environmental Chambers

1.03 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meetings: Arrange preinstallation meeting 1 week prior to commencing work with all parties associated with trade as designated in Contract Documents or as requested by Design Agent. Presided over by Contractor, include Design Agent who may attend, Subcontractor performing work of this trade, Owner's representative, testing company's representative and consultants of applicable discipline. Review Contract Documents for work included under this trade and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, Project staffing, restrictions on areas of work and other matters affecting construction, to permit compliance with intent of work of this Section.

1.04 SUBMITTALS

A. Product Data: Indicate Product description including solid surface sheets, sinks, bowls and illustrating full range of standard colors, fabrication information and compliance with specified performance requirements. Submit Product data with resistance to list of chemicals.

B. Shop Drawings: Submit Shop Drawings for work of this Section in accordance with Section

C. 01 30 00. Indicate plans, sections, dimensions, component sizes, edge details, thermosetting requirements, fabrication details, attachment provisions, sizes of furring, blocking, including concealed blocking and coordination requirements with adjacent work. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacles and other items installed in solid surface.

D. Coordination Drawings: Submit coordination drawings indicating plumbing and miscellaneous steel work indicating locations of wall rated or non-rated, blocking requirements, locations and recessed wall items and similar items.

E. Samples: Submit samples in accordance with Section 01 30 00. Submit minimum 6" x 6" samples. Cut sample and seam together for representation of inconspicuous seam. Indicate full range of color and pattern variation. Approved samples will be retained as standards for work.

F. Test and Evaluation Reports: Submit flammability test reports [and food preparation zone certifications/listing confirming compliance with NSF/ANSI 51. Refer to www.nsf.org for the latest compliance to NSF/ANSI 51 for Food Zone - all food types.]

1.05 CLOSEOUT SUBMITTALS

A. Operational and Maintenance Data:
   1. Submit manufacturer's care and maintenance data, including repair and cleaning instructions. Include in Project closeout documents.
   2. Provide a commercial care and maintenance kit and video. Review maintenance procedures and warranty details with Owner upon completion.

1.06 QUALITY ASSURANCE

A. Qualifications:

1. Installers: Provide work of this Section executed by competent installers with minimum 5 years experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

B. Mock-Ups:
1. Prior to final approval of Shop Drawings, erect 1 full size mock-up of each component at Project site demonstrating quality of materials and execution for Design Agent review.
2. Should mock-up not be approved, rework or remake until approval is secured. Remove rejected units from Project site.
3. Approved mock-up will be used as standard for acceptance of subsequent work.
4. Approved mock-ups may remain as part of finished work.

1.07 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements: Deliver no components to Project site until areas are ready for installation.

B. Storage and Handling Requirements:
1. Store components indoors prior to installation.
2. Handle materials to prevent damage to finished surfaces.

1.08 WARRANTY

A. Manufacturer Warranty: Provide manufacturer's standard warranty for material only for period of 10 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Design Agent and at no expense to Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer List: Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:
1. Corian® by DuPont; www.corian.com
2. Samsung Chemical USA; www.staron.com
3. Wilsonart Contract; www.wilsonartcontract.com

B. Substitution Limitations: This Specification is based on Corian® Products. Comparable Products from manufacturers listed herein will be accepted provided they meet requirements of this Specification.

2.02 MATERIALS

A. Description:

B. Sustainability Characteristics: Provide Products meeting following LEED® performance criteria:
1. MRc4: Provide Product with a combined minimum pre-consumer and post-consumer recycled content of [xx%].
2. MRc4: Provide Product with maximum pre-consumer and post-consumer recycled content available.
3. MRc5: Provide Product with regional content.
4. EQc4.1: Provide adhesives and sealants with VOC quantities lower than stated in SCAQMD Rule 1168. Ensure VOC quantities for sealants do not exceed 250 g/l under any circumstances.

C. Solid Surface Material:

D. Non-porous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment; not coated, laminated or of composite construction; meeting following criteria:

E. Flammability: Class 1 and A when tested to UL 723.

F. Food Equipment Material Compliance: Food Zone to NSF/ANSI 51.

1. Ensure material has minimum physical and performance properties specified under “Performance/Design Criteria”.
2. Ensure superficial damage to a depth of 0.010" is repairable by sanding and polishing.

G. Adhesive for Bonding to Other Products: One component silicone to ASTM C920.

H. Sealant: A standard mildew-resistant, FDA/UL® [and NSF/ANSI 51 compliant in Food Zone area,] recognized silicone color matched sealant or clear silicone sealants.

I. Sink/Bowl Mounting Hardware: Manufacturer's approved bowl clips, brass inserts and fasteners for attachment of undermount sinks/bowls.

J. Heat Reflecting Tape: Manufacturer’s standard aluminum foil tape, with required thickness, for use with cutouts near heat sources.

K. Insulating Nomex® Fabric: Manufacturer’s standard for use with conductive tape in insulating solid surface material from adjacent heat source.

2.03 COMPONENTS

A. Window Sills and Bench Surfaces: 1/2" thick solid surfacing material, adhesively joined with inconspicuous seams, edge details as indicated on Drawings. Color selected later by Design Agent and Owner from manufacturer’s full color range.

B. Acceptable Product: “DuPont™ Corian® Charging Unit - Individual” by DuPont as Basis of Design.

C. Fabrication:
1. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved Shop Drawings and solid polymer manufacturer requirements. Form joints between components using manufacturer’s standard joint adhesive without conspicuous joints. Provide factory cutouts for plumbing fittings and bath accessories as indicated on Drawings.
2. Where indicated, thermoform corners and edges or other objects to shapes and sizes indicated on Drawings, prior to seaming and joining. Cut components larger than finished dimensions and sand edges to remove nicks and scratches. Heat entire component uniformly prior to forming.
3. Ensure no blistering, whitening and cracking of components during forming.
4. Fabricate backsplashes from solid surfacing material with optional radius cove where counter and backsplashes meet as indicated on Drawings. Backsplashes for most colors may be fabricated by traditional means discussed in K-25294 Backsplashes. Colors with metallic/mica particle or veined colors creating directional aesthetics (K-26833 Directional Aesthetics) may require the techniques in Technical Bulletin K-28235 Thermoformed Backsplash.
5. Fabricate joints between components using manufacturer's standard joint adhesive. Ensure joints are inconspicuous in appearance and without voids. Attach 50 mm (2") wide reinforcing strip of solid polymer material under each joint. Reinforcing strip of solid polymer material is not required when using DuPont™ Joint Adhesive 2.0.
6. Provide holes and cutouts for plumbing and bath accessories as indicated on Drawings.
7. Rout and finish component edges to a smooth, uniform finish. Rout cutouts, then sand edges smooth. Repair or reject defective or inaccurate work.
8. Finish: Ensure surfaces have uniform finish:
   a. Matte, with a 60° gloss rating of 5 - 20.
   b. Semi-gloss, with a 60° gloss rating of 25 - 50.
   c. Polished, with a 60° gloss rating of 55 - 80.
   d. Fabrication Tolerances:
      1) Variation in Component Size: +/-1/8".
      2) Location of Openings: +/-1/8" from indicated location.

2.04 EXAMINATION

A. Verification of Conditions:

1. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work. Proceed with installation only after unsatisfactory conditions have been corrected.
2. Verify actual site dimensions and location of adjacent materials prior to commencing work.
3. Notify Design Agent in writing of any conditions which would be detrimental to installation.

B. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

2.05 INSTALLATION

A. Install components plumb, level, rigid, scribed to adjacent finishes in accordance with reviewed Shop Drawings and Product installation details.

B. Fabricate field joints using manufacturer's recommended adhesive, with joints being inconspicuous in finished work. Exposed joints/seams are not permitted. Keep components and hands clean when making joints. Reinforce field joints as specified herein. Cut and finish component edges with clean, sharp returns.

C. Route radii and contours to template. Anchor securely to base component or other supports. Align adjacent components and form seams to comply with manufacturer’s written recommendations using adhesive in color to match work. Carefully dress joints smooth, remove surface scratches and clean entire surface.

D. Seal between wall and components with joint sealant as specified herein and in Section 07 92 00, as applicable.

E. Keep components and hands clean during installation. Remove adhesives, sealants and other stains. Ensure components are clean on date of Substantial Completion of the Work.

2.06 REPAIR

A. Repair minor imperfections and cracked seams and replace areas of severely damaged surfaces in accordance with manufacturer’s “Technical Bulletins”.

2.07 SITE QUALITY CONTROL

A. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Design Agent at no cost to Owner.

2.08 CLEANING

A. Remove excess adhesive and sealant from visible surfaces.

B. Clean surfaces in accordance with manufacturer’s “Care and Maintenance Instructions”.

2.09 PROTECTION

A. Provide protective coverings to prevent physical damage or staining following installation for duration of Project.

B. Protect surfaces from damage until date of Substantial Completion of the Work.

END OF SECTION

SECTION 07 1113
BITUMINOUS DAMPPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Bituminous dampproofing.

B. Protection boards.

1.02 RELATED REQUIREMENTS

A. Section 07 2100 - Thermal Insulation: Rigid insulation board used as protection board.

1.03 REFERENCE STANDARDS

A. ASTM D449/D449M - Standard Specification for Asphalt Used in Dampproofing and Waterproofing; 2003 (Reapproved 2014).

B. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal; 1997 (Reapproved 2011).

C. ASTM D1227 - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; 2013.

D. NRCA (WM) - The NRCA Waterproofing Manual; 2005.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide properties of primer, bitumen, and mastics.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with at least three years of documented experience.

1.06 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application until dampproofing has cured.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Other Acceptable Bituminous Dampproofing Manufacturers:
   1. Karnak Corporation: www.karnakcorp.com.
   2. Mar-Flex Systems, Inc: www.mar-flex.com/sle.
   3. W. R. Meadows, Inc: www.wrmeadows.com/sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 BITUMINOUS DAMPPROOFING

A. Bituminous Dampproofing: Cold-applied water-based emulsion; asphalt with mineral colloid or chemical emulsifying agent; with or without fiber reinforcement; asbestos-free; suitable for application on vertical and horizontal surfaces.
   1. Composition - Vertical Application: ASTM D1227 Type III or ASTM D1187/D1187M Type I.
   2. Composition - Horizontal and Low-Slope Application: ASTM D1227 Type II or III.
   3. VOC Content: Not more than permitted by local, State, and federal regulations.
   4. Applied Thickness: 1/16 inch, minimum, wet film.
   5. Products:
      a. W. R. Meadows, Inc; Sealmastic Emulsion Type I (spray-grade): www.wrmeadows.com/sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

B. Primers, Mastics, and Related Materials: Type as recommended by dampproofing manufacturer.

2.03 ACCESSORIES

A. Protection Board: Rigid insulation specified in Section 07 2100.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions are acceptable prior to starting this work.

B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.

C. Verify that items penetrating surfaces to receive dampproofing are securely installed.

3.02 PREPARATION

A. Protect adjacent surfaces not designated to receive dampproofing.

B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.

C. Do not apply dampproofing to surfaces unacceptable to manufacturer.

D. Apply mastic to seal penetrations, small cracks, or minor honeycombs in substrate.

3.03 APPLICATION

A. Foundation Walls: Apply two coats of asphalt dampproofing.

B. Perform this work in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.

C. Prime surfaces in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.

D. Apply bitumen with mop.

E. Apply bitumen in one coat, continuous and uniform, at a rate of 25 sq ft/gal per coat.

F. Seal items watertight with mastic, that project through dampproofing surface.

G. Place protection board directly over dampproofing, butt joints, and adhere to tacky dampproofing.

H. Scribe and cut boards around projections, penetrations, and interruptions.

END OF SECTION

SECTION 07 2100
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Board insulation at perimeter foundation wall below EIFS, above metal soffit panels, and other detailed locations.

B. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof and for exterior stud wall infill where detailed.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Field-applied termiticide for concrete slabs and foundations.

B. Section 07 2119 - Foamed-In-Place Insulation: Plastic foam insulation under metal roof areas and as detailed.

C. Section 07 2400 – Exterior Insulation and Finish Systems, base insulation board for EIFS system.

D. Section 07 5400 - Thermoplastic Membrane Roofing: Board insulation over low slope roof deck specified in that section.

1.03 REFERENCE STANDARDS

A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.

B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

D. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.

E. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

1.04 SUBMITTALS

A. See Section 01 3300 for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Insulation at Perimeter of Foundation and miscellaneous rigid insulation: Extruded polystyrene (XPS) board.

B. Insulation Above Metal Soffit Panels: Extruded polystyrene (XPS) board.

2.02 FOAM BOARD INSULATION MATERIALS

A. Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578 with either natural skin or cut cell surfaces.
   1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
   2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.

3. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88) per 1 inch thickness at 75 degrees F mean temperature.
4. R-value; 1 inch of material at 72 degrees F: 5, minimum.
5. Complies with fire resistance requirements shown on the drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
6. Type and Water Absorption: Type IV, 0.3 percent by volume, maximum, by total immersion.

2.03 BATT INSULATION MATERIALS

A. Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used, at Contractor's option.

B. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
   1. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
   2. Include vapor retarder faced batt when used at exterior wall areas.

C. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
   1. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Install boards horizontally on foundation perimeter.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BOARD INSTALLATION OVER LOW SLOPE ROOF DECK

A. Board Installation Over Roof Deck, General:
   1. See applicable roofing specification section for specific board installation requirements.
   2. Fasten insulation to deck in accordance with roofing manufacturer's written instructions and applicable Factory Mutual requirements.
   3. Do not apply more insulation than can be covered with roofing in same day.

3.04 BATT INSULATION

A. Install insulation in accordance with manufacturer's instructions.

B. Install insulation in shim spaces and crevices in exterior wall and roof.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

3.05 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

3.06 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 2119
FOAMED-IN-PLACE INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Foamed-in-place insulation, sometimes referred to as “spray foam insulation”.

B. Protective intumescent coating.

1.02 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

C. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

D. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

1.04 SUBMITTALS

A. See Section 01 3300 for submittal procedures.

B. Product Data: Provide product description, insulation properties, overcoat properties, and preparation requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than three years of documented experience.

B. Applicator Qualifications: Company specializing in performing work of the type specified, with minimum three years documented experience.

1.06 FIELD CONDITIONS

A. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.

B. Do not apply foam when temperature is within 5 degrees F of dew point.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Foamed-In-Place Insulation:
   1. Icynene Inc; as basis of design: www.icynene.com/#sle.
   2. Substitutions: See Section 01 3300

2.02 MATERIALS

A. Foamed-In-Place Insulation: Low-density, flexible, open celled, water vapor permeable polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
   1. Thermal Resistance: R-value of 3.0, minimum, per 1 inch thickness at 75 degrees F mean temperature when tested in accordance with ASTM C518.
   2. Air Permeance: 0.04 cfm/sq ft, maximum, when tested at intended thickness in accordance with ASTM E2178 or ASTM E283 at 1.57 psf.
   3. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.
   4. Basis of Design:
      a. Icynene Inc; Icynene Classic Plus: www.icynene.com/#sle.

5. Substitutions: Must be open cell acrylic material with complete off-gassing within 30 days.

2.03 ACCESSORIES

A. Primer: As required by insulation manufacturer.

B. Protective Coating: Intumescent coating of type recommended by insulation manufacturer and as required to comply with applicable codes.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify work within construction spaces or crevices is complete prior to insulation application.

B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation or overcoat adhesion.

3.02 PREPARATION

A. Mask and protect adjacent surfaces from over spray or dusting.

B. Apply primer in accordance with manufacturer's instructions.

3.03 APPLICATION

A. Apply insulation in accordance with manufacturer's instructions.

B. Apply insulation by spray method, to a uniform monolithic density without voids.

C. Apply to a minimum cured thickness of 4.5 inch.

D. Patch damaged areas.

E. Trim excess away for applied trim or remove as required for continuous sealant bead.

3.04 FIELD QUALITY CONTROL

A. Field inspections and tests will be performed by a technician authorized by foam manufacturer and retained by the Contractor as part of the Base Bid.

B. Inspection will include verification of insulation and overcoat thickness and density.

3.05 PROTECTION

A. Do not permit subsequent construction work to disturb applied insulation.

END OF SECTION

SECTION 07 2400
EXTERIOR INSULATION AND FINISH SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Composite wall cladding of mechanically fastened rigid insulation and reinforced finish coating over cementitious base coat ("Class PM"). System may be referred to as “foundation insulation and finish system”.

1.02 RELATED REQUIREMENTS

A. Section 07 6200 - Sheet Metal Flashing and Trim: Perimeter flashings.

B. Section 07 9005 - Joint Sealers: Sealing joints between EIFS and adjacent construction and penetrations through EIFS.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

B. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2011.

C. ASTM C150/C150M - Standard Specification for Portland Cement; 2017.

D. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.

E. ASTM C1397 - Standard Practice for Application of Class PB Exterior Insulation and Finish Systems (EIFS) and EIFS with Drainage; 2013.

F. ASTM D968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive; 2017.

G. ASTM D2247 - Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity; 2015.

H. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.

I. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).

J. ASTM E2486/E2486M - Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS); 2013.

K. ASTM G153 - Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2013.

L. ASTM G155 - Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2013.

M. ICC-ES AC219 - Acceptance Criteria for Exterior Insulation and Finish Systems; 2009, with Editorial Revision (2014).

N. ICC-ES AC235 - Acceptance Criteria for EIFS Clad Drainage Wall Assemblies; 2009, with Editorial Revision (2012).

O. ISO 9001 - Quality management systems -- Requirements; 2015.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on system materials, product characteristics, performance criteria, and system limitations.

C. Selection Samples: Submit manufacturer's standard range of samples illustrating available coating colors and textures.

D. Manufacturer's Installation Instructions: Indicate preparation required, installation techniques, and jointing requirements.

1.05 QUALITY ASSURANCE

A. Maintain copy of specified installation standard and manufacturer's installation instructions at project site during installation.

B. EIFS Manufacturer Qualifications: Provide EIFS products other than insulation from the same manufacturer with qualifications as follows:
   1. Member in good standing of EIMA (EIFS Industry Members Association).
   2. Manufacturer of EIFS products for not less than 5 years.
   3. Manufacturing facilities ISO 9001 certified.

C. Insulation Manufacturer Qualifications: Approved by manufacturer of EIFS and approved and labeled under third party quality program as required by applicable building code.

D. Installer Qualifications: Company specializing in the type of work specified and with at least three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to project site in manufacturer's original, unopened containers with labels intact. Inspect materials and notify manufacturer of any discrepancies.

B. Storage: Store materials as directed by manufacturer's written instructions.

1.07 FIELD CONDITIONS

A. Do not prepare materials or apply EIFS under conditions other than those described in the manufacturer's written instructions.

B. Do not prepare materials or apply EIFS during inclement weather unless areas of installation are protected. Protect installed EIFS areas from inclement weather until dry.

C. Do not install coatings or sealants when ambient temperature is below 40 degrees F.

D. Do not leave installed insulation board exposed to sunlight for extended periods of time.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide manufacturer's standard material warranty, covering a period of not less than 5 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design:
   1. Dryvit Systems, Inc; Dryvit Outsulation EIFS, Class PM: www.dryvit.com/#sle.

B. Other Acceptable Manufacturers:
   1. Substitutions: See Section 01 6000 - Product Requirements.

2.02 EXTERIOR INSULATION AND FINISH SYSTEM

A. Exterior Insulation and Finish System: BARRIER type; double-reinforced finish coating on insulation board mechanically fastened to substrate; provide a complete system that has been tested to show compliance with the following characteristics; include all components of specified system and substrate in tested samples.

B. Water Penetration Resistance: No water penetration beyond the plane of the base coat/insulation board interface after 15 minutes, when tested in accordance with ASTM E331 at 6.24 psf differential pressure with tracer dye in the water spray; include in tested sample at least two vertical joints and one horizontal joint of same type to be used in construction; disassemble sample if necessary to determine extent of water penetration.

C. Salt Spray Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 300 hours exposure in accordance with ASTM B117, using at least three samples matching intended assembly, at least 4 by 6 inches in size.

D. Freeze-Thaw Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating when viewed under 5x magnification after 10 cycles, when tested in accordance with ICC-ES AC219 or ICC-ES AC235.

E. Weathering Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating when viewed under 5x magnification after 2000 hours of accelerated weathering conducted in accordance with ASTM G153 Cycle 1 or ASTM G155 Cycles 1, 5, or 9.

F. Water Degradation Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 14 days exposure, when tested in accordance with ASTM D2247.

G. Mildew Resistance: No growth supported on finish coating during 28 day exposure period, when tested in accordance with ASTM D3273.

H. Abrasion Resistance of Finish: No cracking, checking or loss of film integrity when tested in accordance with ASTM D968 with 113.5 gallons of sand.

I. Impact Resistance: Construct system to provide the following impact resistance without exposure of broken reinforcing mesh, when tested in accordance with ASTM E2486/E2486M:
   1. High: 90 to 150 in-lb, for all areas.

2.03 MATERIALS

A. Finish Coating Top Coat: Water-based, air curing, acrylic or polymer-based finish with integral color and texture.
   1. Texture: fine sand.
   2. Color: As selected by Design Agent from manufacturer's standard range.

B. Base Coat: Fiber-reinforced, acrylic or polymer-based product compatible with insulation board and reinforcing mesh.

C. Reinforcing Mesh: Balanced, open weave glass fiber fabric, treated for compatibility and improved bond with coating, weight, strength, and number of layers as required to meet required system impact rating.
   1. Panzer 15 by DryVit, installed under standard mesh by DryVit

D. Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578, with natural skin surfaces.
   1. Board Size: 48 by 96 inch.
   2. Board Size Tolerance: 1/16 inch from square and dimension.
   3. Board Thickness: As indicated on drawings.
   4. Dimensional Stability: 2 percent, maximum.
   5. Board Edges: Square.
   6. Type and Thermal Resistance, R-value (RSI-value): Type X, 5.0 (0.88) per 1 inch thickness at 75 degrees F mean temperature.
   7. Type and Compressive Resistance: Type X, 15 psi (104 kPa), minimum.
   8. Type and Board Density: Type X, 1.30 pcf (21 kg/cu m), minimum.
   9. Type and Water Absorption: Type X, 0.3 percent by volume, maximum, by total immersion.

2.04 ACCESSORY MATERIALS

A. Insulation Adhesive: Type required by EIFS manufacturer for project substrate.

B. Metal Flashings: As specified in Section 07 6200.

C. Trim: EIFS manufacturer's standard PVC trim accessories, as required for a complete project and including starter track.

D. Sealant Materials: Compatible with EIFS materials and as recommended by EIFS manufacturer. Color to match finish.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate is sound and free of oil, dirt, other surface contaminants, efflorescence, loose materials, or protrusions that could interfere with EIFS installation and is of a type and construction that is acceptable to EIFS manufacturer. Do not begin work until substrate and adjacent materials are complete and thoroughly dry.

B. Verify that substrate surface is flat, with no deviation greater than 1/4 in when tested with a 10 ft straightedge.

3.02 PREPARATION

A. Apply primer to substrate as recommended by EIFS manufacturer for project conditions.

3.03 INSTALLATION - GENERAL

A. Install in accordance with EIFS manufacturer's instructions and ASTM C1397.
   1. Where different requirements appear in either document, comply with the most stringent.
   2. Neither of these documents supercedes provisions of Contract Documents that defines contractual relationships between parties or scope of this work.

3.04 INSTALLATION - INSULATION

A. Install in accordance with manufacturer's instructions.

B. Install back wrap reinforcing mesh at all openings and terminations that are not to be protected with trim.

C. On wall surfaces, install boards horizontally.

D. Place boards in a method to maximize tight joints. Stagger vertical joints and interlock at corners. Butt edges and ends tight to adjacent board and to protrusions. Achieve a continuous flush insulation surface, with no gaps in excess of 1/16 inch.

E. Fill gaps greater than 1/16 inch with strips or shims cut from the same insulation material.

F. Rasp irregularities off surface of installed insulation board.

G. Adhesive Attachment: Use method recommended by EIFS manufacturer.

3.05 INSTALLATION - CLASS PM FINISH

A. Joints: Install control and expansion joints at spacings indicated on the drawings or as approved during the sho drawings process. Do not exceed 150 sq ft for areas defined by the placement of control joints.

B. Reinforcing Mesh: Install in strict accordance with manufacturer's instructions, using mechanical fasteners at spacing recommended.
   1. Lap reinforcing mesh edges and ends 2 inches minimum.

C. Base Coat: Install to minimum thickness specified, following manufacturer's instructions. Leave base coat in condition suitable to receive finish coat.

D. Finish Coat: Apply finish coat after base coat has dried not less than 24 hours, embed finish aggregate, and finish to a uniform texture and color.

E. Seal control and expansion joints within the field of exterior finish and insulation system, using procedures recommended by sealant and finish system manufacturers.

3.06 CLEANING

A. Clean EIFS surfaces and work areas of foreign materials resulting from EIFS operations.

3.07 PROTECTION

A. Protect completed work from damage and soiling by subsequent work.

END OF SECTION

SECTION 07 2500
WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vapor Retarders: Materials to make exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls water vapor resistant and air tight.

B. Air Barriers: Materials that form a system to stop passage of air through exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls.

1.02 RELATED REQUIREMENTS

A. Section 05 4000 - Cold-Formed Metal Framing: Water-resistive barrier under exterior cladding.

B. Section 07 2100 - Thermal Insulation: Vapor retarder/air barrier function of spray foam insulation

C. Section 07 9005 - Joint Sealers: Sealing building expansion joints.

1.03 DEFINITIONS

A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.

B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.

C. Vapor Retarder: Air tight barrier made of material that is relatively water vapor impermeable, to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.
   1. Water Vapor Permeance: For purposes of conversion, 57.2 ng/(Pa s sq m) = 1 perm.

D. Air & Vapor Barrier: Generic term for all weather barrier materials specified. Application determines type to be used.

1.04 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2017.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.

E. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on material characteristics.

C. Shop Drawings: Provide drawings of special joint conditions.

D. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.

E. Manufacturer's Installation Instructions: Indicate preparation.

F. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.

G. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification; keep copies of each contractor accreditation and installer

certification on site during and after installation, and present on-site documentation upon request.

1.06 QUALITY ASSURANCE

A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/#sle:
   1. Installer Qualification: Use accredited contractor, certified installers, evaluated materials, and third-party field quality control audit.
   2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture, and use secondary materials approved in writing by primary material manufacturer.

1.07 MOCK-UP

A. Install air barrier, vapor retarder, and water-resistive barrier materials mock-up on ramp enclosure for 4' length.

1.08 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

PART 2 PRODUCTS

2.01 WEATHER BARRIER ASSEMBLIES

A. Air Barrier:
   1. On outside surface of sheathing of exterior walls use air barrier sheet, self-adhesive type.
   2. At detailed areas, fascia tie-ins, and other locations for which metal flashing is not appropriate.
   3. May be referred to as “self-adhered flashing membrane”, “Ice and Water Shield”, “air barrier sheet” or “waterproof underlayment”.

B. Exterior Vapor Retarder:
   1. On under-side of elevated ramp over outdoors space use vapor retarder coating.
   2. Also may be referred to as “air & vapor barrier” or “vapor retarder coating”.

2.02 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)

A. Air Barrier Sheet, Self-Adhered:
   1. Air Permeance: 0.004 cubic feet per minute per square foot, maximum, when tested in accordance with ASTM E2178.
   2. Water Vapor Permeance: 10 perms, minimum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant procedure).
   3. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 90 days of weather exposure.
   4. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less (Class A), when tested in accordance with ASTM E84.
   5. Seam and Perimeter Tape: As recommended by sheet manufacturer.
   6. Manufacturers:
      a. Henry Company; Blueskin VP160: www.henry.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 VAPOR RETARDER MATERIALS (AIR BARRIER AND WATER-RESISTIVE)

A. Vapor Retarder Coating: Liquid applied, resilient, UV-resistant coating and associated joint treatment.
   1. Water Vapor Permeance: 1.0 perm, maximum, when tested in accordance with ASTM E96/E96M.
   2. VOC Content: Less than 50 g per L when tested in accordance with 40 CFR 59, Subpart D (EPA Method 24).
   3. Suitable for use on concrete, masonry, plywood and gypsum sheathing.

4. Joint Preparation Treatment: Coating manufacturer's recommended method, either tape or reinforcing mesh saturated with coating material.
5. Manufacturers, Basis of Design:
   a. Henry Company; Air-Bloc 32MR: www.henry.com/#sle.
   b. Substitutions: See Section 01 6000 - Product Requirements.
6. Joint Filler: As recommended by coating manufacturer and suitable to the substrate.

2.04 ACCESSORIES

A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.

B. Flexible Flashing: Self-adhesive sheet flashing complying with ASTM D1970/D1970M, except slip resistance requirement is waived if not installed on a roof.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions are ready to accept the work of this section.

3.02 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Clean and prime substrate surfaces to receive adhesives in accordance with manufacturer's instructions.

3.03 INSTALLATION

A. Install materials in accordance with manufacturer's instructions.

B. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

C. Vapor Retarders: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

D. Apply sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.

E. Self-Adhered Sheets:
   1. Prepare substrate in manner recommended by sheet manufacturer; fill and tape joints in substrate and between dissimilar materials.
   2. Lap sheets shingle-fashion to shed water and seal laps air tight.
   3. Once sheets are in place, press firmly into substrate with resilient hand roller; ensure that laps are firmly adhered with no gaps or fishmouths.
   4. Use same material, or other material approved by sheet manufacturer for the purpose, to seal to adjacent construction and as flashing.
   5. At wide joints, provide extra flexible membrane allowing joint movement.

F. Coatings:
   1. Prepare substrate in manner recommended by coating manufacturer; treat joints in substrate and between dissimilar materials as recommended by manufacturer.
   2. Use flashing to seal to adjacent construction and to bridge joints.

G. Openings and Penetrations in Exterior Weather Barriers:
   1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
   2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches wide; do not seal sill flange.
   3. At openings to be filled with non-flanged frames, seal weather barrier to each side of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.

4. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Coordination of ABAA Tests and Inspections:
   1. Provide testing and inspection required by ABAA QAP.
   2. Notify in ABAA writing of schedule for air barrier work. Allow adequate time for testing and inspection.
   3. Cooperate with ABAA testing agency.
   4. Allow access to air barrier work areas and staging.
   5. Do not cover air barrier work until tested, inspected, and accepted.

C. Do not cover installed weather barriers until required inspections have been completed.

D. Obtain approval of installation procedures by the weather barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.

E. Take digital photographs of each portion of the installation prior to covering up.

3.05 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

SECTION 07 4000
PREFORMED METAL ROOFING

PART 1 GENERAL

1.01 GENERAL PROVISIONS

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

1.02 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Custom-fabricated sheet structural Aluminum roofing over open purlins.
   2. May be referred to as “standing seam roofing” or “standing seam metal panels”.

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
   1. Section 061000 - ROUGH CARPENTRY for wood nailers, curbs, and blocking.
   2. Section 076200 - SHEET METAL FLASHING AND TRIM for fasciae, copings, and flashings that are not part of sheet metal roofing.
   3. Section 079005 - JOINT SEALERS for field-applied sheet metal roofing sealants.

1.03 REFERENCE STANDARDS

A. ASTM-E 1646 and ASTM-E 331 (both water infiltration tests),

B. ASTM-E 1680 and ASTM-E 283 (both air infiltration tests),

C. ASTM-E 1592 (uplift test); UL-580 (uplift rating); See FM under B below

D. ASTM-E 108 (Fire test) UL-580 (uplift rating) UL-701 (fire rating)

1.04 PERFORMANCE REQUIREMENTS

A. General: Provide complete sheet metal roofing system, including, but not limited to, custom-fabricated metal roof panels, cleats, clips, anchors and fasteners, sheet metal flashing and related to sheet metal roofing, underlayment, and accessories as indicated and as required for a weathertight installation.

B. Fabricate and install roofing capable of resisting forces required by Code according to recommendations in FMG Loss Prevention Data Sheet 1-49.

C. Thermal Movements: Provide sheet metal roofing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

D. Water Infiltration: Provide sheet metal roofing that does not allow water infiltration to building interior, with metal flashing and connections of sheet metal roofing lapped to allow moisture to run over and off the material.

1.05 SUBMITTALS

A. Product Data: For each product indicated. Include details of construction relative to materials, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Produced by or reviewed by the manufacturers technical department before submittal to Design Agent showing fabrication and installation layouts of sheet metal roofing, including plans, elevations, and keyed references to termination points. Distinguish between shop- and field-assembled work. Include the following:
   1. Details for forming sheet metal roofing, including seams and dimensions.
   2. Details for joining and securing sheet metal roofing, including layout of fasteners, clips, and other attachments. Include pattern of seams.
   3. Details of termination points and assemblies, including fixed points.

4. Details of expansion joints, including showing direction of expansion and contraction.
5. Details of roof penetrations.
6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counter flashings.
7. Details of special conditions.
8. Details of connections to adjoining work.
9. Details of the following accessory items, at a scale of not less than 1-1/2 inches per 12 inches:
   a. Flashing and trim.
   b. Roof curbs.
   c. Snow guards.

C. Qualification Data: For Installer 5 years minimum experience with Sheet Metal Roofing.

D. Manufacturer provide verification of 10 years manufacturing experience with system proposed

E. Maintenance Data: For roofing system to include in maintenance manuals.

F. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

1.06 QUALITY ASSURANCE

A. Source Limitations: Obtain components for roofing system from or approved by roofing system manufacturer.

B. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

C. Comply with FM Roof Nav requirements for system noted on Drawings.

D. Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 01. Review methods and procedures related to roofing system including, but not limited to, the following:
   1. Meet with the Design Agent; Design Agent, Owner's insurer if applicable; testing and inspecting agency representative; roofing Installer; roofing system manufacturer's representative; deck Installer; and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
   2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
   3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
   5. Review structural loading limitations of roof deck during and after roofing.
   6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
   7. Review governing regulations and requirements for insurance and certificates if applicable.
   8. Review temporary protection requirements for roofing system during and after installation.
   9. Review roof observation and repair procedures after roofing installation.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal roofing pans, components, and other sheet metal roofing materials so as not to be damaged or deformed. Package sheet metal roofing materials for protection during transportation and handling.

B. Unload, store, and erect sheet metal roofing materials in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Store sheet metal roofing materials to ensure dryness. Do not store sheet metal

roofing materials in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect strippable protective covering on sheet metal roofing from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal roofing installation.

1.08 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.09 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Finish Warranty Period: 20 years from date of Substantial Completion.
   3. Weathertight Warranty; Manufacturers 20 year weathertight warranty to include repair or replacement of defective materials including panels and metal flashings and workmanship that do not remain watertight for a period of 20 years. Include high wind warranty rider for up to 110 MPH. Manufacturers technical representative shall inspect the system prior to issuance of the weathertight warranty.
   4. Failures include, but are not limited to, the following:
      a. Structural failures of metal roof panel.
      b. Wrinkling or buckling beyond minor oil canning.
      c. Failure to remain weathertight, including uncontrolled water leakage.
      d. Deterioration of metals, metal finishes, and other materials beyond normal weathering,

B. Special Installer's Warranty: Roofing Installer's warranty, on warranty form at end of this Section, signed by Roofing Installer, in which Roofing Installer agrees to repair or replace components of custom-fabricated sheet metal roofing that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not
   2. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 ROOFING SHEET METALS

A. Aluminum Sheet: 3004 alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
   1. Thickness:.040
   2. Surface: Intermediate stiffening or pencil ribs or smooth flat.
   3. Exposed Finishes: Apply the following coil coating: Fluoropolymer Two Coat: Manufacturer's standard Two-coat thermo-cured system consisting of specially formulated inhibitive primer, fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, with a minimum total dry film thickness of 1.0 mil; complying with AAMA 2605. Color as selected by Design Agent and Owner from manufacturer’s full range, including metallics.

B. Basis of Design Manufacturer: Merchant & Evans Zip-Rib, Custom Width

2.02 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing.

B. Fasteners: Self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

C. Elastomeric Joint Sealant: ASTM C 920, of base polymer, type, grade, class, and use classifications required to produce joints in sheet metal roofing that will remain weathertight and as recommended by roll-formed sheet metal roofing manufacturer for installation indicated.

2.03 ACCESSORIES

A. Sheet Metal Roofing Accessories: Provide components required for a complete sheet metal roofing assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of sheet metal roofing, unless otherwise indicated.
   1. Closures: Provide closures at eaves and ridges, fabricated of same metal as sheet metal roofing.
   2. Clips: Minimum 0.0625-inch-thick, stainless steel panel clips designed to withstand negative-load requirements.

B. Flashing and Trim: Formed from same material and with same gauge and finish as sheet metal roofing, Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
   1. Pipe and Penetration Flashing: Premolded, flashing sleeve or pipe collar with flexible metal ring bonded to sloped base. Intended to provide weatherproof seal and to isolate pipe movement from vibration and expansion/contraction.

2.04 FABRICATION

A. General: Custom fabricate sheet metal roofing to comply with details shown and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions (pan width and seam height), geometry, metal thickness, and other characteristics of installation indicated. Fabricate sheet metal roofing and accessories at the shop to greatest extent possible.
   1. Standing-Seam Roofing: Form standing-seam pans with finished seam height of 2.5” minimum

B. General: Fabricate roll-formed sheet metal roofing panels to comply with details shown and roll-formed sheet metal roofing manufacturer's written instructions.

C. Sealant Joints: Where movable, nonexpansion-type joints are indicated or required to produce weathertight seams, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.

D. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturers of dissimilar metals or by fabricator.

E. Sheet Metal Accessories: Custom fabricate flashings and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Obtain field measurements for accurate fit before shop fabrication.
   1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
   2. Seams: Manufacturers machine seamed standing seam. Interlocking snap seams are not permitted.
   3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
   4. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" for application but not less than thickness of metal being secured.

2.05 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, sheet metal roofing supports, and other conditions affecting performance of work.
   1. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances.
   2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored, and that provision has been made for flashings, and penetrations through sheet metal roofing.
   3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Examine roughing-in for components and systems penetrating sheet metal roofing to verify actual locations of penetrations relative to seam locations of sheet metal roofing before sheet metal roofing installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Install flashings and other sheet metal to comply with requirements specified in Section 076200 - SHEET METAL FLASHING AND TRIM.

B. Install flashings to cover underlayment to comply with requirements specified in Section 076200 - SHEET METAL FLASHING AND TRIM.

3.03 INSTALLATION, GENERAL

A. General: Install sheet metal roofing perpendicular to purlins or supports. Anchor sheet metal roofing and other components of the Work securely in place, with provisions for thermal and structural movement. Install fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing.
   1. One Fix point to allow free movement due to thermal expansion and contraction
   2. Flash and seal sheet metal roofing with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
   3. Locate and space fastenings in uniform vertical and horizontal alignment.
   4. Panels shall be factory or field manufactured in continuous lengths without overlap joints
   5. Factory or Field Fabricated roll forming equipment must have current UL approval.
   6. Lap metal flashing over sheet metal roofing to allow moisture to run over and off the material.

B. Fasteners: Use fasteners of sizes that will not penetrate completely through substrate.
   1. Stainless-Steel fasteners.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by fabricator of sheet metal roofing or manufacturers of dissimilar metals.

D. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

E. Fascia: Align bottom of sheet metal roofing and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal sheet metal roofing with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

F. Standing-Seam Roofing: Attach standing-seam metal pans to substrate with threaded fasteners with spacing as determined by metal roof system manufacturer.

3.04 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
   1. Install components required for a complete sheet metal roofing assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
   1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
   2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection.

C. Pipe and Penetration Flashing: Form flashing around pipe penetration and sheet metal roofing. Fasten and seal to sheet metal roofing as recommended by SMACNA.

D. Roof Curbs: Install curbs at locations indicated on Drawings. Set roof curb so top surface of roof curb is level. Install flashing around bases where they meet sheet metal roofing.

E. Bar-Type Snow Guards: Attach bar supports to vertical ribs of standing-seam sheet metal roofing with clamps or setscrews. Do not use fasteners that will penetrate sheet metal roofing.

F. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
   1. .

3.05 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal roofing within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.06 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
   1. Steel and Aluminum Materials: Clean off excess sealants.
   2. Copper Materials: Clean and neutralize flux materials. Clean off excess solder and sealants.

B. Remove temporary protective coverings and strippable films, if any, as sheet metal roofing is installed. On completion of sheet metal roofing installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

C. Replace panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 4200
PHENOLIC SOFFIT PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wood-look phenolic panels for exterior soffit, entrance overhand, and vestibule wall cladding. May be referred to as “HPL panels”.

1.02 RELATED SECTIONS

A. Section 05: “Structural Framing”

B. Section 07: “Thermal Insulation”

C. Section 09: “Joint Sealers”

1.03 REFERENCES

A. ASTM E84 - 12 Standard Test Method for Surface Burning Characteristics of Building Materials.

B. NEMA Standards Publication LD3-2005. High pressure decorative laminates.

C. 2012 International Building Code, Chapter 14 Exterior Walls.

1.04 SUBMITTALS

A. Comply with Section 01330 (01 33 00) - Submittal Procedures.

B. Product Data: Submit manufacturer's printed product literature and specifications including fabrication and assembly.

C. Samples: Submit manufacturer's standard 3”x3” samples of panel cladding materials representative of colors, species and texture.

D. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.

E. Warranty: Submit manufacturer's standard warranty.

F. Installation Instructions (descriptive manual)

G. Shop Drawings: Submit complete sets of fabrication/installation drawings including panel dimensions, thickness, location of joints, method of anchorage, number of anchors, supports, accessories, etc.

1.05 QUALITY ASSURANCE

A. Manufacturer's Qualifications:
   1. Sufficient plant facilities to provide quality and quantity of materials as required without delaying progress of the work.
   2. Minimum of 20 years of experience in paper saturation of phenolic resin, and producing phenolic paper laminate.

B. Fabricated by the manufacturer, and/or
   1. Contracted by the customer, minimum 5 years of experience in fabrication work of exterior cladding system for the size and complexity of the projects.
   2. Approved by the manufacturer.

C. Installer
   1. Proven professional cladding system installer with a minimum of 5 years of documented experience.
   2. Approved by the manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials in manufacturer's original unopened containers/packages, with labels clearly identifying product name, manufacturer, color/texture, and weight.

B. Storage:

1. Store materials in clean, dry area in accordance with manufacturer's instructions.
2. Keep package sealed until ready for use.

C. Handling:
1. Handle materials in accordance with manufacturer's instructions.
2. Protect materials during handling to prevent damage.

1.07 WARRANTY

A. Limited warranty: equal to Compact Wood/CarbonZero LLC warrantee that CompactWood®/CarbonZero hpl Compact X Architectural Panels shall be free from material defects for a period of 10 years.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Basis of Design: CarbonZero hpl Compact X by CompactWood/CarbonZero LLC, 2825 Commerce Parkway, North Port, FL 34289.
1. Web Site: www.compactwood.com Email: pwest@millworkusa.com
2. Substitutions may be proposed in accordance with the Contract Documents

2.02 EXTERIOR ARCHITECTURAL PANELS

A. Material: Solid phenolic laminate panel with UV protection and wood-look surface

B. Species:.AAM 1093 (cherry or mahogany)

C. Finish: SG

D. Standard Size: 48”x120”

E. Panel Thickness: 1/2”, 12 mm

F. Panel Core: Standard natural (brown)

2.03 MINIMUM MATERIAL PROPERTIES

A. NEMA Requirements

Description	Test	NEMA Requirements			
Thickness			0.156"	0.250"	0.500"
Resistance to High Temperature	3.6	Slight Effect	No Effect	No Effect	No Effect
Ball Impact Resistance: Inches Drop	3.8	75"	90"+	96"+	96"+
Dimensional Change: Length (Machine Direction)	3.11	0.3% Maximum	0.25%	0.25%	0.25%
Width (Cross Direction)		0.7% Maximum	0.50%	0.50%	0.50%
Weight Per Unit Area					
Lbs/ft^2			1.07	1.71	3.42
Kg/m^2			5.2	8.35	16.7
Density (PCF)			82	82	82

B. Mechanical Properties

Property	**NEMA Requirements**	0.156"	0.250"	0.500"
Flexural Strength ASTM D-790				
MD (psi)	18,000	20,000	20,000	20,000
CD (psi)	12,000	16,000	16,000	16,000
Flexural Modulus ASTM D-790				
MD (psi)	$1.6x10^6$	2.0×10^6	2.0×10^6	2.0×10^6
CD (psi)	$1.4x10^6$	1.5×10^6	1.5×10^6	1.5×10^6
Tensile Modulus ASTM D-638				
MD (psi)	18,000	18,000	18,000	18,000
CD (psi)	12,000	13,000	13,000	13,000

C. Fire Resistance

Fire Resistance		Product Type Class A	Class B
	Thickness	0.250"	0.250"
Flame Spread Index - ASTM E-84 (BLDG)*		15	30
Smoke Developed Values - ASTM E-84 (BLDG)*		15	105
Fire Rating* (Standard Product is Class B)		A	B*

1. * Test Method: ASTM E84-13a - Standard Test Method for Surface Burning Characteristics of Building Materials. Also known as NFPA 255, UL 723, and UBC 8-1.

D. Manufacturing Tolerance

Thickness (.156 to .375)	+/- .020
Thickness (above .375 to 1.000)	+/- .030
CNC Shaped size (Length -Width)	+/- .020
Drill Diameter	+/- .003
Drill Depth	+/- .020
CNC Hole to Hole	+/- .020
CNC Hole to Edge (1 Oper)	+/- .020
CNC Hole to Edge (2 Oper)	+/- .030
Routing - (Slots Width and Length)	+/- .015
Routing - (Slots Depth)	+/- .020

2.04 ACCESSORIES (FASTENERS)

A. Manufactured by approved supplier.

B. Provide exterior wall cladding system designed to withstand the effects of dead load, live load, and accommodate hygrothermal expansion/contraction of the panel.

PART 3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's/fabricator's/supplier's product data, handling and installation instruction/manual, shop drawings, shipping container/package ticket identification, etc.

3.02 EXAMINATION

A. Verify correct panels received, including dimension, tolerance, color/texture.

B. Verify correct attachment system received for the specific project/job.

C. Verify all the documents, including shop drawings and installation guidelines.

D. Verify installation conditions are satisfactory to receive work of this Section before the commencement.

E. Verify substrate installation is complete, flat, and true to plane.

3.03 PREPARATION

A. Field Measurements: Verify prior to fabrication and installation of the cladding panel.

B. Protect surrounding areas and surfaces to preclude damage during work of this Section.

C. Lay out work before beginning installation as necessary for true, plumb, and aligned panel installations.

D. Verify locations of joints and panel lengths.

3.04 INSTALLATION

A. Conform to manufacturer's instructions and provisions of shop drawings.

B. Conform to fastener's instructions for installation of fasteners.

C. Install to allow hygrothermal expansion/contraction.

D. Use appropriate techniques/tools to work with the panel.

E. Do not force to fit, bend, or stretch/compress.

F. Make cutting and fitting neat, square, and true. Where required, cut, de-burr edges, and clean filings from adjacent surfaces.

G. Do not install damaged or questionable panels.

3.05 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Provide field services to ensure product installation is in accordance with manufacturer's/fabricator's/supplier's instructions and installation manuals, shop drawings, etc.

3.06 ADJUSTING

A. Correct identified defects and irregularities.

B. Replace damaged, soiled, and discolored work.

3.07 CLEANING

A. Leave installation clean and free from residue and debris from work of this Section.

END OF SECTION

SECTION 07 4216
INSULATED CORE METAL WALL PANELS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Foamed-insulation-core horizontal and vertical metal wall panel assembly with integral reveals and profiled panels, with related metal trim and accessories. May be referred to as “insulated metal panels”.

B. Secondary metal framing.

1.02 RELATED REQUIREMENTS

A. Division 05 Section "Cold-Formed Metal Framing" for support framing for insulated core metal wall panels.

B. Division 07 Section "Air Barriers" for transition and flashing components of air/moisture barrier.

C. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal copings, flashings, reglets and roof drainage items.

D. Division 07 Section "Joint Sealers" for field-applied joint sealants.

1.03 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
   1. AAMA 501.1 - Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure.
   2. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtainwalls and Sloped Glazing Systems.
   3. AAMA 508-07 Voluntary Test Method and Specifications for Pressure Equalized Rain Screen Wall Cladding Systems.
   4. AAMA 621 - Voluntary Specification for High Performance Organic coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
      a. American Society of Civil Engineers (ASCE):
         1) ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
   5. ASTM International (ASTM):
      a. ASTM A 653/A 653M - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
      b. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless-Steel Sheet, Strip, Plate, and Flat Bar.
      c. ASTM A 755 - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
      d. ASTM B 117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
      e. ASTM C 209 - Standard Test Methods for Cellulosic Fiber Insulating Board.
      f. ASTM C 645 - Specification for Nonstructural Steel Framing Members.
      g. ASTM C 754 - Specification for Installation of Steel Framing Members to Receive Screw Attached Gypsum Panel Products.
      h. ASTM C 920 - Specification for Elastomeric Joint Sealants.
      i. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus.
      j. ASTM D 968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.
      k. ASTM D 3359 - Standard Test Methods for Measuring Adhesion by Tape Tests.
      l. ASTM D 4585 - Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation.
      m. ASTM D 4587 - Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings

n. ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
o. ASTM E 84 - Test Methods for Surface Burning Characteristics of Building Materials.
p. ASTM E 119 - Test Methods for Fire Tests of Building Construction and Materials.
q. ASTM E 283 - Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences across the
r. Specimen.
s. ASTM E 329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.
t. ASTM E 331 - Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
u. ASTM E 1886 - Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
v. ASTM E 1996 - Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
w. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA):
x. Architectural Sheet Metal Manual.
y. Underwriters Laboratories, Inc. (UL):
   1) UL 263 - Fire Tests of Building Construction and Materials.
   2) UL 1040 - Fire Test of Insulated Wall Construction.
   3) UL 1715 - Fire Test of Interior Finish Material

1.04 PERFORMANCE REQUIREMENTS

A. General: Provide metal wall panel system meeting performance requirements as determined by application of specified tests by a qualified testing agency on manufacturer's standard assemblies. Must be FM labeled.

B. Air Infiltration: Maximum 0.06 cfm/sq. ft. (0.3 L/s per sq. m) per ASTM E 283 at a static-air pressure difference of 6.24 lb./sq. ft. (300 Pa), using minimum 10-by-10-foot (3050-by-3050 mm) test panel that includes horizontal and vertical joints.

C. Water Penetration, Static Pressure: No uncontrolled water penetration per ASTM E 331 at a minimum static differential pressure of 15 lb. /sq. ft. (718 Pa), using minimum 10-by-10-foot (3050-by-3050 mm) test panel that includes either horizontal or vertical joints.

D. Water Penetration, Static Pressure - 2-hour duration: Panel system shall demonstrate no water penetration when tested in accordance with ASTM E331 at 15 psf pressure differential for a two (2) hour duration to satisfy International Building Code, Section 1403.2. Panel systems unable to demonstrate compliance with this requirement will require a separate weather-resistive barrier, approved by CENTRIA for fire performance, installed behind the wall panel system to comply with International Building Code requirements.

E. Water Penetration, Dynamic Pressure: No uncontrolled water penetration per AAMA 501.1 at a minimum static differential pressure of 15 lb/sq. ft. (718 Pa), using minimum 8-by-8-foot (3050by-3050 mm) test panel that includes horizontal and vertical joints. For panels installed horizontally only.

F. System Performance: A 3rd party test report utilizing the standard ASTM E 283, E 331 and AAMA 501 procedures following the test protocol described in AAMA 508-07 must be submitted prior to bid. Test panel must include a horizontal joint, with an imperfect air barrier. For panels installed horizontally only.
   1. Bidders supplying panel systems that have not successfully passed AAMA 508-07 shall provide a backup system that meets the air and water infiltration values as listed above in sections 1.5.B - 1.5.E.

G. Water Absorption: Maximum 1.0 percent absorption rate by volume when tested according to ASTM C 209.

H. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated, per ASTM E 72:
   1. Wind Loads: Determine loads based on uniform pressure, importance factor, exposure category, and basic wind speed indicated on drawings.
   2. Limits of Deflection: Composite wall panel system shall withstand scheduled wind pressure with the following allowable deflection:
      a. Maximum allowable deflection limited to L/180 deflection of panel perimeter normal to plane of wall with no evidence of failure.
   3. Secondary Metal Framing: Design secondary metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."
      a. Backer Flash & IMV - Provide a minimum 5-inch (127mm) wide bearing surface for metal wall panels at the following locations
         1) Horizontal Panel System: At typ. 5/8” vertical joints.
         2) Vertical Panel System: 4-1/2” at horizontal stack joints.
      b. Backer Flash & Gasket - Provide minimum bearing surface for metal wall panels at the following locations:
         1) Horizontal Panel System: 3” wide at vertical joints.
         2) Vertical Panel System: 4-1/2” at horizontal stack joints.
      c. Seal Plate & IMV Gasket - Provide minimum 6-inch- (152-mm-) wide bearing surface for metal wall panels at the following locations:
         1) Horizontal Panel System: At vertical joints.
   4. Windborne-Debris-Impact-Resistance Performance: Pass missile-impact and cyclic-pressure tests per ASTM E 1886 and ASTM E 1996 for Wind Zone indicated on Drawings.
      a. Large-Missile Test: For curtainwall located within 30 feet (9.1 m) of grade (available to missile level, D, only).
      b. Small-Missile Test: For curtainwall located more than 30 feet (9.1 m) above grade.
   5. Seismic Performance: Comply with ASCE 7 Sections 11 - 23, "Seismic".
   6. Blast Resistance: Comply with applicable provisions of the United Facilities Criteria (UFC) 4-010-01 DOD Minimum Antiterrorism Standards for Buildings.

I. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction.

J. Thermal Performance: Thermal-resistance (R) value indicated, based on ASTM C 1363 and maintained ASTM C 518 testing and finite element modeling, with the following conditions:
   1. 15 mph (24.1 km/h) exterior wind speed and still air on interior.
   2. Include side joint and standard fastening.
   3. Base R value reported on performance of specified panel, taking into account integral reveals and profiling with resultant reduction in panel insulation thickness.

K. Fire Performance Characteristics: Provide metal composite wall systems that comply with the performance requirements of Chapter 26 Plastic of the 2015 International Building Code.
   1. Fire Performance of Insulated Wall: Third Party Design Listing CSG/GWP 30-03.

1.05 QUALITY ASSURANCE

A. Manufacturer/Source: Provide metal wall panel system and panel accessories from a single manufacturer.

B. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum 10 years’ experience in manufacture of similar products in successful use in similar applications.
   1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
      a. Product data, including certified independent test data indicating compliance with requirements. Include detailed data indicating compliance with AAMA 508-07 performance specified in this section.

b. Samples of each component.
c. Sample submittal from similar project.
d. Project references: Minimum of 5 installations not less than 5 years old, with Owner and Design Agent contact information.
e. Sample warranty.

2. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.
3. Approved manufacturers must meet separate requirements of Submittals Article.

C. Wall Systems Installer Qualifications: Experienced Installer with minimum of 5 years' experience with successfully completed projects of a similar nature and scope, and employing workers trained by manufacturer to install products of this Section.

D. Testing Agency Qualifications: Qualify in accordance with requirements of ASTM E 329.

E. Mockups: Build mockup in size and location indicated. Show details of composite wall panel system. Demonstrate methods and details of installation. Show details of horizontal and vertical joints, penetrations, doors, windows, louvers, pipe openings, inside and outside corners, top and bottom of wall.
1. Approval of mockup does not relieve Contractor of responsibility to comply with all requirements of contract documents.
2. Approved mockup may become part of installation if approved by Design Agent.

1.06 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct preinstallation meeting at site attended by Owner, Design Agent, manufacturer's technical representative, and other trade contractors.
1. Coordinate building framing in relation to composite wall panel system.
2. Coordinate windows, doors and louvers, and other openings and penetrations of composite wall panel system.

1.07 ACTION SUBMITTALS

A. Product Data: Manufacturer's data sheets for specified products.

B. Shop Drawings: Provide shop drawings prepared by manufacturer or manufacturer's authorized dealer. Include full elevations showing openings and penetrations. Include details of each condition of installation and attachment. Provide details at a minimum scale 1-1/2-inch per foot of all required trim and extrusions needed for a complete installation
1. Indicate points of supporting structure that must coordinate with composite wall panel system installation.

C. Samples for Initial Selection: For each product specified, provide product samples, representative color chips and/or charts of manufacturer's full range of colors.

1.08 INFORMATIONAL SUBMITTALS

A. Letter of Compliance: Indicating compliance of products tested from a qualified independent testing agency.

B. Health Product Declaration (HPD): Submit documentation certifying that products comply with the HPD Open Standard.

C. Environmental Product Declaration (EPD): Submit documentation certifying that products comply with the International EPD® System.

D. Florida Product Approval, HVHZ and Non-HVHZ

E. ASTM E 1886 & E 1996 Large Missile impact test.

F. Manufacturer's warranty: Submit sample warranty.

1.09 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Protect products of composite wall panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage.
   1. Deliver, unload, store, and erect composite wall panel system and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.

1.11 WARRANTY

A. Special Manufacturer's Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal wall panel assemblies that fail in materials and workmanship within [two] years from date of Substantial Completion.

B. Special Panel Finish Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace wall panels that display evidence of deterioration of finish within [20] years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 SYSTEM DESCRIPTION

A. Insulated Core Metal Wall Panel System: Halogen-Free, Factory-foamed-in-place horizontal and vertical wall panel system consisting of an exterior metal face sheet with interior metal liner panel, bonded to factory foamed-in-place core in thermally-separated profile, utilizing no glues or adhesives, with factory sealed tongue-and-groove and pressure-equalized rainscreen-designed horizontal side joint, attached to supports using concealed fasteners.
   1. System is provided complete with secondary metal framing.

2.02 MANUFACTURERS

A. Basis of Design: CENTRIA, Formawall Dimension Series Insulated Core Metal Wall Panels. Provide basis of design product [or comparable product approved by Design Agent prior to bid].
   1. 1. CENTRIA Architectural Systems; Moon Township, PA 15108-2944. Tel: (800)759-7474. Tel: (412)299-8000. Fax: (412)299-8317. Email: info@CENTRIA.com. Web: www.CENTRIA.com.
   2. Substitutions may be proposed in accordance with the Contract Documents.

2.03 PANEL MATERIALS

A. Exposed Coil-Coated Finish:
   1. Fluoropolymer Two-Coat System: 0.8 mil primer with 0.8 mil 70 percent PVDF fluoropolymer color coat, AAMA 621.
      a. Basis of Design: CENTRIA Duragard.
      b. Basis of Design: CENTRIA Kolorshift.

2.04 INSULATION FOR PANEL CORES

A. Metal Panel Foamed-Insulation-Core: Halogen- Free, Foamed-in-place isocyanurate
   1. Density: Minimum 3.1 lb/cu. ft. (43.4 kg/cu. m) minimum

2.05 FOAMED-INSULATION-CORE METAL WALL PANELS

A. Foamed-Insulation-Core Metal Wall Panels: Halogen- Free, Factory-foamed-in-place horizontal and / or vertical wall panel system consisting of an exterior metal face sheet with interior metal liner panel forming a thermally separated profile, bonded to factory foamed-in-place core, and with factory sealed tongue-and-groove and rainscreen-designed pressure-equalized horizontal side joint, configured with weep-hole-vented chamber to maintain equalized atmospheric pressure reducing potential for moisture drive into wall assembly, attached to supports using concealed fasteners.
   1. Exclusions: The following do not meet the requirements of this Section:
      a. Laminated panels.
      b. Barrier wall-designed systems.
      c. Systems relying upon venting only at vertical joints to attain pressure equalization.

d. Systems relying upon field-installed gaskets or wet seals to meet performance requirements.
e. Panels that contain Halogenated Fire Retardants

2. Horizontal Panel - Side Joint: Side joints with positive drip edge, sloped drain shelf and integral venting to the exterior along the panel length to permit moisture drainage and to allow air to enter the pressure equalization chamber. Side joint shall have a 23/8-inch baffle interlock and shall provide effective pressure equalization as demonstrated by testing specified in 1.4.F.
3. Horizontal Panel - End Joint: End joints for insulated metal panels shall be designed to allow moisture to be drained from the panel's side joint. No end dam sealant is to be applied to the ends of the side joint at the end joint location.
   a. Backer Flash - A continuous back-up flash behind the end joint is required with two beads of field applied non-curing butyl sealant between the panel and back up flashing for each panel. The field applied non-curing butyl sealant shall be married to the panel's shop applied non-curing butyl sealant within the panel's side joint.]
      1) Gasketed End Joint - End joint shall be gasketed, exposed wet seals are not permitted. Outer wings of gasket shall compress against the metal return flange (trimless end) of the panel face.] The end joint shall be designed to allow moisture to be drained from the panel's side joint.]
   b. Seal Plate - An extruded aluminum seal plate with combination TPE gasket, drain cavity and non-curing butyl seal a vertical pressure-equalized vented chamber permitting moisture to drain to exterior. The field applied non-curing butyl sealant shall be married to the panel's shop applied noncuring butyl sealant within the panel's side joint.]
      1) Gasketed End Joint - End joint shall be gasketed, exposed wet seals are not permitted. Outer wings of gasket shall compress against the metal return flange (trimless end) of the panel face.] The end joint shall be designed to allow moisture to be drained from the panel's side joint.]
4. Panel Ends: Flat & FWGX Panels - Factory formed trimless ends, tabbed under panel horizontal shelf. Profile Panels - Factory applied end caps of matching substrate, color and finish]
5. Panel Width: 36" Flat Panels, 12" DS-59.
6. Panel Length: 16'
   a. Max. Segment Length = 12"
7. Panel Profiles: Flat and DS-59 Profile, in locations and sizes indicated.
8. Panel Reveals:
   a. Horizontal panels
      1) Flat Panels: 1/4"
      2) Profile-faced Panels: As indicated. DS-59 Profile.
9. Panel Thickness: 3.00 inch - T (76 mm).
10. Thermal-Resistance (R) Value: 3"-T flat - R-22.

2.06 METAL WALL PANEL ACCESSORIES

A. General: Provide complete metal wall panel assembly incorporating trim, copings, fascia, parapet caps, soffits, sills, inside and outside corners, and miscellaneous flashings. Provide manufacturer's factory-formed clips, shims, flashings, gaskets, lap tapes, closure strips, and caps for a complete installation. Fabricate accessories in accordance with SMACNA Manual.

B. Formed Flashing and Trim: Match material, thickness, and color of metal wall panel face sheets.

C. Extrusion Trim: Provide manufacturer-provided extruded trim for the following locations and as indicated on Drawings:
   1. Base trim.
   2. Coping.
   3. Panel installation perimeter.

4. Opening perimeters.

D. Sealants: Type recommended by metal wall panel system manufacturer for application, meeting requirements of Division 07 Section "Joint Sealants."

E. Flashing Tape: 4-inch wide self-adhering butyl flashing tape.

F. Panel Attachment Clips: Concealed G-90 galvanized steel clip configured to prevent overdriving of fastener and crushing of foam core, with panel fasteners engaging both face and liner elements and mechanically attaching to panel supports. Clip configured also to be utilized without removing significant portions of the foam at each clip location.

G. Fasteners: Self-tapping screws, bolts, nuts, and other acceptable fasteners recommended by panel manufacturer. Where exposed fasteners cannot be avoided, supply corrosion-resistant fasteners with heads matching color of metal wall panels by means factory-applied coating.

2.07 SECONDARY METAL FRAMING

A. Miscellaneous Framing Components, General: Cold-formed metallic-coated steel sheet, ASTM C 645, Grade 50, with ASTM A 653/A 653M, G90 (Z180) hot-dip galvanized zinc coating.

B. Subgirts: C- or Z- shaped sections, 0.054-inch (1.37mm) minimum nominal thickness.

C. Sill Channels: 0.06-inch (1.52 mm) minimum.

D. Hat Channels: 0.06-inch (1.52 mm) minimum nominal thickness.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine metal wall panel system substrate with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal wall panels.

B. Wall Substrate: Confirm that wall substrate is within tolerances acceptable to metal wall panel system manufacturer.
   1. Maximum deviations acceptable:
      a. 1/4-inch in 20 feet (6.4 mm in 6 m) vertically or horizontally from face plane of framing.
      b. 1/2-inch (12.7 mm) from flat substrate on any building elevation.
      c. 1/8-inch in 5 feet (3.2 mm in 1.5 m).

C. Framing: Inspect framing that will support metal wall panels to determine if support components are installed as indicated on approved shop drawings. Confirm presence of acceptable framing members at recommended spacing to match installation requirements of metal wall panels.

D. Openings: Verify that windows, doors, louvers and other penetrations match layout on shop drawings.

E. Advise G.C., in writing, of all out-of-tolerance work and other deficient conditions prior to proceeding with metal wall panel installation.

F. Correct out of tolerance work and other deficient conditions prior to proceeding with panel installation.

3.02 PREPARATION

A. Secondary Metal Framing: Install secondary metal framing and other metal panel supports per ASTM C 754 and metal wall panel manufacturer's recommendations.

3.03 METAL WALL PANEL SYSTEM INSTALLATION

A. General: Install metal wall panel system in accordance with approved shop drawings and manufacturer's recommendations. Install metal wall panels in orientation, sizes, and locations indicated. Anchor metal wall panels and other components securely in place. Provide for thermal and structural movement

B. Attach panels to metal framing using recommended clips, screws, fasteners, sealants, and adhesives indicated on approved shop drawings.
   1. Fasteners for Steel Wall Panels: Stainless-steel for exterior locations and locations exposed to moisture; carbon steel for interior use only.
   2. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as approved by manufacturer.
   3. Fasten metal wall panels to supports with concealed clips at each joint at location, spacing, and with fasteners recommended by manufacturer. Install clips to supports with self-tapping fasteners.
   4. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.
   5. Horizontal Application:
      a. Horizontal Joinery: Working from base of installation to top connect upper panel to lower panel at dry seal joinery.
      b. Vertical Joinery: Provide reveal between vertical ends of panels as shown on shop drawings using IMV and/or gasket furnished by manufacturer to form a weather tight seal between panels.
   6. Vertical Application:
      a. Horizontal Joinery: Working from left of initial installation to right, connect right panel to left panel at dry seal joinery.
   7. Dissimilar Materials: Where elements of metal wall panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.

C. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies.
   1. Seal panel end utilizing 2 beads of non-curing butyl aligning with factory-applied seal in adjacent panel pocket; apply continuously without gaps to complete panel system air barrier.
   2. Seal metal wall panel to supports or back-up flashing sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer. Do not install sealant in locations that will interfere with drainage of pressure-equalized panel chambers.
   3. Prepare joints and apply sealants per Division 07 Section "Joint Sealants."

3.04 ACCESSORY INSTALLATION

A. General: Install metal wall panel accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
   1. Install related flashings and sheet metal trim per requirements of Division 07 Section "Sheet Metal Flashing and Trim."
   2. Install components required for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
   3. Comply with performance requirements and manufacturer's written installation instructions.
   4. Provide concealed fasteners except where noted on approved shop drawings.
   5. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.05 FIELD QUALITY CONTROL

A. The panel installer shall water test panel [and window] areas for each crew at least twice during installation schedule and once at the conclusion of the installation.

B. Progress or check tests can be performed by the installer following test procedures noted in AAMA 501.2. No independent test agency need to be employed in this test phase. Results of this test phase is to be recorded and reported to the panel manufacturer.

C. Final AAMA 501.2 testing will be conducted by an independent test agency following project completion. Areas of test are to be determined by the Design Agent/Engineer and General

Contractor/Contract Manager and the panel installer. Engagement of the test agency is the responsibility of the [GC/CM] [panel installer]. A field representative from the panel manufacturer is required for the final inspection and testing.

3.06 CLEANING AND PROTECTION

A. Remove temporary protective films. Clean finished surfaces as recommended by metal wall panel manufacturer. Clear weep holes and drainage channels of obstructions, dirt, and sealant. Maintain in a clean condition during construction.

B. Replace damaged panels and accessories that cannot be repaired by finish touch-up or minor repair.

END OF SECTION

SECTION 07 5423

THERMOPLASTIC-POLYOLEFIN ROOFING (TPO)

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Thermoplastic membrane roofing system, including all components specified. May be referred to “membrane roof”. Metal fascia system is included in this section.

B. Comply with the published recommendations and instructions of the roofing membrane manufacturer, at http://manual.fsbp.com.

C. Commencement of work by Contractor shall constitute acknowledgement by Contractor that this specification can be satisfactorily executed, under the project conditions and with all necessary prerequisites for warranty acceptance by roofing membrane manufacturer. No modification of the Contract Sum will be made for failure to adequately examine the Contract Documents or the project conditions.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Wood nailers associated with roofing and roof insulation.

B. Section 07 6200 - Sheet Metal Flashing and Trim: Formed metal flashing and trim items associated with roofing.

C. Section 07 7100 - Roof Specialties: Manufactured copings, fascias, gravel stops, and other flashing-related items.

1.03 REFERENCE STANDARDS

A. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems; 2017.

B. ASTM C473 - Standard Test Methods for Physical Testing of Gypsum Panel Products; 2016.

C. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.

D. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2014.

E. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer; 2016.

F. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2014.

G. ASTM D1004 - Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting; 2013.

H. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.

I. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing; 2013.

J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

K. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.

L. FM (AG) - FM Approval Guide; current edition.

M. FM 4470 - Approval Standard for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction; 2016.

N. PS 1 - Structural Plywood; 2009.

O. PS 20 - American Softwood Lumber Standard; 2010.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data:
   1. Provide membrane manufacturer's printed data sufficient to show that all components of roofing system, including insulation and fasteners, comply with the specified requirements and with the membrane manufacturer's requirements and recommendations for the system type specified; include data for each product used in conjunction with roofing membrane.

C. Samples: Submit samples of each product to be used.

D. Executed Warranty.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall have the following:
   1. Company specializing in manufacturing the roofing membrane specified in this section with ten years of roof product manufacturing experience.
   2. Manufacturer must be able to provide the project with the membrane and high density coverboard that is produced in their facilities.

B. Installer Qualifications: Roofing installer shall have the following:
   1. Shall be a current licensed contractor of the manufacturer.
   2. Shall have a fully staffed office within 50 miles of the job site.
   3. Shall have at least five years experience in installing specified system.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact and legible.

B. Store materials clear of ground and moisture with weather protective covering.

C. Keep combustible materials away from ignition sources.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Comply with all warranty procedures required by manufacturer, including notifications, scheduling, and inspections.

C. Warranty: Equal to Firestone Limited System Warranty covering membrane, fasica edge, roof insulation, and other indicated components of the system, for the term indicated.
   1. Limit of Liability: No dollar limitation.
   2. Scope of Coverage: Repair leaks in the roofing system caused by:
      a. Ordinary wear and tear of the elements.
      b. Manufacturing defect in Firestone brand materials.
      c. Defective workmanship used to install these materials.
      d. Damage due to winds up to 110 mph. Include extended warranty wind coverage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design Manufacturer - Roofing System: Firestone Building Products LLC, Carmel, IN: www.firestonebpco.com.
   1. Roofing systems manufactured by others are acceptable provided the roofing system is completely equivalent in materials and warranty conditions and the manufacturer meets the following qualifications:
      a. Specializing in manufacturing the roofing system to be provided.

B. Manufacturer of Insulation and Cover Boards: Same manufacturer as roof membrane.

C. Manufacturer of Metal Roof Edging: Same manufacturer as roof membrane.
   1. Metal roof edging products by other manufacturers are not acceptable.

2. Field- or shop-fabricated metal roof edgings are not acceptable.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ROOFING SYSTEM DESCRIPTION

A. Roofing System: Thermoplastic polyolefin (TPO) single-ply membrane.
1. Membrane Attachment: Fully adhered.
2. Comply with applicable local building code requirements.

B. Roofing System Components: Listed in order from the top of the roof down:
1. Membrane: Thickness as specified.
2. Insulation Cover Board: Gypsum-based board, 1/2 inch thick; mechanically fastened.
3. Insulation:
a. Maximum Board Thickness: 3 inches; use as many layers as necessary; stagger joints in adjacent layers.
b. Maximum Thickness: 6 inches.

2.03 MEMBRANE MATERIALS

A. Membrane: Flexible, heat weldable sheet composed of thermoplastic polyolefin polymer and ethylene propylene rubber; complying with ASTM D6878/D6878M, with polyester weft inserted reinforcement and the following additional characteristics:
1. Solar Reflectance: 0.79, minimum, when tested in accordance with ASTM C1549.
2. Color: White.

B. Curb and Parapet Flashing: Same material as membrane, with encapsulated edge which eliminates need for seam sealing the flashing-to-roof splice; precut to 18 inches wide.

C. Formable Flashing: Non-reinforced, flexible, heat weldable sheet, composed of thermoplastic polyolefin polymer and ethylene propylene rubber.
1. Thickness: 0.060 inch plus/minus 10 percent.
2. Tensile Strength: 1550 psi, minimum, when tested in accordance with ASTM D638 after heat aging.
3. Elongation at Break: 650 percent, minimum, when tested in accordance with ASTM D638 after heat aging.
4. Tearing Strength: 12 lbf, minimum, when tested in accordance with ASTM D1004 after heat aging.
5. Color: White.
6. Acceptable Product: UltraPly TPO Flashing by Firestone.

D. Tape Flashing: 5-1/2 inch nominal wide TPO membrane laminated to cured rubber polymer seaming tape, overall thickness 0.065 inch nominal; TPO QuickSeam Flashing by Firestone.

E. Bonding Adhesive: Single-ply LVOC adhesive fourmulated for compatibility with the TPO membrane & a wide variety of substrate materials, including masonry, wood, metal, and insulation facings.

F. Pourable Sealer: Two-part polyurethane, two-color for reliable mixing; Pourable Sealer by Firestone.

G. Seam Plates: Steel with barbs and Galvalume coating; corrosion-resistance complying with FM 4470.

H. Termination Bars: Aluminum bars with integral caulk ledge; 1.3 inches wide by 0.10 inch thick; Firestone Termination Bar by Firestone.

I. Cut Edge Sealant: Synthetic rubber-based, for use where membrane reinforcement is exposed; UltraPly TPO Cut Edge Sealant by Firestone.

J. General Purpose Sealant: EPDM-based, one part, white general purpose sealant; UltraPly TPO General Purpose Sealant by Firestone.

K. Molded Flashing Accessories: Unreinforced TPO membrane pre-molded to suit a variety of flashing details, including pipe boots, inside corners, outside corners, etc.; UltraPly TPO Small and Large Pipe Flashing by Firestone.

2.04 ROOF INSULATION AND COVER BOARDS

A. Polyisocyanurate Board Insulation: Closed cell polyisocyanurate foam with black glass reinforced mat laminated to faces, complying with ASTM C1289 Type II Class 1, with the following additional characteristics:
   1. Minimum thickness: 5.2" (Two layers)
   2. Size: 48 inches by 96 inches, nominal.
      a. Exception: Insulation to be attached using adhesive or asphalt may be no larger than 48 inches by 48 inches, nominal.
   3. R-value (LTTR):
      a. 5.2 inch Thickness total: 30, minimum.
   4. Compressive Strength: 20 psi when tested in accordance with ASTM C1289.
   5. Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents.
   6. Recycled Content: 19 percent post-consumer and 15 percent pre-consumer (post-industrial), average.

B. Gypsum-Based Cover Board: Non-combustible, water resistant gypsum core with embedded glass mat facers, complying with ASTM C1177/C1177M, and with the following additional characteristics:
   1. Size: 48 inches by 96 inches, nominal.
      a. Exception: Board to be attached using adhesive or asphalt may be no larger than 48 inches by 48 inches, nominal.
   2. Thickness: As indicated elsewhere.
   3. Surface Water Absorption: 2.5 g, maximum, when tested in accordance with ASTM C473.
   4. Spanning Capability: Recommended by manufacturer for following minimum flute spans:
      a. 1/2 inch Thickness: 5 inches, minimum.
   5. Surface Voids: All surface voids of the immediate substrate greater than 1/2" wide must be properly filled with an acceptable insulation or suitable fill material.
   6. Surface Burning Characteristics: Flame spread index of 0 (zero), smoke developed index of 0 (zero), when tested in accordance with ASTM E84.
   7. Combustibility: Non-combustible, when tested in accordance with ASTM E136.
   8. Factory Mutual approved for use with FM 1-60 and 1-90 rated roofing assemblies.
   9. Mold Growth Resistance: Zero growth, when tested in accordance with ASTM D3273 for minimum of 4 weeks.
   10. Acceptable Product: Georgia-Pacific DensDeck Prime Roof Guard.

2.05 METAL ACCESSORIES

A. Metal Roof Edging and Fascia: Continuous pre-fabricated .040 metal edge member serving as termination of roof membrane and retainer for metal fascia; watertight with no exposed fasteners; mounted to roof edge nailer. Firestone Edgegard or equal including Extender with offset. Depth as detailed..
   1. Wind Performance:
      a. Membrane Pull-Off Resistance: 100 lbs/ft, minimum, when tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test method RE-1.
      b. Fascia Pull-Off Resistance: At least minimum required when tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test method RE-2.
      c. Provide product listed in FM (AG) with at least FM 1-270 rating.
   2. Description: Size and attachment method shall facilitate manufacturer's requirement for proper edge termination.
   3. Functional Characteristics: Fascia retainer supports while allowing for free thermal cycling of fascia.
   4. Aluminum Bar: Continuous 6063-T6 alloy aluminum extrusion with pre-punched slotted holes; miters welded; injection molded EPDM splices to allow thermal expansion.
   5. Anchor Bar Cleat: 20 gage, 0.036 inch G90 coated commercial type galvanized steel with pre-punched holes.

6. Curved Applications: Factory modified.
7. Fasteners: Factory-provided corrosion resistant fasteners, with drivers; no exposed fasteners permitted.
8. Special Shaped Components: Provide factory-fabricated pieces necessary for complete installation, including miters, scuppers, and end caps; minimum 14 inch long legs on corner pieces.
9. Scuppers: Welded watertight.
10. Accessories: Provide matching brick wall cap, downspout, extenders, and other special fabrications as shown on the drawings.
11. Color: Selected by Owner and Design Agent.

2.06 ACCESSORY MATERIALS

A. Wood Nailers: PS 20 dimension lumber, Structural Grade No. 2 or better Southern Pine, Douglas Fir; or PS 1, APA Exterior Grade plywood; pressure preservative treated.
   1. Width: 3-1/2 inches, nominal minimum, or as wide as the nailing flange of the roof accessory to be attached to it.
   2. Height: Total wood nailer height shall match the total thickness of insulation being used and shall be installed with a 1/8" gap between each length and at each change of direction.

PART 3 INSTALLATION

3.01 GENERAL

A. Install roofing, insulation, flashings, and accessories in accordance with roofing manufacturer's published instructions and recommendations for the specified roofing system. Where manufacturer provides no instructions or recommendations, follow good roofing practices and industry standards. Comply with federal, state, and local regulations.

B. Obtain all relevant instructions and maintain copies at project site for duration of installation period.

C. Do not start work until Pre-Installation Notice has been submitted to manufacturer as notification that this project requires a manufacturer's warranty.

D. Perform work using competent and properly equipped personnel.

E. Temporary closures, which ensure that moisture does not damage any completed section of the new roofing system, are the responsibility of the applicator. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition.

F. Install roofing membrane only when surfaces are clean, dry, smooth and free of snow or ice; do not apply roofing membrane during inclement weather or when ambient conditions will not allow proper application; consult manufacturer for recommended procedures during cold weather. Do not work with sealants and adhesives when material temperature is outside the range of 60 to 80 degrees F.

G. Protect adjacent construction, property, vehicles, and persons from damage related to roofing work; repair or restore damage caused by roofing work.
   1. Protect from spills and overspray from bitumen, adhesives, sealants and coatings.
   2. Particularly protect metal, glass, plastic, and painted surfaces from bitumen, adhesives, and sealants within the range of wind-borne overspray.
   3. Protect finished areas of the roofing system from roofing related work traffic and traffic by other trades.

H. Until ready for use, keep materials in their original containers as labeled by the manufacturer.

I. Consult membrane manufacturer's instructions, container labels, and Material Safety Data Sheets (MSDS) for specific safety instructions. Keep all adhesives, sealants, primers and cleaning materials away from all sources of ignition.

3.02 EXAMINATION

A. Examine roof deck to determine that it is sufficiently rigid to support installers and their mechanical equipment and that deflection will not strain or rupture roof components or deform deck.

B. Verify that surfaces and site conditions are ready to receive work. Correct defects in the substrate before commencing with roofing work.

C. Examine roof substrate to verify that it is properly sloped to drains.

D. Verify that the specifications and drawing details are workable and not in conflict with the roofing manufacturer's recommendations and instructions; start of work constitutes acceptable of project conditions and requirements.

3.03 PREPARATION

A. Take appropriate measures to ensure that fumes from adhesive solvents are not drawn into the building through air intakes.

B. Prior to proceeding, prepare roof surface so that it is clean, dry, and smooth, and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease and other materials that may damage the membrane.

C. Fill all surface voids in the immediate substrate that are greater than 1/4 inch wide with fill material acceptable insulation to membrane manufacturer.

D. Seal, grout, or tape deck joints, where needed, to prevent bitumen seepage into building.

3.04 INSULATION AND COVER BOARD INSTALLATION

A. Install insulation in configuration and with attachment method(s) specified in PART 2, under Roofing System.

B. Install only as much insulation as can be covered with the completed roofing system before the end of the day's work or before the onset of inclement weather.

C. Lay roof insulation in courses parallel to roof edges.

D. Neatly and tightly fit insulation to all penetrations, projections, and nailers, with gaps not greater than 1/8 inch. Fill gaps greater than 1/8 inch with acceptable insulation. Do not leave the roofing membrane unsupported over a space greater than 1'8 inch.

3.05 SINGLE-PLY MEMBRANE INSTALLATION

A. Beginning at low point of roof, place membrane without stretching over substrate and allow to relax at least 30 minutes before attachment or splicing; in colder weather allow for longer relax time.

B. Lay out the membrane pieces so that field and flashing splices are installed to shed water.

C. After making sure the sheet is placed in its final position allowing for a 3" lap, fold it back evenly onto itself so as to expose the underside.

D. NOTE: Where TPO membrane has been cut to expose reinforcing membrane, TPO cut edge sealant or TPO general purpose sealant must be used to encapsulate exposed edge.

E. Sweep the mating surface of the membrane with a stiff broom to remove any dirt that may have accumulated.

F. Apply TPO bonding adhesive at about the same time to both the exposed underside of the sheet and the substrate to which it will be adhered so as to allow approximately the same drying time.

G. Do not apply bonding adhesive over an area that is to be later heat welded to another sheet or flashing.

H. Allow bonding adhesive to flash off until tacky. Touch the bonding adhesive surface with a clean, dry finger to be certain that the adhesive film is dry to the touch and there is no wet adhesive beneath the top adhesive film. If either motion exposes wet or stringy adhesive when

the finger is lifted, then it is not ready for mating. Flash off time will vary depending on ambient air conditions.

I. Starting at the fold, roll the previously coated portion of the sheet into the coated substrate slowly and wvenly so as to minimize wrinkles.

J. To ensure proper contact, compress the bonded half of the sheet to the substrate with a stiff push broom.

K. Fold the unadhered half of the membrane sheet back onto itself, and repeat the procedure to complete the bonding of the sheet.

L. Secure membrane at all locations where the membrane terminates or goes through an angle change greater than 1" in 12" except for round pipe penetrations less than 18" in diameter and square penetrations less than 4" square.

M. Install membrane adhered to the substrate, with edge securement as specified.

N. Edge Securement: Secure membrane at all locations where membrane terminates or goes through an angle change greater than 2 in 12 inches using mechanically fastened reinforced perimeter fastening strips, plates, or metal edging as indicated or as recommended by roofing manufacturer.
   1. Exceptions: Round pipe penetrations less than 18 inches in diameter and square penetrations less than 4 inches square.
   2. Metal edging is not merely decorative; ensure anchorage of membrane as intended by roofing manufacturer.

3.06 FLASHING AND ACCESSORIES INSTALLATION

A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.
   1. Lap splice areas that have been contaminated must be wiped down with a dry or damp (water only) clean cloth prior to heat welding and allow to completely dry.
   2. All field and flashing splices on the horizontal surface shall be completed using an automatic heat welder which has been designed for hot air welding of thermoplastic membranes.
   3. Hand held welders are only to be used on vertical welds of where an automatic welder is not practical or cannot be used.
   4. Seams made with the automatic welder shall be a minimum of 1-1/2" wide. Seams made with hand welders shall be a minimum of 2" wide. Use 2" wide silicone coated steel hand rollers to assure proper mating of surfaces as hand heat welding proceeds.
   5. Seams made with the automatic welder shall be a minimum of 1-1/2" wide. Seams made with hand welders shall be a minimum of 2" wide. Use 2" wide silicone or silicone coated steel hand rollers to assure proper mating of surfaces as hand heat welding proceeds.
   6. Probe all completed welds using a slotted screwdriver or cotter pin puller type tool to verify seam integrity. Do not probe welds until they have had time to cool to ambient conditions. Any welds found to be insufficiently welded need to be repaired on a daily basis.

B. Metal Accessories: Install metal edgings, gravel stops, and copings in locations indicated on the drawings, with horizontal leg of edge member over membrane and flashing over metal onto membrane.
   1. Follow roofing manufacturer's instructions.
   2. Remove protective plastic surface film immediately before installation.
   3. Install water block sealant under the membrane anchorage leg.
   4. Flash with manufacturer's recommended flashing sheet unless otherwise indicated.

C. Scuppers: Set in sealant and secure to structure; flash as recommended by manufacturer.

D. Flashing at Walls, Curbs, and Other Vertical and Sloped Surfaces: Install weathertight flashing at all walls, curbs, parapets, curbs, skylights, and other vertical and sloped surfaces that the roofing membrane abuts to; extend flashing at least 8 inches high above membrane surface.

1. Use the longest practical flashing pieces.
2. Evaluate the substrate and overlay and adjust installation procedure in accordance with membrane manufacturer's recommendations.
3. Apply TPO Bonding Adhesive at about the same time to both the membrane flashing and the surface to which it is being bonded so as to allow approximately the same drying time. Apply TPO Bonding Adhesive by rolling the adhesive on to the mating surfaces evenly, avoiding globs or puddles.
4. Allow TPO Bonding Adhesive to flash off until tacky. Touch the TPO Bonding Adhesive surface with a clean, dry finger to be certain that the adhesive does not stick or string. As you are touching the adhesive, pushing straight down to check for stringing, also push forward on the adhesive at an angle to ensure that the adhesive is ready throughout its thickness. If either motion exposes wet or stringy adhesive when the finger is lifted, then it is not ready for mating. Flash off time will vary depending on ambient air conditions.
5. Roll the flashing into the adhesive evenly and carefully so as to minimize wrinkles.
6. To ensure proper contact, compress the flashing to the substrate with a stiff push broom.
7. Provide termination directly to the vertical substrate as shown on roof drawings.

E. Flashing at Penetrations: Flash all penetrations passing through the membrane; make flashing seals directly to the penetration.
   1. Pipes, Round Supports, and Similar Items: Flash with specified pre-molded pipe flashings wherever practical; otherwise use specified self-curing elastomeric flashing.
   2. Pipe Clusters and Unusual Shaped Penetrations: Provide penetration pocket at least 2 inches deep, with at least 1 inch clearance from penetration, sloped to shed water.

3.07 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspection by Manufacturer: Provide final inspection of the roofing system by a Technical Representative employed by roofing system manufacturer specifically to inspect installation for warranty purposes (i.e. not a sales person).

C. Perform all corrections necessary for issuance of warranty.

3.08 CLEANING

A. Clean all contaminants generated by roofing work from building and surrounding areas, including bitumen, adhesives, sealants, and coatings.

B. Repair or replace building components and finished surfaces damaged or defaced due to the work of this section; comply with recommendations of manufacturers of components and surfaces.

C. Remove leftover materials, trash, debris, equipment from project site and surrounding areas.

3.09 PROTECTION

A. Where construction traffic must continue over finished roof membrane, provide durable protection and replace or repair damaged roofing to original condition.

END OF SECTION

SECTION 07 6100
SHEET METAL CEILING PANELS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This section includes metal ceiling systems at the underside of the existing ramp structure as shown on the architectural drawings.

1.03 SUBMITTALS

A. Manufacturer's Literature and Data:
   1. Product Data: Submit manufacturer's technical data and brochures specified system.

B. Shop Drawings:
   1. Shop drawings shall show dimensions, sizes, thickness, finishes, joining, mounting attachments, and relationship to adjoining work.

C. Samples:
   1. Samples shall include a minimum 8" long nominal piece X the module width of each type of metal panel, finished as specified, and accessories.

D. Certification:
   1. Submit certification from manufacturer of ceiling panels attesting that products comply with specified requirements including finish as specified.

E. Qualification Data:
   1. Firms specified in "Quality Assurance" Article must demonstrate their capabilities and experience by including lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

F. Product Test Reports:
   1. All products furnished shall have a flame spread classification of 0-25 for a Class A or Class 1 ratin in accordance with ASTM E84.
   2. All products furnished shall be tested in accordance with ASTM C-423-90 for sound absorption.

G. Maintenance Data:
   1. Provide maintenance instructions for acoustical panels to be included in maintenance manuals as specified in Division 1.

H. Warranty:
   1. Provide product warranty for one year from date of material shipment.

1.04 QUALITY ASSURANCE

A. Manufacturer: Manufacturer: Furnish components from one (1) manufacturer with a minimum of ten (10) years of experience in the fabrication of metal ceiling specialties, utilizing systems, materials and techniques as herein specified.

B. Installer: Firm with not less than three (3) years of successful experience in the installation of systems similar to those required by this project and acceptable to manufacturer of the system.

C. Fabricator must own and operate its own Manufacturing facilities for all metal components. Systems consisting of components from a variety of manufacturers will not be considered or accepted.

D. Manufacturer/Fabricator must own and operate its own Painting and Finishing facility to assure single source responsibility and quality control.

E. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct testing indicated, as documented according to ASTM E 548.

1.05 DELIVERY, STORAGE & HANDLING

A. All materials shall be protected during fabrication, shipment, site storage and erection to prevent damage to the finished work from other trades. Store acoustical panels inside a well-ventilated area, away from uncured concrete and masonry, and protected from the weather, moisture, soiling, abrasion, extreme temperatures, and humidity.

1.06 SEQUENCING

A. Substitute Products: Alternate proposals for substitute products will not be accepted unless approval is issued in addenda.

B. Contract Execution: Submittals shall be completed and approved prior to award of subcontract for system components.

C. Manufacturer's Production Schedule: Sub-contract for the work of this section shall be planned to allow sufficient time for manufacturer's production and delivery scheduling.

PART 2 - PRODUCTS

2.01 MANUFACTURER – BASIS OF DESIGN

A. TURN-Key™ Ceiling Systems shall be manufactured by Gordon Interior Specialties, Division of Gordon, Inc., 5023 Hazel Jones Road, Bossier City, LA 71111, (800) 747-8954, FAX (800) 877-8746, www.gordoninteriors.com , sales@gordoninteriors.com .

B. The listed manufacturer shall not be construed as closing specifications to other prospective manufacturers, but rather as establishing a level of quality in a metal system. Other systems may be submitted for approval; as provided for in the specifications at least 10 working days prior to submission of bids. Companies desiring to submit a proposal shall submit all descriptive information of the system proposed including photographs and shop drawings of at least three projects similar in detail and scope.

2.02 SYSTEM DESCRIPTION

A. Ceiling System shall be TURN-Key™ Ceiling Systems. All panels, perimeter trims and suspension components including acoustical component shall be provided as a complete package of this work. Gordon has many suspension and trim options to choose

2.03 MATERIALS

A. Metal Panels
   1. Aluminum sheet shall be 3003-H14 alloy, minimum .040” recommended, (ASTM B 209).
   2. Panels are 30 widths, of varying lengths, micro-perforated, and formed edges with tab and slot connection.
   3. The panels shall be fabricated of smooth aluminum.

B. Suspension – strut as recommended by product manufacturer.

C. Accessories
   1. Contura perimeter trim, J trim, and internal splices required for a complete system as necessary.
   2. Furring channels and screws are to be provided by others.
   3. General: Provide metals free from surface blemishes where exposed to view in finished unit. Surfaces that exhibit pitting, seam marks, roller marks, stains, and discolorations, or other imperfections on finished units are not acceptable. All metal shall be of the highest grade -commercial type,

2.04 2.4 FINISHES

A. Paint Finishes
   1. TURN-Key™ panels shall receive a micro-etched pretreatment prior to receiving an electrostatically applied Acrylic-Polyester hybrid powder coat paint finish.

2. All cut edges, including perforated holes must be coated. Finish shall be cured and oven baked to insure paint adhesion and uniform surface hardness.
3. Paint color to be selected from: Exterior grade Gordon ACROGUARD®-UVX Exterior Durability Powder Coat Color Chart.

PART 3 -EXECUTION

3.01 INSPECTION

A. Examine building structure scheduled to receive ceiling system for unevenness or irregularities that would affect quality and execution of work.

B. Tolerances:
   1. Install ceiling system with maximum permissible deflection of L/360 of span maximum surface deviation of 1/8” in 4’-0” (No load applied) ASTM 635-92.

C. INSTALLATION
   1. General: Comply with manufacturer’s printed instructions, governing regulations for Seismic Codes, and with the Ceiling & Interior Systems Construction Association standards applicable to work.
   2. Space Enclosure: Do not install any work until space is enclosed and weatherproofed, wet-work in space is completed and nominally dry, work above ceilings is complete, and temperature and humidity is continuously maintained at values near those of final occupancy.

D. CLEANING
   1. Clean all surfaces following installation.
   2. Replace material having scratches, abrasions, or other defects, with unblemished panels, or suspension.
   3. Maintenance per manufacturer’s finish maintenance instructions.

E. PROTECTION
   1. Protection of TURN-Key™ Ceiling Systems from damage by other trades after installation to be provided by general contractor.

3.02 3.5 GENERAL RESPONSIBILITY

A. A. Variation from specification: Any variation from this specification resulting in additional cost to any other contractor or subcontractor on this project shall be the sole financial responsibility of the contractor for the work of this section.

END OF SECTION

SECTION 07 6200
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including all metal flashings, counterflashings, and other items indicated on the Drawings. This includes continuous base flashing, metal sill trim, formed aluminum trim, sidewall flashing, jamb flashing and closure flashing.

B. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS

A. Section 07 4000 - Preformed Metal Roofing, standing seam closures and accessories by manufacturer.

B. Section 07 5423 – Thermoplastic Polyolefin Roofing (TPO), metal fascia system.

C. Section 07 7100 - Roof Specialties: Snow guards.

D. Section 07 7123 – Manufactured Gutters and Downspouts, gutter system.

1.03 REFERENCE STANDARDS

A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2015.

B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

C. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

E. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007, with Editorial Revision (2012).

F. CDA A4050 - Copper in Architecture - Handbook; current edition.

G. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

A. See Section 01 3300 - for submittal procedures.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

C. Samples: Submit two samples, 6 by 6 inch in size illustrating material of typical flashing.

D. Samples: Submit two samples 6 by 6 inch in size illustrating metal finish color.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with five years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

A. Pre-Finished Aluminum: ASTM B209 (ASTM B209M); 20 gage, (0.032 inch) thick; plain finish shop pre-coated with modified silicone coating.
   1. Modified Silicone Polyester Coating: Pigmented Organic Coating System, AAMA 2603; baked enamel finish system.
   2. Green color to match preformed metal panel system.

2.02 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside 1/2 inch; miter and seam corners.

D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

F. Fabricate flashings to allow toe to extend 2 inches over roofing surface. Return and brake edges.

2.03 ACCESSORIES

A. Fasteners: Galvanized steel, with soft neoprene washers.

B. Primer: Zinc chromate type.

C. Concealed Sealants: Non-curing butyl sealant.

D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.

E. Plastic Cement: ASTM D4586/D4586M, Type I.

PART 3 EXECUTION

3.01 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.02 INSTALLATION

A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..

B. Apply plastic cement compound between metal flashings and felt flashings.

C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

D. Secure gutters and downspouts in place with concealed fasteners.

E. Connect downspouts to downspout boots, and grout connection watertight.

END OF SECTION

SECTION 07 7100
ROOF SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Snowguards.

1.02 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.

B. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2015.

C. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

D. NRCA (RM) - The NRCA Roofing Manual; 2017.

E. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.

C. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.

PART 2 PRODUCTS

2.01 MANUFACTURERS – Basis of Design

A. Snow Guards:
   1. Alpine: clamp to seam system, 2 rail, aluminum mil anodized finish
   2. Substitution: See Section 01 6000

2.02 FINISHES

A. Mill Anodized Finish: AAMA 611 AA-M12C22A42/44 Class I anodic coating not less than 0.7 mils thick.

2.03 ACCESSORIES

A. Sealant for Joints in Linear Components: As recommended by component manufacturer.

B. End caps for rails, matching material and finish.

C. Ice flags, two per rib.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

3.02 INSTALLATION

A. Install components in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.

END OF SECTION

SECTION 07 7123
MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pre-finished aluminum roof gutters, flanges and downspouts with transition boot connections.

1.02 RELATED REQUIREMENTS

A. Section 07 5423 – Thermoplastic-Polyolefin Roofing (TPO), connection to edge of system.

1.03 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.

B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

C. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.

D. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Conform to applicable code for size and method of rain water discharge.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on prefabricated components.

C. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.

D. Samples: Submit two samples, 6 inch long illustrating component design, finish, color, and configuration.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.

B. Prevent contact with materials that could cause discoloration, staining, or damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS- Basis of Design

A. Gutters and Downspouts:
   1. Firestone; Industrial Gutter System and Downspouts: www.firestone.com.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Scupper and Collectors:
   1. Firestone; Industrial Gutter System: www.firestone.com.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. Aluminum Sheet: ASTM B209 (ASTM B209M); 0.032 inch thick.
   1. Finish: Class I anodized.
   2. Color: As selected from manufacturer's standard colors.

2.03 COMPONENTS

A. Gutters: Profile as indicated.

B. Downspouts: Firestone Rectangular profile.

C. Anchors and Supports: Profiled to suit gutters and downspouts.
   1. Gutter Supports: Brackets.
   2. Downspout Supports: Brackets.

D. Fasteners: Same material and finish as gutters and downspouts, with soft neoprene washers.

2.04 ACCESSORIES

A. Downspout Boots: Cast iron; ASTM A48.
   1. Manufacturers:
      a. Downspoutboots.com, a division of J. R. Hoe & Sons: www.downspoutboots.com.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.05 FABRICATION

A. Form gutters and downspouts of profiles and size indicated.

B. Fabricate with required connection pieces.

C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.

D. Hem exposed edges of metal.

E. Fabricate gutter and downspout accessories; seal watertight.

2.06 FINISHES

A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42; integrally colored anodic coating not less than 0.7 mils thick.

B. Class II Color Anodized Finish: AAMA 611 AA-M12C22A41; integrally colored anodic coating not less than 0.4 mils thick.

C. Primer Coat: Finish concealed side of metal sheets with primer compatible with finish system, as recommended by finish system manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that surfaces are ready to receive work.

3.02 PREPARATION

A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.

B. Slope gutters 1/2 inch per foot.

C. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

D. Connect downspouts to downspout boots at 12 inches above grade. Grout connection watertight.

E. Connect downspouts to storm sewer system. Grout connection watertight.

END OF SECTION

SECTION 07 8400
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping systems.

B. Firestopping of all joints and penetrations in smoke resistant assemblies including all connection to existing building whether indicated on drawings or not, and other openings indicated.

1.02 RELATED REQUIREMENTS

A. Section 01 7000 - Execution and Closeout Requirements: Cutting and patching.

B. Section 09 2116 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

1.03 REFERENCE STANDARDS

A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2015.

B. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2013a.

C. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus; 2015a.

D. ITS (DIR) - Directory of Listed Products; current edition.

E. FM (AG) - FM Approval Guide; current edition.

F. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

G. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.

H. UL (FRD) - Fire Resistance Directory; current edition.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.

C. Product Data: Provide data on product characteristics, performance ratings, and limitations.

D. Sustainable Design Submittal: Submit VOC content documentation for all non-preformed materials.

1.05 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 MOCK-UP

A. Install one firestopping assembly representative of each fire rating design required on project.
   1. Where one design may be used for different penetrating items or in different wall constructions, install one assembly for each different combination.

B. If accepted, mock-up will represent minimum standard for the Work.

C. If accepted, mock-up may remain as part of the Work. Remove and replace mock-ups not accepted.

1.07 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MATERIALS

A. Firestopping Materials: Any materials meeting requirements.

B. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.

C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

2.02 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Perimeter Fire Containment Firestopping: Use any system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of the floor assembly.

B. Through Penetration Firestopping: Use any system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.

2.03 FIRESTOPPING PENETRATIONS THROUGH CONCRETE AND CONCRETE MASONRY CONSTRUCTION

2.04 FIRESTOPPING PENETRATIONS THROUGH GYPSUM BOARD WALLS

2.05 FIRESTOPPING SYSTEMS

A. Firestopping: Any material meeting requirements.

1. Fire Ratings: Use any system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

C. Install backing materials to arrest liquid material leakage.

3.03 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Do not cover installed firestopping until inspected by authorities having jurisdiction.

3.04 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.05 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 9005
JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sealants and joint backing.

1.02 RELATED REQUIREMENTS

A. Section 07 2500 - Weather Barriers: Sealants required in conjunction with air barriers and vapor retarders:

B. Section 07 8400 - Firestopping: Firestopping sealants.

C. Section 09 2116 - Gypsum Board Assemblies: Acoustic sealant.

1.03 REFERENCE STANDARDS

A. ASTM C834 - Standard Specification for Latex Sealants; 2014.

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

D. ASTM D1667 - Standard Specification for Flexible Cellular Materials--Poly(Vinyl Chloride) Foam (Closed-Cell); 2005 (Reapproved 2011).

E. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with other sections referencing this section.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating sealant chemical characteristics.

1.06 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.07 WARRANTY

A. Provide installer's 5 year labor and materials warranty in addition to sealant manufacturer's warranty, with shall be 20 years. Contractor shall return within its warranty period and replace any sealant that exhibits loss of bond on one side, reversion, split conditions, absence of backer rod, or extruding from the joint.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Gunnable and Pourable Sealants:
   1. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
   2. Dow Corning Corporation: www.dowcorning.com.
   3. Pecora Corporation: www.pecora.com.
   4. Tremco Global Sealants: www.tremcosealants.com.
   5. Substitutions: See Section 01 6000 - Product Requirements.

B. Preformed Compressible Foam Sealers:
   1. EMSEAL Joint Systems, Ltd: www.emseal.com.
   2. Sandell Manufacturing Company, Inc: www.sandellmfg.com.
   3. Dayton Superior Corporation: www.daytonsuperior.com.
   4. Tremco Global Sealants: www.tremcosealants.com.
   5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SEALANTS

A. Sealants and Primers - General: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.

B. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
   1. Color: Match adjacent finished surfaces.
   2. Applications: Use for-
      a. Interior wall and ceiling control joints.
      b. Joints between door and window frames and wall surfaces.
      c. Other interior joints for which no other type of sealant is indicated.
   3. Products:
      a. Pecora Corporation; AC-20 + Silicone Acrylic Latex Caulking Compound: www.pecora.com.
      b. Sherwin-Williams Company; White Lightning 3006 Siliconized Acrylic Latex Caulk: www.sherwin-williams.com.
      c. Substitutions: See Section 01 6000 - Product Requirements.

C. General Purpose Exterior Sealant: Silicone modified color-matched sealant
   1. Colors: Match adjacent finished surfaces. Assume match to metal roofing, precast panels, and metal panel joints. Assume four colors: CCRI green TPO match, precast match and curtainwall match.
   2. Applications: Use for:
      a. All exterior joints
      b. Joints between door and window frames and wall surfaces.
   3. Products:
      a. Basis of Design: Dow 795.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean and prime joints in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Protect elements surrounding the work of this section from damage or disfigurement.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Install bond breaker where joint backing is not used.

D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

E. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Tool joints concave.

3.04 CLEANING

A. Clean adjacent soiled surfaces.

3.05 PROTECTION

A. Protect sealants until cured.

END OF SECTION

SECTION 08 1116
ALUMINUM DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glazed aluminum doors for both interior and exterior applications.

B. Aluminum frames to match.

C. Glazing.

1.02 RELATED REQUIREMENTS

A. Section 07 2500 - Weather Barriers: Sealing door frame to weather barrier installed on adjacent construction.

B. Section 07 9005 - Joint Sealants: Sealing joints between door frames and adjacent construction.

1.03 REFERENCE STANDARDS

A. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

C. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

D. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's descriptive literature for each type of door; include information on fabrication methods.

C. Shop Drawings: Include elevations of each opening type.
   1. Verify dimensions by field measurements before fabrication and indicate on shop drawings.

D. Selection Samples: Complete set of color and finish options, using actual materials, for Design Agent's selection.

E. Manufacturer's Qualification Statement.

F. Installer's Qualification Statement.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than five years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver aluminum components in manufacturer's standard protective packaging, palleted, crated, or banded together.

B. Inspect delivered components for damage and replace. Repaired components will not be accepted.

C. Store components in clean, dry, indoor area, under cover in manufacturer's packaging until installation.

D. Protect materials and finish from damage during handling and installation.

1.07 FIELD CONDITIONS

A. Do not begin installation of interior aluminum components until space has been enclosed and ambient thermal conditions are being maintained at levels consistent with final project requirements.

1.08 WARRANTY

A. Lifetime warranty in institutional use. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS – Basis of Design

A. Glazed Aluminum Doors, Exterior:
   1. Kawneer; 500 Standard Entrances, 560 Insulclad Thermal Entrances: www.kawneer.com.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Aluminum Frames, Exterior:
   1. Kawneer; 500 Standard Entrances, 560 Insulclad Thermal Entrances: www.kawneer.com.
   2. Substitutions: See Section 01 6000 - Product Requirements.

C. Glazed Aluminum Doors, Interior:
   1. Kawneer; profile to match without thermal break or insulated glass
   2. Substitutions: See Section 01 6000 - Product Requirements.

D. Aluminum Frames, Interior:
   1. Kawneer; profile to match with thermal break
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DOORS AND FRAMES

A. Glazed Aluminum Doors: Extruded aluminum tube frame, full glazed, with middle rail; factory glazed. Prepped for ADA auto opening hardware and security hardware interlocks and power.
   1. Finish: Factory finish.
   2. Glazing, Exterior Doors: Sealed insulating units, 1 inch thick, made of clear 1/4 inch thick fully tempered glass. Interior Doors: clear tempered class ¼” thick minimum.

B. Aluminum Frames for Doors, Sidelights, or Transoms: Extruded aluminum, thermally and non-thermally broken hollow or C-shaped sections; no steel components. Same prep.
   1. Finish: Same as doors.

C. Dimensions and Shapes: As indicated on drawings; dimensions indicated are nominal.
   1. Provide the following clearances:
      a. Hinge and Lock Stiles: 1/8 inch.
      b. Between Meeting Stiles: 1/4 inch.
      c. At Top Rail and Bottom Rail: 1/8 inch.

2.03 COMPONENTS

A. Tubular Doors: Extruded aluminum tubing, 1/8 inch minimum thickness, with heavy-duty plated steel through bolts in rails, glazing stops, and glazing gaskets.

B. Frames: Extruded aluminum shapes, not less than 0.062 inch thick, reinforced at hinge and strike locations.
   1. Corner Brackets: Extruded aluminum, fastened with stainless steel screws.
   2. Trim: Extruded aluminum, not less than 0.062 inch thick, removable snap-in type without exposed fasteners.

2.04 ACCESSORIES

A. Fasteners: Aluminum, non-magnetic stainless steel, or other material warranted by manufacturer as non-corrosive and compatible with aluminum components.

B. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible, otherwise, non-magnetic stainless steel or steel hot-dip galvanized in compliance with ASTM A123/A123M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall surfaces and openings are ready to receive frames and are within tolerances specified in manufacturer's instructions.

3.02 PREPARATION

A. Perform cutting, fitting, forming, drilling, and grinding of frames as required for project conditions.

B. Replace components with damage to exposed finishes.

C. Separate dissimilar metals to prevent electrolytic action between metals.

3.03 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and approved shop drawings.

B. Set frames plumb, square, level, and aligned to receive doors. Anchor frames to adjacent construction in strict accordance with manufacturer's recommendations and within specified tolerances.

C. Where aluminum surfaces contact metals other than stainless steel, zinc, or small areas of white bronze, protect from direct contact by applying elastomeric sealant between the different metals.

D. Hang doors and adjust hardware to achieve specified clearances and proper door operation.

3.04 CLEANING

A. Upon completion of installation, thoroughly clean door and frame surfaces in accordance with AAMA 609 & 610.

B. Do not use abrasive, caustic, or acid cleaning agents.

3.05 PROTECTION

A. Protect products of this section from damage caused by subsequent construction until Date of Substantial Completion.

B. Replace damaged or defective components that cannot be repaired to a condition indistinguishable from undamaged components.

END OF SECTION

SECTION 08 4413
GLAZED ALUMINUM CURTAIN WALLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum-framed curtain wall, both splayed and straight, with vision glazing and infill panels.

1.02 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.

B. AAMA 501.4 - Recommended Static Test Method for Evaluating Curtain Wall and Storefront Systems Subjected to Seismic and Wind Induced Interstory Drifts; 2009.

C. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.

D. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.

E. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.

F. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.

G. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

H. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

I. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

J. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.

K. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

L. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

M. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2015a.

N. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

O. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.

P. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.

Q. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.04 SUBMITTALS

A. See Section 01 3300 for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, internal drainage details, glazing, and infill.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.

D. Samples: Submit two samples 6 by 6 inches in size illustrating finished aluminum surface, glazing, infill panels, and glazing materials.

E. Test Reports: Submit results of full-size mock-up testing. Reports of tests previously performed on the same design are acceptable.

F. Field Quality Control Submittals: Report of field testing for water leakage.

G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at Rhode Island.

B. Verify that each component is appropriate for use in structural sealant glazing (SSG) application in regards to at least the following properties; size, shape, dimensions, material, self-life, storage conditions, and color.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than three years of documented experience.

D. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.06 MOCK-UP

A. See Section 01 4000 - Quality Requirements, for general requirements for mock-ups.

B. Provide 10 by 10 feet mock-up including each component being used on the project. Assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.

C. Locate on-site where directed by Design Agent. Mock-up may remain as part of the Work.

D. Locate off-site where directed. Remove when directed.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.09 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Glazed Aluminum Curtain Walls: Basis of Design
   1. Kawneer North America; 1600 SSJ Curtain Wall System: www.kawneer.com.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 CURTAIN WALL

A. Aluminum-Framed Curtain Wall: Two types – splayed mullion option, 0-5 degress, and same system without splay. See drawings for locations. Factory fabricated, factory finished aluminum framing members with infill and related flashings, anchorage and attachment devices.

1. Outside glazed, with pressure plate and mullion cover.
2. Fabrication Method: Shop/factory unitized system.
3. Glazing Method: Either shop/factory or field glazed system.
4. Finish: Class I natural anodized.
   a. Factory finish surfaces that will be exposed in completed assemblies.
   b. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
5. Provide flush joints and corners, weathersealed, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for imposed loads.
6. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
7. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
8. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.
9. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

B. Structural Performance Requirements: Design and size components to withstand the following load requirements without damage or permanent set.
   1. Design Wind Loads: Comply with the following:
      a. V ultimate = 146 miles per hour
      b. V assumed = 135 miles per hour, exposure C.
      c. Measure performance by testing in accordance with ASTM E330/E330M, using test loads equal to 1.5 times the design wind loads and 10 second duration of maximum pressure.
      d. Member Deflection: For spans less than 13 feet 6 inches, limit member deflection to flexure limit of glass in any direction, and maximum of 1/175 of span or 3/4 inch, whichever is less and with full recovery of glazing materials.
      e. Member Deflection: For spans over 13 feet 6 inches and less than 40 feet, limit member deflection to flexure limit of glass in any direction, and maximum of 1/240 of span plus 1/4 inch, with full recovery of glazing materials.
   2. Seismic Loads: Design and size components to withstand seismic loads and sway displacement in accordance with requirements of ASCE 7.
   3. Interstory Differential Lateral Movement: Meeting pass/fail criteria of AAMA 501.4 for Use Group I, Standard Occupancy, when tested at design displacement of 0.010 times greater adjacent story height, maximum, and 1.5 times design displacement, through three complete cycles.
   4. Movement: Accommodate the following movement without damage to components or deterioration of seals:
      a. Expansion and contraction caused by 180 degrees F surface temperature.
      b. Expansion and contraction caused by cycling temperature range of 170 degrees F over a 12 hour period.
      c. Movement of curtain wall relative to perimeter framing.
      d. Deflection of structural support framing, under permanent and dynamic loads.

C. Water Penetration Resistance: No uncontrolled water on indoor face when tested as follows:
   1. Test Pressure Differential: 20 psf.

D. Air Leakage: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 psf pressure differential across assembly.

E. Thermal Performance Requirements:

1. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.
2. Overall U-value Including Glazing: .342 Btu/(hr sq ft deg F), maximum.

2.03 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
   1. Framing members for interior applications need not be thermally broken.
   2. Cross-Section: As indicated on drawings.
   3. Structurally Reinforced Members: Extruded aluminum with internal reinforcement of structural steel member.

B. Glazing: 1" insulated glass sandwich, argon-filled, slight green reflective tint on 2nd surface, and Solarban 60 coating on 3rd surface.

C. Infill Panels: Insulated, aluminum sheet face and back, with edges formed to fit glazing channel and sealed.
   1. Core: Glass fiber insulation core with R-value of 5.
   2. Exterior Finish: Class I natural anodized.
   3. Interior Finish: Clear anodized.

2.04 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Sheet Aluminum: ASTM B209 (ASTM B209M).

C. Structural Steel Sections: ASTM A36/A36M; galvanized in accordance with requirements of ASTM A123/A123M.

D. Weatherseal Sealant: Silicone, with adhesion in compliance with ASTM C794; compatible with glazing accessories.

E. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, and compatible with flashing material.

F. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

G. Glazing Accessories: As specified in Section 08 8000.

H. Shop and Touch-Up Primer for Steel Components: Zinc oxide, alkyd, linseed oil primer appropriate for use over hand cleaned steel.

I. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

2.05 FINISHES

A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other related work.

B. Verify that curtain wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

C. Verify that anchorage devices have been properly installed and located.

3.02 INSTALLATION

A. Install curtain wall system in accordance with manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

H. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 0.5 inches per 100 ft, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

C. Sealant Space Between Curtain Wall Mullions and Adjacent Construction: Maximum of 3/4 inch and minimum of 1/4 inch.

3.04 FIELD QUALITY CONTROL

A. Provide services of manufacturer's field representative to observe installation and submit report.

3.05 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.06 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 08 7100
DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hardware for aluminum doors.

1.02 RELATED REQUIREMENTS

A. Section 08 1116 - Aluminum Doors and Frames.

B. Section 08 4413 - Glazed Aluminum Curtain Walls: Door hardware, except cylinders.

C. Section 10 1400 - Signage: Additional signage requirements.

1.03 REFERENCE STANDARDS

A. DHI (H&S) - Sequence and Format for the Hardware Schedule; 1996.

B. DHI (KSN) - Keying Systems and Nomenclature; 1989.

C. ITS (DIR) - Directory of Listed Products; current edition.

D. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

E. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.

F. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

G. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. General:
   1. Submit in accordance with Conditions of Contract and Division 01 requirements.
   2. Highlight, encircle, or otherwise specifically identify on submittals deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
   3. Prior to forwarding submittal, comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, “EXAMINATION” article, herein.

C. Action Submittals:
   1. Product Data: Product data including manufacturers’ technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
   2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
      a. Wiring Diagrams: For power, signal, and control wiring and including:
         1) Details of interface of electrified door hardware and building safety and security systems.
         2) Schematic diagram of systems that interface with electrified door hardware.
         3) Point-to-point wiring.
         4) Risers.
   3. Samples for Verification: If requested by Architect, submit production sample or sample installations of each type of exposed hardware unit in finish indicated, and tagged with full description for coordination with schedule.
      a. Samples will be returned to supplier in like-new condition. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
   4. Door Hardware Schedule: Submit schedule with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule as published by the Door

and Hardware Institute. Indicate complete designations of each item required for each door or opening, include:

a. Door Index; include door number, heading number, and Architects hardware set number.
b. Opening Lock Function Spreadsheet: List locking device and function for each opening.
c. Type, style, function, size, and finish of each hardware item.
d. Name and manufacturer of each item.
e. Fastenings and other pertinent information.
f. Location of each hardware set cross-referenced to indications on Drawings.
g. Explanation of all abbreviations, symbols, and codes contained in schedule.
h. Mounting locations for hardware.
i. Door and frame sizes and materials.
j. Name and phone number for local manufacturer's representative for each product.
k. Operational Description of openings with any electrified hardware (locks, exits, electromagnetic locks, electric strikes, automatic operators, door position switches, magnetic holders or closer/holder units, and access control components). Operational description should include how door will operate on egress, ingress, and fire and smoke alarm connection.
    1) Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work that is critical in Project construction schedule.

5. Key Schedule:
    a. After Keying Conference, provide keying schedule listing levels of keying as well as explanation of key system's function, key symbols used and door numbers controlled.
    b. Use ANSI/BHMA A156.28 “Recommended Practices for Keying Systems” as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
    c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
    d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
    e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion.
        1) Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
    f. Prepare key schedule by or under supervision of supplier, detailing Owner’s final keying instructions for locks.
6. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory prepared for door hardware installation.

D. Informational Submittals:
1. Qualification Data: For Supplier, Installer and Architectural Hardware Consultant.
2. Product Certificates for electrified door hardware, signed by manufacturer:
    a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
3. Certificates of Compliance:
    a. Certificates of compliance for fire-rated hardware and installation instructions if requested by Architect or Authority Having Jurisdiction.
    b. Installer Training Meeting Certification: Letter of compliance, signed by Contractor, attesting to completion of installer training meeting specified in “QUALITY ASSURANCE” article, herein.

c. Electrified Hardware Coordination Conference Certification: Letter of compliance, signed by Contractor, attesting to completion of electrified hardware coordination conference, specified in “QUALITY ASSURANCE” article, herein.

4. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by qualified testing agency, for door hardware on doors located in accessible routes.
5. Warranty: Special warranty specified in this Section.

E. Closeout Submittals:
1. Operations and Maintenance Data : Provide in accordance with Division 01 and include:
a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
b. Catalog pages for each product.
c. Name, address, and phone number of local representative for each manufacturer.
d. Parts list for each product.
e. Final approved hardware schedule, edited to reflect conditions as-installed.
f. Final keying schedule
g. Copies of floor plans with keying nomenclature
h. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.
i. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

1.05 QUALITY ASSURANCE

A. Standards for Fire-Rated Doors: Maintain one copy of each referenced standard on site, for use by Design Agent and Contractor.

B. Product Substitutions: Comply with product requirements stated in Division 01 and as specified herein.
1. Where specific manufacturer’s product is named and accompanied by “No Substitute,” including make or model number or other designation, provide product specified. (Note: Certain products have been selected for their unique characteristics and particular project suitability.)
a. Where no additional products or manufacturers are listed in product category, requirements for “No Substitute” govern product selection.
2. Where products indicate “acceptable manufacturers” or “acceptable manufacturers and products”, provide product from specified manufacturers, subject to compliance with specified requirements and “Single Source Responsibility” requirements stated herein.

C. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that provides certified Architectural Hardware Consultant (AHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
1. Warehousing Facilities: In Project's vicinity.
2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
4. Coordination Responsibility: Coordinate installation of electronic security hardware with Architect and electrical engineers and provide installation and technical data to Architect and other related subcontractors.
a. Upon completion of electronic security hardware installation, inspect and verify that all components are working properly.

D. Installer Qualifications: Qualified tradesmen, skilled in application of commercial grade hardware with record of successful in-service performance for installing door hardware similar in quantity, type, and quality to that indicated for this Project.

E. Architectural Hardware Consultant Qualifications: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
   1. For door hardware, DHI-certified, Architectural Hardware Consultant (AHC).
   2. Can provide installation and technical data to Architect and other related subcontractors.
   3. Can inspect and verify components are in working order upon completion of installation.
   4. Capable of producing wiring diagrams.
   5. Capable of coordinating installation of electrified hardware with Architect and electrical engineers.

F. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
   1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated.
   2. Manufacturers that perform electrical modifications and that are listed by testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

G. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

H. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
   1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.

I. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.

J. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release latch. Locks do not require use of key, tool, or special knowledge for operation.

K. Accessibility Requirements: For door hardware on doors in an accessible route, comply with governing accessibility regulations cited in “REFERENCES” article, herein.
   1. Provide operating devices that do not require tight grasping, pinching, or twisting of wrist and that operate with force of not more than 5 lbf (22.2 N).
   2. Maximum opening-force requirements:
      a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
      b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
      c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
   3. Bevel raised thresholds with slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
   4. Adjust door closer sweep periods so that, from open position of 70 degrees, door will take at least 3 seconds to move to 3 inches (75 mm) from latch, measured to leading edge of door.

L. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01.
   1. Attendees: Owner, Contractor, Architect, Installer, and Supplier’s Architectural Hardware Consultant.
   2. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
      a. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
      b. Preliminary key system schematic diagram.
      c. Requirements for key control system.

d. Requirements for access control.
e. Address for delivery of keys.

M. Pre-installation Conference: Conduct conference at Project site
1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Inspect and discuss preparatory work performed by other trades.
3. Inspect and discuss electrical roughing-in for electrified door hardware.
4. Review sequence of operation for each type of electrified door hardware.
5. Review required testing, inspecting, and certifying procedures.

N. Coordination Conferences:
1. Installation Coordination Conference: Prior to hardware installation, schedule and hold meeting to review questions or concerns related to proper installation and adjustment of door hardware.
a. Attendees: Door hardware supplier, door hardware installer, Contractor.
b. After meeting, provide letter of compliance to Architect, indicating when meeting was held and who was in attendance.
2. Electrified Hardware Coordination Conference: Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.
a. Attendees: electrified door hardware supplier, doors and frames supplier, electrified door hardware installer, electrical subcontractor, Owner, Architect and Contractor.
b. After meeting, provide letter of compliance to Architect, indicating when coordination conference was held and who was in attendance.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
1. Deliver each article of hardware in manufacturer’s original packaging.

C. Project Conditions:
1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
2. Provide secure lock-up for door hardware delivered to Project, but not yet installed. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

D. Protection and Damage:
1. Promptly replace products damaged during shipping.
2. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work.
3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

E. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

F. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.07 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

E. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

F. Direct shipments not permitted, unless approved by Contractor.

1.08 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

B. Warranty Period: Years from date of Substantial Completion, for durations indicated.
   1. Closers:
      a. Mechanical: 30 years.
      b. Electrified: 2 years.
   2. Automatic Operators: 2 years.
   3. Exit Devices:
      a. Mechanical: 3 years.
      b. Electrified: 1 year.
   4. Locksets:
      a. Mechanical: 3 years.
      b. Electrified: 1 year.
   5. Continuous Hinges: Lifetime warranty
   6. Key Blanks: Lifetime

C. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

1.09 MAINTENANCE

A. Maintenance Tools:
   1. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

1.10 REGULATORY REQUIREMENTS

A. Locate latching hardware between 34 inches to 44 inches above the finished floor, per 2016 California Building Code, Section 11b-404.2.7.
   1. Panic Hardware: locate between 36 inches to 44 inches above the finished floor.

B. Handles, pull, latches, locks, other operating devices:
   1. Readily openable from egress side without tight grasping, tight pinching, or twisting of the wrist to operate. 2016 California Building Code Section 11B-309.4.
   2. Force required to activate the operable parts: 5.0 pounds maximum, per 2016 California Building Code Section 11b-309.4.

C. Adjust doors to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As allowed per 2016 California Building Code Section 11B-404.4.9, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15-pounds.
   1. [Exception: exterior doors' pressure-to-open may be increased to 8.5-pounds if: at a single location, and one of a bank of eight leafs or fraction of eight, and one leaf of this bank is fitted with a low- or high-energy operator.]

D. Low-energy powered doors: comply with ANSI/BHMA A156.19. Reference: 2016 California Building Code Section 11B-404.2.9, Exception 2.

1. Where powered door serves an occupancy of 150 or more, provide back-up battery power or stand-by generator power, capable of supporting a minimum of 150 cycles.
2. Actuators, vertical bar type: minimum 2-inches wide, 30-inches high, bottom located minimum 5-inches above floor or ground, top located minimum 35-inches above floor or ground. Displays International Symbol of Accessibility, per 2016 California Building Code Section 11B-703.7.
3. Actuators, plate type: use two at each side of the opening. Minimum 4-inches diameter or 4-inches square. Displays International Symbol of Accessibility, per 2016 California Building Code Section 11B-703.7. Locate centerline of lower plate between 7- and 8-inches above floor or ground, and upper plate between 30- and 44-inches above floor or ground.
4. Actuator location: conspicuously located, clear and level floor/ground space for forward or parallel approach.

E. Adjust door closer sweep periods so that from an open position of 90 degrees, the door will take at least 5 seconds to move to a point 12 degrees from the latch, measured to the landing side of the door, per 2016 California Building Code Section 11B-404.2.7.
   1. Spring hinges: adjust for 1.5 seconds minimum for 70 degrees to fully-closed.

F. Smooth surfaces at bottom 10 inches of push sides of doors, facilitating push-open with wheelchair footrests, per 2016 California Building Code Section 11B-404.2.10.

G. Door opening clear width no less than 32 inches, measured from face of frame stop, or edge of inactive leaf of pair of doors, to door face with door opened to 90 degrees. Hardware projection not a factor in clear width if located above 30 inches and below 80 inches, and the hardware projects no more than 4 inches. 2016 California Building Code Section 11b-404.2.3.
   1. Exception: doors not requiring full passage through the opening, that is, to spaces less than 24 inches in depth, may have the clear opening width reduced to 20 inches. Example: shallow closets.
   2. Door closers and overhead stops: not less than 78 inches above the finished floor or ground, per 2016 California Building Code 11B-307.4.

H. Thresholds: floor or landing no more than 0.50 inches below the top of the threshold of the doorway per 2016 California Building Code Section 11B-404.2.5. Vertical rise no more than 0.25 inches, change in level between 0.25 inches and 0.50 inches: beveled to slope no greater than 1:2 (50 percent slope). 2016 California Building Code Section 11B-303.2-3.

I. Floor stops: Do not locate in path of travel. Locate no more than 4 inches from walls, per DSA Policy #99-08 (Access).

J. Pairs of doors: limit swing of inactive leaf to 90 degrees to protect persons reading wall-mounted tactile signage. [Pairs of doors with independently-activated hardware both leafs: limit swing of right-hand or right-hand-reverse leaf to 90 degrees to protect persons reading wall-mounted tactile signage, per 2016 California Building Code Section 11B-703.4.2.]

K. Door and door hardware encroachment: when door is swung fully-open into means-of-egress path, the door, including the hardware, may not encroach/project more than 7 inches into the required exit width. 2010 California Building Code 1005.2 and 1005.3. [2016 California Building Code, Section 1005.7.1.

L. In I-2 occupancies, latch release hardware is not permitted to project in the required exit width, regardless of its mounting height.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The Owner requires use of certain products for their unique characteristics and particular project suitability to insure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: “No Substitute.”

1. Where “No Substitute” is noted, submittals and substitution requests for other products will not be considered.

B. Approval of manufacturers and/or products other than those listed as ”Scheduled Manufacturer ” or “Acceptable Manufacturers” in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.

C. Approval of products from manufacturers indicated in “Acceptable Manufacturers” is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer’s product.

D. Hand of Door: Drawings show direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.

E. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

A. Fasteners
   1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
   2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
   3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.
   4. Install hardware with fasteners provided by hardware manufacturer.

B. Modification and Preparation of Existing Doors: Where existing door hardware is indicated to be removed and reinstalled.
   1. Provide necessary fillers, Dutchmen, reinforcements, and fasteners, compatible with existing materials, as required for mounting new opening hardware and to cover existing door and frame preparations.
   2. Use materials which match materials of adjacent modified areas.
   3. When modifying existing fire-rated openings, provide materials permitted by NFPA 80 as required to maintain fire-rating.

C. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
   1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

D. Cable and Connectors: Hardwired Electronic Access Control Lockset and Exit Device Trim:
   1. Data: 24AWG, 4 conductor shielded, Belden 9843, 9841 or comparable.
   2. DC Power: 18 AWG, 2 conductor, Belden 8760 or comparable.
   3. Provide type of data and DC power cabling required by access control device manufacturer for this installation.
   4. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with sufficient number and wire gauge with standardized Molex plug connectors to accommodate electric function of specified hardware. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product: Ives 5BB series
   2. Acceptable Manufacturers and Products: No Substitute

B. Requirements:
   1. Provide five-knuckle ball bearing hinges conforming to ANSI/BHMA A156.1.
   2. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
      a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
      b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
   3. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
      a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
      b. Interior: Heavy weight, steel, 5 inches (127 mm) high
   4. 2 inches or thicker doors:
      a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
      b. Interior: Heavy weight, steel, 5 inches (127 mm) high
   5. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
   6. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
   7. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
      a. Steel Hinges: Steel pins
      b. Non-Ferrous Hinges: Stainless steel pins
      c. Out-Swinging Exterior Doors: Non-removable pins
      d. Out-Swinging Interior Lockable Doors: Non-removable pins
      e. Interior Non-lockable Doors: Non-rising pins
   8. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors, and 5 inches (127 mm) at 2 inches (51 mm) or thicker doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.
   9. Doors 36 inches (914 mm) wide or less furnish hinges 4-1/2 inches (114 mm) high; doors greater than 36 inches (914 mm) wide furnish hinges 5 inches (127 mm) high, heavy weight or standard weight as specified.
   10. Provide hinges with electrified options as scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component.
   11. Provide mortar guard for each electrified hinge specified.
   12. Provide spring hinges where specified. Provide two spring hinges and one bearing hinge per door leaf for doors 90 inches (2286 mm) or less in height. Provide one additional bearing hinge for each 30 inches (762 mm) of additional door height.

2.04 CONTINUOUS HINGES

A. Aluminum Geared
   1. Manufacturers:
      a. Scheduled Manufacturer: Ives.
      b. Acceptable Manufacturers: No Substitute
   2. Requirements:
      a. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
      b. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum, with 0.25-inch (6 mm) diameter Teflon coated stainless steel hinge pin.
      c. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.

d. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
e. On fire-rated doors, provide aluminum geared continuous hinges that are classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
f. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware.
g. Install hinges with fasteners supplied by manufacturer.
h. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.05 ELECTRIC POWER TRANSFER

A. Manufacturers:
1. Scheduled Manufacturer: Von Duprin EPT-10
2. Acceptable Manufacturers: No Substitute

B. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires sufficient to accommodate electric function of specified hardware.

C. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.06 FLUSH BOLTS

A. Manufacturers:
1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: No Substitute

B. Requirements:
1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.07 MORTISE LOCKS

A. Manufacturers and Products:
1. Scheduled Manufacturer and Product: Schlage L9000 series
2. Acceptable Manufacturers and Products: No Substitute

B. Requirements:
1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1 Operational, Grade 1 Security, and manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
2. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1 inch (25 mm) throw, constructed of stainless steel.
3. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
4. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
   a. Lever Design: Schlage 06A.
   b. Tactile Warning (Knurling): Where required by authority having jurisdiction. Provide on levers on exterior (secure side) of doors serving rooms considered to be hazardous.

2.08 EXIT DEVICES

A. Manufacturer and Product:
   1. Scheduled Manufacturer: Von Duprin 98 series
   2. Acceptable Manufacturers and Products: No Substitute.

B. Manufacturers and Products:
   1. Scheduled Manufacturer: To establish standard of quality and design intent, exit device specifications have been based on Von Duprin products. Products of other manufacturers meeting or exceeding design and performance requirements specified herein will be considered for substitution subject to compliance with provisions of Division 01 Section "Product Requirements."

C. Requirements:
   1. Provide exit devices tested to ANSI/BHMA A156.3-2014 Grade 1: UL certified to meet maximum 5 pound requirements according to the California Building Code section 11B-309.4,] and UL listed for Panic Exit or Fire Exit Hardware. Cylinders: Refer to "KEYING" article, herein.
   2. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
   3. Quiet Operation: Incorporate fluid damper or other device that eliminates noise of exit device operation.
   4. Touchpad: Extend minimum of one half of door width, but not the full length of exit device rail. Provide end-cap with two-point attachment to door. Match exit device finish, stainless steel for US26, US26D, US28, US32, and US32D finishes; and for all other finishes, provide compatible finish to exit device. Provide compression springs in devices, latches, and outside trims or controls; tension springs prohibited.
   5. Provide rim devices with a dual cylinder or inside thumb turn cylinder option with a visual security indicator that identifies the trims locked/unlocked status of the door from the inside of the room. Indicator in unlocked state presents a 1/2 inch x 1/2 inch white metal flag with black icon at top of device head. Indicator in locked state has no flag present. Provide rim devices without the dual cylinder or inside thumb turn cylinder option capable of being retrofitted with the visual security indicator.
   6. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrical requirements.
      a. Provide devices capable of standard 15 second release delay and indefinite release delay as required by code, when tied into fire alarm system will release immediately when an alarm condition exists.
      b. Provide devices with all control inputs - door position input, external inhibit input, fire alarm input; auxiliary locking; nuisance alarm and internal horn; and, remote signaling output self-contained in the device assembly.
         1) a)
   7. Provide exit devices with manufacturer's approved strikes.
   8. Provide exit devices cut to door width and height. Locate exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
   9. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
   10. Provide cylinder dogging at non-fire-rated exit devices, unless specified less dogging.
   11. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion that is removed by use of a keyed cylinder, which is self-locking when re-installed.
   12. Where lever handles are specified as outside trim for exit devices, provide heavy-duty lever trims with forged or cast escutcheon plates. Provide vandal-resistant levers that will travel to 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set.
      a. Lever Style: Match lever style of locksets.

b. Tactile Warning (Knurling): Where required by authority having jurisdiction. Provide on levers on exterior (secure side) of doors serving rooms considered to be hazardous.

13. Provide UL labeled fire exit hardware for fire rated openings.
14. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
15. Provide electrified options as scheduled in the hardware sets.

2.09 CYLINDERS

A. Manufacturers:
1. Scheduled Manufacturer: Schlage Everest 29T
2. Acceptable Manufacturers: No Substitute

B. Requirements:
1. Provide cylinders/cores from the same manufacturer of locksets, compliant with ANSI/BHMA A156.5; latest revision, Section 12, Grade 1; permanent cylinders; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.
2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
   a. Permanent cylinder with patented, restricted keyway.
3. Patent Protection: Cylinders/cores requiring use of restricted, patented keys, patent-protected until the year, 2029.
4. Nickel silver bottom pins.

2.10 KEYING

A. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:
1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
   a. Master Keying system as directed by the Owner.
2. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements shall be cause for replacement of cylinders/cores involved at no additional cost to Owner.
3. Provide keys with the following features:
   a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
   b. Patent Protection: Keys and blanks protected by one or more utility patent(s) until the year, 2029.
4. Identification:
   a. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication "Keying Systems and Nomenclature" for identification. Blind code marks shall not include actual key cuts.
   b. Identification stamping provisions must be approved by the Architect and Owner.
   c. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
   d. Failure to comply with stamping requirements shall be cause for replacement of keys involved at no additional cost to Owner.
   e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
5. Quantity: Furnish in the following quantities.
   a. Change (Day) Keys: 3 per cylinder/core.
   b. Master Keys: 6

2.11 POWER SUPPLIES

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product: Schlage or Von Duprin PS900 series
   2. Acceptable Manufacturers and Products: No Substitute

B. Requirements:
   1. Provide power supplies, recommended and approved by manufacturer of electrified locking component, for operation of electrified locks, electrified exit devices, magnetic locks, electric strikes, and other components requiring power supply.
   2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
   3. Provide regulated and filtered 24 VDC power supply , and UL class 2 listed.
   4. Options:
      a. Provide power supply, where specified, with internal capability of charging sealed backup batteries 24 VDC, in addition to operating DC load.
      b. Provide sealed batteries for battery back-up at each power supply where specified.
      c. Provide keyed power supply cabinet.
   5. Provide power supply in an enclosure, complete, and requiring 120VAC to fused input.
   6. Provide power supply with emergency release terminals, where specified, that allow release of all devices upon activation of fire alarm system complete with fire alarm input for initiating “no delay” exiting mode.

2.12 DOOR CLOSERS

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product: LCN 4010/4110/4020 series.
   2. Acceptable Manufacturers and Products: No Substitute.

B. Requirements:
   1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. Certify surface mounted mechanical closers to meet fifteen million (15,000,000) full load cycles. ISO 9000 certify closers. Stamp units with date of manufacture code.
   2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
   3. Cylinder Body: 1-1/2 inch (38 mm) diameter with 11/16 inch (17 mm) diameter double heat-treated pinion journal.
   4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
   5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
   6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
   7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers. When closers are parallel arm mounted, provide closers which mount within 6-inch (152 mm) top rail without use of mounting plate so that closer is not visible through vision panel from pull side.
   8. Pressure Relief Valve (PRV) Technology: Not permitted.
   9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI/BHMA Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
   10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.13 ELECTRO-MECHANICAL AUTOMATIC OPERATORS

A. Manufacturers and Products:
   1. Scheduled Manufacturer and Product: LCN Senior Swing
   2. Acceptable Manufacturers and Products: No Substitute

B. Requirements:
   1. Provide low energy automatic operator units that are electro-mechanical design complying with ANSI/BHMA A156.19.
      a. Opening: Powered by DC motor working through reduction gears.
      b. Closing: Spring force.
      c. Manual, hydraulic, or chain drive closers: Not permitted.
      d. Operation: Motor is off when door is in closing mode. Door can be manually operated with power on or off without damage to operator. Provide variable adjustments, including opening and closing speed adjustment.
      e. Cover: Aluminum.
   2. Provide units with manual off/auto/hold-open switch, push and go function to activate power operator, vestibule interface delay, electric lock delay, hold-open delay adjustable from 2 to 30 seconds, and logic terminal to interface with accessories, mats, and sensors.
   3. Provide drop plates, brackets, or adapters for arms as required to suit details.
   4. Provide hard-wired motion sensors and/or actuator switches for operation as specified. Provide weather-resistant actuators at exterior applications.
   5. Provide key switches, with LED's, recommended and approved by manufacturer of automatic operator as required for function as described in operation description of hardware sets. Cylinders: Refer to "KEYING" article, herein.
   6. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.
   7. Provide units with inputs for smoke evacuation doors, where specified, which allow doors to power open upon fire alarm activation and hold open indefinitely or until fire alarm is reset, presence detector input, which prevents closed door from opening or door that is fully opened from closing, hold open toggle input, which allows remote activation for indefinite hold open and close second time input is activated, vestibule inputs, which allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

2.14 DOOR TRIM

A. Manufacturers:
   1. Scheduled Manufacturer: Ives
   2. Acceptable Manufacturers: No Substitute

B. Requirements:
   1. Provide push plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick and beveled 4 edges. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
   2. Provide push bars of solid bar stock, diameter and length as scheduled. Provide push bars of sufficient length to span from center to center of each stile. Where required, mount back to back with pull.
   3. Provide offset pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
   4. Provide flush pulls as scheduled. Where required, provide back-to-back mounted model.
   5. Provide pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.

6. Provide pull plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick, beveled 4 edges, and prepped for pull. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
7. Provide wire pulls of solid bar stock, diameter and length as scheduled.
8. Provide decorative pulls as scheduled. Where required, mount back to back with pull.

2.15 PROTECTION PLATES

A. Manufacturers:
1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: No Substitute

B. Requirements:
1. Provide kick plates, mop plates, and armor plates minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes of plates:
   a. Kick Plates: 10 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
   b. Mop Plates: 4 inches (102 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
   c. Armor Plates: 36 inches (914 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

2.16 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:
1. Scheduled Manufacturers: Glynn-Johnson
2. Acceptable Manufacturers: No Substitute

B. Requirements:
1. Provide heavy duty concealed mounted overhead stop or holder as specified for exterior and interior vestibule single acting doors.
2. Provide heavy duty concealed mounted overhead stop or holder as specified for double acting doors.
3. Provide heavy or medium duty and concealed or surface mounted overhead stop or holder for interior doors as specified. Provide medium duty surface mounted overhead stop for interior doors and at any door that swings more than 140 degrees before striking wall, open against equipment, casework, sidelights, and where conditions do not allow wall stop or floor stop presents tripping hazard.
4. Where overhead holders are specified provide friction type at doors without closer and positive type at doors with closer.

2.17 DOOR STOPS AND HOLDERS

A. Manufacturers:
1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: No Substitute

B. Provide door stops at each door leaf:
1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.
3. Where wall or floor stop cannot be used, provide medium duty surface mounted overhead stop.

2.18 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:
1. Scheduled Manufacturer: Zero International
2. Acceptable Manufacturers: No Substitute

B. Requirements:
   1. Provide thresholds, weather-stripping (including door sweeps, seals, and astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
   2. Size of thresholds:
      a. Saddle Thresholds: 1/2 inch (13 mm) high by jamb width by door width
      b. Bumper Seal Thresholds: 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width
   3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

2.19 SILENCERS

A. Manufacturers:
   1. Scheduled Manufacturer: Ives
   2. Acceptable Manufacturers: No Substitute

B. Requirements:
   1. Provide "push-in" type silencers for hollow metal or wood frames.
   2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
   3. Omit where gasketing is specified.

2.20 DOOR POSITION SWITCHES

A. Manufacturers:
   1. Scheduled Manufacturer: Schlage
   2. Acceptable Manufacturers: No Substitute

B. Requirements:
   1. Provide recessed or surface mounted type door position switches as specified.
   2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

2.21 FINISHES

A. Finish: BHMA 626/652 (US26D); except:
   1. Hinges at Exterior Doors: BHMA 630 (US32D)
   2. Continuous Hinges: BHMA 628 (US28)
   3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
   4. Protection Plates: BHMA 630 (US32D)
   5. Overhead Stops and Holders: BHMA 630 (US32D)
   6. Door Closers: Powder Coat to Match
   7. Wall Stops: BHMA 630 (US32D)
   8. Weatherstripping: Clear Anodized Aluminum
   9. Thresholds: Mill Finish Aluminum

PART 3 EXECUTION

3.01 EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Existing Door and Frame Compatibility: Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.

C. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Where on-site modification of doors and frames is required:
   1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.
   2. Field modify and prepare existing door and frame for new hardware being installed.
   3. When modifications are exposed to view, use concealed fasteners, when possible.
   4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:
      a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
      b. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
      c. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

3.03 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
   1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
   2. Custom Steel Doors and Frames: HMMA 831.
   3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

H. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches (750 mm) of door height greater than 90 inches (2286 mm).

I. Lock Cylinders: Install construction cores to secure building and areas during construction period.

J. Lead Protection: Lead wrap hardware penetrating lead-lined doors. Levers and roses to be lead lined. Apply kick and armor plates on lead-lined doors with adhesive as recommended by manufacturer.

K. Wiring: Coordinate with Division 26, ELECTRICAL sections for:
   1. Conduit, junction boxes and wire pulls.
   2. Connections to and from power supplies to electrified hardware.
   3. Connections to fire/smoke alarm system and smoke evacuation system.
   4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
   5. Testing and labeling wires with Architect's opening number.

L. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

M. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Closers shall not be visible in corridors, lobbies and other public spaces unless approved by Architect.

N. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

O. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
   1. Configuration: Provide least number of power supplies required to adequately serve doors with electrified door hardware.

P. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

Q. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.

R. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

S. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

T. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.04 FIELD QUALITY CONTROL

A. Architectural Hardware Consultant: Engage qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
   1. Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.05 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
   1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
   2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
   3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.06 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.07 DEMONSTRATION

A. Provide training for Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

3.08 DOOR HARDWARE SCHEDULE

A. Locksets, exit devices, and other hardware items are referenced in the following hardware sets for series, type and function. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.

B. Hardware Sets:

HARDWARE SET: 01

102 105

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	MFR
1	EA	CONT. HINGE	112HD EPT	IVE
1	EA	POWER TRANSFER	EPT10 CON	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-98-NL-OP	VON
1	EA	RIM CYLINDER	AS REQUIRED	SCH
1	EA	OFFSET DOOR PULL	8190-0	IVE
1	EA	OVERHEAD STOP	CONCEALED HEAVY DUTY 100S SERIES	GLY
1	EA	SURF. AUTO OPERATOR	4640 SERIES (PUSH SIDE MOUNTED)	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-852/8310-818 AS REQUIRED	LCN
1	SET	SEALS	BY ALUMINUM DOOR SUPPLIER	
1	EA	DOOR SWEEP	BY ALUMINUM DOOR SUPPLIER	
1	EA	DOOR CONTACT	679-05HM/WD	SCE
1	EA	POWER SUPPLY	PS902 900-4RL	VON

ALL WIRING AND CONNECTIONS BY DIVISION 26.
OPERATIONAL DESCRIPTION:
IMMEDIATE EGRESS ALWAYS ALLOWED. DOOR CAN BE MANUALLY OR AUTOMATICALLY OPERATED. ACCESS CONTROL SYSTEM TO RETRACT AND HOLD EXIT DEVICE LATCHBOLT AND ENABLE EXTERIOR AUTOMATIC OPERATOR ACTUATOR. DOOR CAN BE MANUALLY PULLED OPEN OR AUTOMATICALLY OPERATED BY PUSHING ACTUATOR WHICH SIGNALS AUTOMATIC OPERATOR TO OPEN DOOR. INTERIOR ACTUATOR TO SIGNAL AUTOMATIC OPERATOR TO OPEN DOOR. LOCATE ACTUATORS AS DIRECTED BY ARCHITECT. DOORS TO REMAIN UNLOCKED DURING NORMAL CLASS HOURS AND LOCKED DURING AFTER HOURS. NO CREDENTIAL READER TO BE MOUNTED AT OPENINGS.

HARDWARE SET: 01 A

101 104

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	MFR
1	EA	CONT. HINGE	112HD EPT	IVE
1	EA	POWER TRANSFER	EPT10 CON	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-98-NL-OP	VON
1	EA	RIM CYLINDER	AS REQUIRED	SCH
1	EA	OFFSET DOOR PULL	8190-0	IVE

1	EA	OVERHEAD STOP	CONCEALED HEAVY DUTY 100S SERIES	GLY
1	EA	SURF. AUTO OPERATOR	4640 SERIES (PUSH SIDE MOUNTED)	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-852/8310-818 AS REQUIRED	LCN
1	SET	SEALS	BY ALUMINUM DOOR SUPPLIER	
1	EA	DOOR SWEEP	BY ALUMINUM DOOR SUPPLIER	
1	EA	DOOR CONTACT	679-05HM/WD	SCE
1	EA	POWER SUPPLY	PS902 900-4RL	VON
1	EA	MULTITECH READER	MTK15	

ALL WIRING AND CONNECTIONS BY DIVISION 26.
OPERATIONAL DESCRIPTION:
IMMEDIATE EGRESS ALWAYS ALLOWED. DOOR CAN BE MANUALLY OR AUTOMATICALLY OPERATED. ACCESS CONTROL SYSTEM TO RETRACT AND HOLD EXIT DEVICE LATCHBOLT AND ENABLE EXTERIOR AUTOMATIC OPERATOR ACTUATOR. DOOR CAN BE MANUALLY PULLED OPEN OR AUTOMATICALLY OPERATED BY PUSHING ACTUATOR WHICH SIGNALS AUTOMATIC OPERATOR TO OPEN DOOR. INTERIOR ACTUATOR TO SIGNAL AUTOMATIC OPERATOR TO OPEN DOOR. LOCATE ACTUATORS AS DIRECTED BY ARCHITECT. DOORS TO REMAIN UNLOCKED DURING NORMAL CLASS HOURS. AFTER HOURS ACCESS ONLY BY CONTACTING CAMPUS SECURITY VIA PHONE MOUNTED NEAR OPENINGS. CONNECT TO NEW PIM SYSTEM.

HARDWARE SET: 02

100 103

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	MFR
6	EA	CONT. HINGE	112HD EPT	IVE
2	EA	POWER TRANSFER	EPT10 CON	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-9847-EO-LBR	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-9847-NL-OP-LBR	VON
1	EA	RIM CYLINDER	AS REQUIRED	SCH
1	EA	MORTISE CYLINDER	AS REQUIRED	SCH
2	EA	OFFSET DOOR PULL	8190-0	IVE
2	EA	OVERHEAD STOP	CONCEALED HEAVY DUTY 100S SERIES	GLY
2	EA	SURFACE CLOSER	4111 EDA	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
1	EA	THRESHOLD	8655A (VERIFY JAMB DEPTH)	ZER
1	EA	MULLION SEAL	8780N	ZER
2	EA	DOOR CONTACT	679-05HM/WD	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	VON

ALL WIRING AND CONNECTIONS BY DIVISION 26.
OPERATIONAL DESCRIPTION:
IMMEDIATE EGRESS ALWAYS ALLOWED. DOORS TO REMAIN UNLOCKED DURING NORMAL CLASS HOURS BY RETRACTING LATCH. AFTER HOURS ACCESS ONLY BY CONTACTING

CAMPUS SECURITY VIA PHONE MOUNTED NEAR OPENINGS. NO CREDENTIAL READER TO BE MOUNTED AT OPENINGS.

HARDWARE SET: 03

200

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	MFR
6	EA	CONT. HINGE	112HD	IVE
2	EA	PUSH/PULL BAR	9190-0	IVE
1	EA	SURFACE CLOSER	4111 EDA	LCN
1	EA	SURF. AUTO OPERATOR	4640 SERIES (PUSH SIDE MOUNTED)	LCN
1	EA	ACTUATOR, WALL MOUNT	8310-852/8310-818 AS REQUIRED	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	IVE
2	EA	STOP	WS407/FS436 AS SPECIFIED	IVE
2	EA	SILENCER	SR64	IVE

ALL WIRING AND CONNECTIONS BY DIVISION 26.
OPERATIONAL DESCRIPTION:
IMMEDIATE EGRESS ALWAYS ALLOWED. DOOR CAN BE MANUALLY OR AUTOMATICALLY OPERATED. DOOR CAN BE MANUALLY PULLED OPEN OR AUTOMATICALLY OPERATED BY PUSHING ACTUATOR WHICH SIGNALS AUTOMATIC OPERATOR TO OPEN DOOR. INTERIOR ACTUATOR TO SIGNAL AUTOMATIC OPERATOR TO OPEN DOOR. OPERATOR ONLY TO BE INSTALLED ON 1 LEAF. LOCATE ACTUATORS AS DIRECTED BY ARCHITECT.

HARDWARE SET: 04

201

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	MFR
6	EA	CONT. HINGE	112HD	IVE
2	EA	PUSH/PULL BAR	9190-0	IVE
1	EA	SURFACE CLOSER	4111 EDA	LCN
1	EA	SURF. AUTO OPERATOR	4630 SERIES (PULL SIDE MOUNTED)	LCN
1	EA	ACTUATOR, WALL MOUNT	8310-852/8310-818 AS REQUIRED	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	IVE
2	EA	STOP	WS407/FS436 AS SPECIFIED	IVE
2	EA	SILENCER	SR64	IVE

END OF SECTION

SECTION 09 0561

COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preparation of new and existing concrete floor slabs for installation of floor coverings.

B. Testing of concrete floor slabs for moisture and alkalinity (pH).

C. Remedial floor coatings. Assume coatings required for entire ramp area. Include in Base Bid.

1.02 RELATED REQUIREMENTS

A. Section 01 4000 - Quality Requirements: Additional requirements relating to testing agencies and testing.

B. Section 03 3000 - Cast-in-Place Concrete: Limitations on curing requirements for new concrete floor slabs.

1.03 REFERENCE STANDARDS

A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

B. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2016a.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

1.05 SUBMITTALS

A. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
   1. Moisture and alkalinity (pH) limits and test methods.
   2. Manufacturer's required bond/compatibility test procedure.

B. Testing Agency's Report:
   1. Description of areas tested; include floor plans and photographs if helpful.
   2. Summary of conditions encountered.
   3. Moisture and alkalinity (pH) test reports.
   4. Copies of specified test methods.
   5. Recommendations for remediation of unsatisfactory surfaces.
   6. Submit report not more than two business days after conclusion of testing.

C. Adhesive Bond and Compatibility Test Report.

1.06 QUALITY ASSURANCE

A. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
   1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.

PART 2 PRODUCTS

2.01 MATERIALS

A. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
   1. Thickness: As required for application and in accordance with manufacturer's installation instructions.
   2. Products:

a. LATICRETE International, Inc; LATICRETE NXT Vapor Reduction Coating with LATICRETE NXT Level Plus: www.laticrete.com/#sle.
b. Sika Corporation; Sikafloor Moisture Tolerance Epoxy Primer and Sikafloor Self-Leveling Moisture Tolerant Resurfacer: www.sikafloorusa.com.
c. Tnemec Company, Inc; Series 208 Epoxoprime MVT: www.tnemec.com/#sle.
d. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

A. Perform following operations in the order indicated:
1. Preliminary cleaning.
2. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
3. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
4. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
5. Specified remediation, if required.
6. Patching, smoothing, and leveling, as required.
7. Other preparation specified.
8. Adhesive bond and compatibility test.
9. Protection.

B. Remediations:
1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating or remedial sheet membrane over entire suspect floor area.
3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.02 PRELIMINARY CLEANING

A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.

B. Do not use solvents or other chemicals for cleaning.

3.03 MOISTURE VAPOR EMISSION TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.

C. Test in accordance with ASTM F1869 and as follows.

D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.

F. Report: Report the information required by the test method.

3.04 ALKALINITY TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.

C. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.

D. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.05 PREPARATION

A. See individual floor covering section(s) for additional requirements.

B. Comply with requirements and recommendations of floor covering manufacturer.

C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.

D. Do not fill expansion joints, isolation joints, or other moving joints.

3.06 ADHESIVE BOND AND COMPATIBILITY TESTING

A. Comply with requirements and recommendations of floor covering manufacturer.

3.07 APPLICATION OF REMEDIAL FLOOR COATING

A. Comply with requirements and recommendations of coating manufacturer.

END OF SECTION

SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior metal stud wall framing.

B. Gypsum wallboard.

C. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

A. Section 05 4000 - Cold-Formed Metal Framing: Exterior wind-load-bearing metal stud framing.

B. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

C. Section 07 9005 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

1.03 REFERENCE STANDARDS

A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.

B. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

D. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.

E. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.

F. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.

G. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.

H. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.

I. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.

J. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.

K. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing Board; 2013.

L. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.

M. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2015.

N. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.

O. GA-216 - Application and Finishing of Gypsum Board; 2013.

P. GA-226 - Application of Gypsum Board to Form Curved Surfaces; Gypsum Association; 2008.

Q. ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers; ICC Evaluation Service, Inc; 2013.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 5 years of experience.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

2.02 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:
   1. Clarkwestern Dietrich Building Systems LLC; www.clarkdietrich.com.
   2. Marino; www.marinoware.com.
   3. Phillips Manufacturing Co; www.phillipsmfg.com/#sle.
   4. USG.
   5. Substitutions: See Section 01 6000 - Product Requirements.

B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
   1. Studs: "C" shaped with flat or formed webs with knurled faces.
   2. Runners: U shaped, sized to match studs.
   3. Furring: Hat-shaped sections, minimum depth of 7/8 inch.

C. Loadbearing Studs for Application of Gypsum Board: As specified in Section 05 4000.

D. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
   1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
   2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot dipped galvanized coating.
   3. Provide components UL-listed for use in UL-listed fire-rated head of partition joint systems indicated on drawings.
   4. Deflection and Firestop Track:
      a. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-rating of the wall assembly.
      b. Products:
         1) FireTrak Corporation; Posi Klip.
         2) Metal-Lite, Inc; The System.
         3) Substitutions: See Section 01 6000 - Product Requirements.
   5. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 12 feet.

2.03 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. CertainTeed Corporation: www.certainteed.com.
   2. Georgia-Pacific Gypsum: www.gpgypsum.com.
   3. USG Corporation: www.usg.com.
   4. Made in USA or Canada only.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.

1. Application: Use for vertical surfaces above 7' above finished floor, unless otherwise indicated.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   a. Mold resistant board is required at all locations.
3. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
4. Thickness:
   a. Vertical Surfaces: 5/8 inch.

C. Abuse Resistant Wallboard: May be referred to as "High impact GWB" or "Impact Resistant GWB".
1. Application: All GWB below 7' above finished floor whether or not labelled as impact resistant.
2. Surface Abrasion: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
3. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
4. Soft Body Impact: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
5. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
6. Paper-Faced Type: Gypsum wallboard as defined in ASTM C1396/C1396M.
7. Type: Fire resistance rated Type X, UL or WH listed.
8. Thickness: 5/8 inch.
9. Edges: Tapered.
10. Products:
    a. American Gypsum Company; M-Bloc AR Type X.
    b. Continental Building Products; Protecta AR 100 Type X with Mold Defense.
    c. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold Guard Abuse-Resistant.
    d. National Gypsum Company; Gold Bond Hi-Abuse XP Gypsum Board.

2.04 ACCESSORIES

A. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.

B. Water-Resistive Barrier: Plastic sheet complying with ICC-ES AC38.

C. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
1. Types: As detailed or required for finished appearance.
2. Special Shapes: In addition to conventional cornerbead and control joints, provide U-bead and L-bead at exposed panel edges and all junctures to dissimilar materials.
3. Products:
   a. Same manufacturer as framing materials.
   b. Substitutions: See Section 01 6000 - Product Requirements.

D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
1. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
2. Ready-mixed vinyl-based joint compound.
3. Chemical hardening type compound where necessary.

E. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.

F. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.

G. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Studs: Space studs at 16 inches on center.
   1. Extend partition framing to structure where indicated and to ceiling in other locations.
   2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
   3. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

C. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

D. Standard Wall Furring: Install at concrete walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
   1. Orientation: Horizontal.
   2. Spacing: As indicated.

3.03 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
   1. Exception: Tapered edges to receive joint treatment at right angles to framing.

C. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

D. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
   1. Paper-Faced Sheathing: Immediately after installation, protect from weather by application of water-resistive barrier.

E. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.

F. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
   1. Not more than 30 feet apart on walls and ceilings over 50 feet long.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.05 JOINT TREATMENT

A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   2. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.

B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

1. Feather coats of joint compound so that camber is maximum 1/32 inch.

3.06 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 2217
NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Curved Cold-Formed Steel Framing Products, including:
   1. Hand formable metal framing for curved walls and ceilings.

1.02 RELATED REQUIREMENTS

A. Section 09 2236 - Lath.

B. Section 09 2400 - Cement Plastering.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

B. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.

C. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations.

C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.06 MOCK-UP

A. Mock-Up Panel: Construct a 4 foot wide by 8 foot high sample panel of plaster work at the jobsite demonstrating installation procedures, finish texture, and color. Show each phase of installation including framing, insulation, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Framing, Connectors, and Accessories:
   1. Radius Track Corporation: www.radiustrack.com..
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 HAND FORMABLE METAL FRAMING

A. Hand Formable Framing: As specified for Non-structural metal framing studs and tracks.
   1. Minimum Metal Thickness: 0.033 inch (0.84 mm).
   2. Coating: G60 (Z180).

B. Hand-Formable Track:
   1. Basis of Design Product: Hand-Formable Ready-Track by Radius Track Corporation.
   2. Web Depth: 2-1/2 inches
   3. Flange Height: 1-1/4 inches

C. Hand-Formable Arch:
   1. Basis of Design Product: Hand-Formable Ready-Arch by Radius Track Corporation.
   2. Web Depth: 3-1/2 inches
   3. Flange Height: 1-1/4 inches

D. Hand-Formable Angle:
   1. Basis of Design Product: Hand-Formable Ready-Angle by Radius Track Corporation.
   2. Angle Size: 1-1/2 x 1-1/2 inches

E. Fasteners: ASTM C1002 self-piercing tapping screws.

F. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that rough-in utilities are in proper location.

3.02 CEILING AND WALL FURRING

A. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.

B. Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.

C. Hand-Formable Track: Field-bend tracks to conform with compound curve of steel structure and install at curved shapes in ceilings and walls.

D. Hand-Formabel Arch: Field-bend tracks to conform with compound curve of steel structure and install at curved shapes in ceilings and walls.

E. Hand-Formable Angle: Field-bend tracks to conform with compound curve of steel structure and install at curved shapes in ceilings and walls.

3.03 TOLERANCES

A. Maximum Variation From True Position: 1/8 inch in 10 feet.

B. Maximum Variation From Plumb: 1/8 inch in 10 feet.

END OF SECTION

SECTION 09 2236
LATH

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal lath for cement plaster.

1.02 RELATED REQUIREMENTS

A. Section 09 2217 - Non-Structural Metal Framing.

B. Section 09 2400 - Cement Plastering.

1.03 REFERENCE STANDARDS

A. ASTM C841 - Standard Specification for Installation of Interior Lathing and Furring; 2003 (Reapproved 2013).

B. ASTM C847 - Standard Specification for Metal Lath; 2014a.

C. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.

D. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.

E. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster; 2016c.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data metal lath and accessories including structural characteristics, material limitations, and finish.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with at least three years of documented experience.

PART 2 PRODUCTS

2.01 LATH

A. Diamond Mesh Metal Lath: ASTM C847, galvanized; self-furring.
   1. Weight: To suit application and as specified in ASTM C841 or ASTM C1063 for framing spacing.
   2. Weight: 2.5 lb/sq yd.

B. Beads, Screeds, Joint Accessories, and Other Trim: Depth governed by plaster thickness, and maximum possible lengths.
   1. Material: Formed galvanized sheet steel, expanded metal flanges.
   2. Control Joints: Accordion profile with factory-installed protective tape, 2 inch flanges.

2.02 ACCESSORIES

A. Fasteners: Self-piercing tapping screws; ASTM C1002 or ASTM C954.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that substrates are ready to receive work and conditions are suitable for application.

C. Do not begin until unacceptable conditions have been corrected.

D. If substrate preparation is the responsibility of another installer, notify Design Agent of unsatisfactory preparation before proceeding.

3.02 INSTALLATION - GENERAL

A. Install interior lath and furring for gypsum plaster in accordance with ASTM C841.

3.03 WALL FURRING INSTALLATION

A. Install furring channels horizontally; secure with fasteners on alternate channel flanges at maximum 24 inches on center.

B. Space furring channels maximum 16 inches on center, and not more than 4 inches away from floor and ceiling lines.

3.04 CEILING FURRING INSTALLATION

A. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.

B. Install furring independent of walls, columns, and above-ceiling work.

C. Securely anchor hangers to structural members or embed in structural slab. Space hangers as required to limit deflection to criteria indicated.

D. Install furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.

3.05 CONTROL AND EXPANSION JOINT INSTALLATION

A. Locate joints as indicated on drawings and comply with ASTM C1063.
   1. Area of plaster panel not to exceed 144 sq ft for vertical surfaces.
   2. Area of plaster panel not to exceed 100 sq ft for horizontal, curved or angled surfaces.
   3. Spacing between control joints not to exceed 18 ft in each direction.
   4. Area bounded by control joints not to exceed a length-to-width ratio of 2-1/2 to 1.

B. Install prefabricated joint accessories in accordance with ASTM C1063.

3.06 LATH INSTALLATION

A. Apply lath taut, with long dimension perpendicular to supports.

B. Lap or nest ends of metal lath in accordance with ASTM C841.

C. Secure end laps with tie wire where they occur between supports.

D. Continuously reinforce internal angles with corner mesh, except where the metal lath returns 3 inches from corner to form the angle reinforcement; fasten at perimeter edges only.

E. Place base screeds at termination of plaster areas; secure rigidly in place.

F. Place lath vertically above each top corner and each side of door frames to 6 inches above ceiling line.

G. Place casing beads at terminations of plaster finish. Butt and align ends. Secure rigidly in place.

H. Place additional strip mesh diagonally at corners of lathed openings. Secure rigidly in place.

3.07 TOLERANCES

A. Maximum Variation from True Lines and Levels: 1/8 inch in 10 feet.

B. Maximum Variation from True Position: 1/8 inch.

END OF SECTION

SECTION 09 2400
CEMENT PLASTERING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cement plastering.

1.02 RELATED REQUIREMENTS

A. Section 09 2217 - Non-Structural Metal Framing.

B. Section 09 2236 - Lath: Lath, furring, beads, screeds, and joint accessories for plaster base.

C. Section 09 9123 - Interior Painting.

1.03 REFERENCE STANDARDS

A. ASTM C150/C150M - Standard Specification for Portland Cement; 2017.

B. ASTM C897 - Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters; 2015.

C. ASTM C926 - Standard Specification for Application of Portland Cement-Based Plaster; 2018a.

D. ASTM C932 - Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering; 2006 (Reapproved 2013).

E. ASTM C1328/C1328M - Standard Specification for Plastic (Stucco) Cement; 2012.

F. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2015.

G. FM (AG) - FM Approval Guide; current edition.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittals procedures.

B. Product Data: Provide data on plaster materials and trim accessories.

C. Evaluation Service Reports: Show compliance with specified requirements.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.06 MOCK-UP

A. Mock-Up Panel: Construct a 4 foot wide by 8 foot high sample panel of plaster work at the jobsite demonstrating installation procedures, finish texture, and color. Show each phase of installation including framing, insulation, and finish.

1.07 FIELD CONDITIONS

A. Interior Plaster Work: Maintain minimum ambient temperature of 50 degrees F during installation of plaster and until fully cured.

PART 2 PRODUCTS

2.01 CEMENT PLASTER APPLICATIONS

A. Lath Plaster Base: Metal lath.
   1. Plaster Type: Factory prepared plaster mix.
   2. Number of Coats: Four.
   3. First (Scratch) Coat: Apply to a nominal thickness of 3/8 inch.
   4. Second (Brown) Coat: Apply to a nominal thickness of 3/8 inch.
   5. Leveling Coat: Apply to a nominal thickness of 1/32 to 1/16 inch.
   6. Finish Coat: Apply to a nominal thickness of 1/8 inch.

2.02 FACTORY PREPARED CEMENT PLASTER

A. Fire-Resistance Rating: Determined in accordance with test procedures in ASTM E119 and complying with the following:

A. Exterior Portland cement plaster system made of scratch and brown base coat, leveling coat, and finish coat; install in accordance with ASTM C926.
   1. Manufacturer – System:
      a. BASF Wall Systems; Senergy Platinum CI Stucco Ultra: www.wallsystems.basf.com/#sle.
      b. LaHabra; FastWall 300: www.lahabrastucco.com/sle.
      c. Parex USA, Inc; Armourwall 300: www.parexusa.com/sle.

2.03 ACCESSORIES

A. Lath: As specified in Section 09 2236.

B. Beads, Screeds, and Joint Accessories: As specified in Section 09 2236.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions are acceptable prior to starting this work.

B. Verify lath is flat or formed to the structural curve, secured to substrate, and joint and surface perimeter accessories are properly in place.

C. Verify mechanical and electrical equipment and services located within areas to receive this work have been properly tested and approved.

3.02 MIXING

A. Mix only as much plaster as can be used prior to initial set.

B. Mix materials dry, to uniform color and consistency, before adding water.

C. Protect mixtures from frost or freezing temperatures, contamination, and excessive evaporation.

3.03 APPLICATION

A. Apply plaster in accordance with manufacturer's written instructions and comply with ASTM C926.

B. Base Coats:
   1. Apply base coat(s) to fully embed lath and to specified thickness.
   2. Follow guidelines in ASTM C926 and manufacturer's written installation instructions for moist curing base coats and application of subsequent coats.

C. Leveling Coat:
   1. Apply leveling coat to specified thickness.

D. Finish Coats:
   1. Cement Plaster:
      a. Apply with sufficient material and pressure to ensure complete coverage of base to specified thickness.
      b. Apply desired surface texture while mix is still workable.

3.04 TOLERANCES

A. Maximum Variation from True Flatness: 1/8 inch in 10 feet.

3.05 REPAIR

A. Patching: Remove loose, damaged or defective plaster and replace with plaster of same composition; finish to match surrounding area.

END OF SECTION

SECTION 09 5447
MODULAR METAL CEILING SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes "Acoustically lined ceiling panels" consisting of:
   1. Perforated and non-perforated metal ceiling panels with wood veneer-look finish.
   2. Acoustical backing – Class A rated.
   3. Suspension assemblies
   4. Accessories; provide other necessary items including devices for attachment overhead construction, secondary members, splines, splices, connecting clips, wall connectors, wall angles, and other devices required for a complete installation.
   5. Supplemental support framing: Provide fully engineered secondary framing as required to meet code, conforming to layout shown in drawings, to support direct-hung ceilings suspension system.
   6. Layout and installation of items penetrating or being installed in ceiling systems to be coordinated with responsible trades.

B. Related Sections / Work:
   1. Sections 05 40 00 - Cold-Formed metal Framing
   2. Sections 09 2116 - Gypsum Board Assemblies
   3. Sections 09 9123 – Interior Painting
   4. Division 21 – Fire Protection
   5. Division 23 - Heating, Ventilating and Air Conditioning
   6. Division 26 - Electrical

C. Alternates (Substitutions):
   1. Prior approval: unless otherwise provided for in the contract documents, proposed product substitutions may be submitted by the Question deadline date established in the bidding process. Approval of a proposed substitution is contingent upon the Design Agent's review of the proposal for acceptability. Approved products will be set forth by addenda. If substitute products have not been approved by addenda, but are included in a bid, the specified products shall be provided without additional compensation.
   2. Submittals which do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet the requirements for this section, including but not necessarily limited to the following: panel design, size, composition, color, finish, suspension system component profiles and sizes; and compliance with the referenced standards; and single source materials supplier (as specified in Section 1.5).

D. This Section covers the general requirements only for Ceilings as shown on the drawings. The supplying and installation of additional accessory feature and other items not specifically mentioned herein, but which are necessary to make a complete installation shall also be included or clarified accordingly.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM)
   1. E 84 - "Standard Test Method for Surface Burning Characteristics of Building Materials"
   2. B 209 - "Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate"
   3. C 423 - "Sound Absorption and Sound Absorption Coefficients by Reverberation Room Method"
   4. E 488 - "Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements"

5. E 580 - “Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Moderate Seismic Restraint”
6. B 633 - “Standard Specification for Electrodeposited Coatings of Zinc on Iron or Steel”
7. C 635 - “Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings”
8. C 636 - “Recommended Practice for Installation of Metal Ceiling Suspensions Systems for Acoustical and Lay-in Panels”
9. A 641 - “Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire”
10. A 653 - “Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip process”
11. E 795 - “Standard Practices for Mounting Test Specimens During Sound Absorption Tests”
12. D 1002 - “Practice for Adhesion Resistance”
13. D 1044 - “Practice for Abrasion Resistance”
14. E 1190 - “Standard Test Methods for Strength of Power Actuated Fasteners Installed in Structural Members”
15. E 1264 - “Classification for Acoustical Ceiling Products”
16. E 1477 - “Standard Test Method for Luminous Reflectance factor of Acoustical Materials by use of Integrating-Sphere Reflectometers”

B. Applicable LEED Environmental Categories and Credits and performance requirements as indicated:
   1. Material and Resources (MR)
      a. MR Credit 4.1 & 4.2 - Recycled Content
      b. MR Credit 5.1 & 5.2 - Regional Materials
      c. MR Credit 7.0 - Certified Wood
   2. Indoor Environmental Quality (EQ)
      a. EQ Credit 4.1 - Low Emitting Materials, Adhesives & Sealants
      b. EQ Credit 4.1 - Low Emitting Materials, Paints
      c. EQ Credit 4.4 - Low Emitting Materials, Composite Wood & Agrifiber
   3. Innovation in Design (IC)
      a. IC Credit 1.1 - Enhanced Acoustical Performance

C. Architectural Woodworking Institute (AWI) and or WIC requirements shall be met for woodworking materials.

D. National Electrical Manufacturers Association (NEMA) Standard 11-14-95 for Chemical Resistance

E. American Architectural Manufacturers Association (AAMA) 620-02 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Aluminum Substrates

F. Ceiling & Interior Systems Construction Association (CISCA) "Ceiling Systems Handbook”.
   1. Guidelines for Seismic Restraint
      a. Acoustical Tile and Lay-in Panels - Zones 0 - 2
      b. Direct Hung Suspended Ceiling Assemblies - Zones 3 & 4

G. Local Building Code (UBC or IBC), current edition requirements

1.04 SUBMITTALS

A. Product Data: Manufacturers product data for each type of product specified in this section.

B. Product Certification: Manufacturers certifications that products comply with specified requirements and governing codes; including product data, laboratory test reports and research reports showing compliance with specified standards.

C. Shop (Coordination) Drawings: Submit shop drawings for reflected ceiling plans (RCP’s), drawn to scale, and coordinating penetrations and ceiling mounted items. Show the following details:
   1. Reflected ceiling plan including joint patterns & details.

2. Ceiling suspension system plan with appropriate components, suggested hanger locations & details.
3. Method of attaching suspension system hangers to building structure.
4. Ceiling-mounted items including: light fixtures, air outlets and inlets, speakers, sprinklers, and other interfaces.
5. Special moldings at walls, column penetrations, and other junctures of ceilings with adjoining construction.
6. Framing and support details for work supported by ceiling suspension system.
7. Minimum drawing scale: 1/8” = 1’-0”.
8. Provide full scale drawings of perforation patterns. Provide minimum 1”=1’-0” scale layout for each panel type showing perforation layout and orientation as required. Perforations to be in alignment and neatly arranged as applicable.

D. BIM (Building Information Modeling): Provide 3-D models (as applicable) of the ceiling system including, panels, suspension and necessary components to make the system complete; compatible with “NavisWorks” or other appropriate 3-D model interfacing software.

E. Samples for Verification: Full-size units (or as specified below) of each type of ceiling assembly indicated; in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics. Submit samples for each type specified.
1. 12-inch square, metal pan units.
2. 12-inch long samples of each exposed molding or trim.
3. 12-inch long samples of each suspension component.

F. Qualification Data: For firms and persons specified in "Quality Assurance" (Section 1.5). Provide documents to demonstrate their capabilities and experience. Include lists of at least 5 completed projects with project names and addresses, names and addresses of Design Agents and Owners, and other information specified.

G. Copy of manufacturers warranty showing compliance with the requirements herein (reference Section 1.8).

1.05 QUALITY ASSURANCE

A. Unless accepted otherwise by the Design Agent, use manufacturer and installers that employ a Quality Management System complying with the program described in ISO 9001-2008, or similar system.

B. Installer
1. To certify a minimum 5 years experience installing similar systems and scope to those specified.
2. Provide list of at least 5 successful installations with similar products and scope. Include names and contact numbers of Design Agent and Owner for reference.

C. Manufacturer
1. To certify a minimum of 5 years experience manufacturing similar products to those specified.
2. Provide support documentation including name and date of project completion. Include names and contact numbers of Design Agent and Owners for reference.
3. Manufacturer shall be single source and shall be the fabricator and supplier of appropriate major components.

D. Fire-Test-Response Characteristics: Provide metal pan ceilings that comply with one of the following requirements:
1. Fire-response tests performed by UL, ITS/Warnock Hersey, or another independent testing and inspecting agency that is acceptable to authorities having jurisdiction and that performs testing and follow-up services.
2. Surface-burning characteristics of metal pan ceilings comply with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84.

E. Mock-Ups: Before releasing ceilings (within 90 days of order to proceed), if requested, construct mock-ups for each form of construction and finish required to verify selections made

under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up to comply with the following minimum requirements, using materials indicated for completed work:

1. Locate mock-ups in the location and of the size indicated or, if not indicated, as directed by the Design Agent. Minimum mock-up size to be 10'x 10' unless otherwise specified.
2. Notify Design Agent seven days in advance of the dates and times when mock-ups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Site Coordination Mock-up:
   a. For approval of assembly, sequence of installation, coordination of trades involved, including ceiling panel types and shapes.
   b. Sized large enough to include a minimum of 2 adjacent panels Demonstrating interface work of fire protection sprinklers, lighting, mechanical diffusers, anchoring method at steel structure; adjacent vertical wall; skylight and fascia, trim and accessories.
5. Obtain Design Agent's approval of mock-ups before starting construction of metal pan ceilings. Submit detailed, ACAD shop drawing illustrating extent and scope of mock-ups. Do not proceed without approval of these drawings.
6. Maintain mock-ups during construction in an undisturbed condition as a standard for judging the completed work.
   a. When directed, demolish and remove mock-ups from project site.
   b. Approved mock-ups in an undisturbed condition at the time of initial Acceptance may become part of the completed work, subject to Design Agent / Owner approval.

F. Pre-installation Conference: Conduct conference at Project site as directed by the project Design Agent.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver ceiling units and suspension system components in original, unopened packages clearly labeled with the following information: name of manufacturing source and location; product type, description and quantity; clients name and shipping address.

B. Panel's protective layer to be removed only after installation is complete to help prevent panel surface damage.

C. Store components in a fully enclosed space where they will be protected against physical damage from direct moisture, significant change in humidity, direct sunlight, significant change in temperature, surface contamination, and any other preventable cause. Maintain relative humidity of 65 - 75% and a uniform temperature of 60 - 75 degrees Fahrenheit.

D. Exercise care in handling components to prevent damage to the surfaces and edges and prevent distortion or other physical damage. Comply with prescribed stacking instructions to prevent damage to thee components.

1.07 PROJECT CONDITIONS

A. Environmental Limitations
   1. Do not install metal pan ceilings until after spaces are enclosed and weather tight and after wet work and work above ceilings is complete and accepted by project Design Agent.
   2. Coordinate with other work supported by, adjacent to or penetrating through the ceiling system.
   3. For all products, but especially those containing solid wood or wood veneer; maintain environmental conditions (temperature, humidity and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturers' absolute limits. Allow materials to reach ambient temperature and humidity for a minimum of 24 hours (48 hours recommended), prior to starting installation.

B. Do not install products in exterior space unless the system has been specifically designed and approved for exterior application.

C. If the project is located within range of moisture associated with large bodies of water (fresh or salt), necessary materials shall be finished with coatings appropriate to condition of use.

1.08 WARRANTY

A. Provide specified manufacturers warranty against defects in workmanship, discoloration, or other defect considered undesirable by the Design Agent or Owner.

B. This warranty shall remain in effect for a minimum period of five (5) years from date of initial acceptance.

C. Installation is warranted by the installer for a period of one (1) year or as per separate sub contractor agreement.

1.09 MAINTENANCE & EXTRA MATERIALS

A. Maintenance Instructions: Provide manufacturers standard maintenance and cleaning instructions for finishes provided.

B. Extra Materials: Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents. Only typical system components are included with attic stock.
   1. Ceiling Pan Units: Full-size units equal to 1½ percent (1½%) of amount installed.
   2. Ceiling Suspension System Components: Quantity of each grid and exposed component equal to 1½ percent (1½%) of amount installed.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Supply specified item or comply with Section 01 60 00 “Substitutions”. Specified manufacturers standard of quality and manufacturing tolerances shall be the criteria for evaluating “equivalent” products. Substitution shall be equal to or of better quality than the specified product in the opinion of the Design Agent and / or owner.

B. Basis of design: Ceilings Plus - 6711 E. Washington Blvd., Los Angeles, CA 90040. 800-822-3411 - www.ceilingsplus.com.

2.02 MATERIALS

A. Ceiling Type: Illusions - Sarante - by Ceilings Plus - Perforated - finish to match Design Agent’s sample; or approved equal.
   1. Provide manufacturers metal panels that comply with ASTM E1264 classifications as designated by type, pattern, acoustical rating and light reflectance unless otherwise indicated.
   2. Panels are to be manufactured from single sheets of aluminum selected for surface flatness, smoothness and freedom from surface blemishes where exposed to view in a finished unit. Do not use material where the exposed surface exhibit pitting, seam marks, roller marks, stains, discolorations, or variations in flatness exceeding those permitted by referenced standards.
   3. Panels are to be die formed with an integral return edge on each of the four panel sides. Steel clips that locate and align panels to the grid with torsion springs, are to be factory machine riveted to the return edge of the panels using counter sunk rivet holes that allow the flat heads of the counter sunk rivets to be flush the face of the panel return. Roll forming will not be accepted. Cupping at edges or corners will not be accepted.
   4. Panel Attachment: Torsion springs field applied to steel clips on flanges engage into factory applied slots for a concealed suspension system. No fasteners of any kind shall be visible on exposed face surfaces of ceiling panels or support tees. Down light openings and other ceiling penetrations shall be factory precision cut whenever viable.
   5. Panel material shall be aluminum sheet type 3105 (painted) / 5005 (anodized) series alloy that has a minimum 70% (50% @ 5005) recycled content. It shall be machine stretcher-leveled and a minimum of .032” thickness, or greater if required, so that the panel deflection does not exceed specified deflection criteria.

6. Panel finishes shall be in accordance with the requirements indicated in “FINISHES, GENERAL” Section 2.4. The panel finish shall be:
   a. “Sarante” - PVC free, faux wood laminate.
      1) Maximum .008” thick laminate.
      2) Permanently bonded to the aluminum sheet prior to fabrication. No edge banding allowed.
      3) Formaldehyde free, water based adhesive of minimum bond strength of 8 psi @ 25 degrees C. Zero VOC application process.
   b. Baked Polyester “Painted” finish - 3105 alloy.
   c. Flouropolymer “Painted” finish - 3105 alloy.
   d. “Anodized” finish - 5005 alloy.
7. Panel sizes as per drawings. Field cut panels at non modular perimeter conditions, at column interfaces or as detailed or specified.
8. Panel Edge: 1 1/4” minimum integral return on each of the four panel sides.
9. Panel Thickness: .040” thick aluminum.
10. Panel Flatness Criteria - Provide panels with deflection of L/360 or .125 inches, whichever is less.
11. Edge Profile: Panel joints are butt condition (concealed tee - as per ASTM E 1264) both directions (as per drawings) unless specified otherwise.
12. Panels to be factory pre-curved as required.
13. Provide concealed suspension system compatible with torsion spring accessibility. Reference “METAL SUSPENSION SYSTEMS, GENERAL” Section 2.3. Minimum two (2) torsion springs per opposing panel edges, four (4) total.
14. Perforation shall be as selected by the Design Agent from Ceilings Plus’ standard patterns. Panels to have solid non-perforated borders along each of the four sides.
15. Sound-Absorptive Fabric Layer: Provide manufacturers acoustic pads sized to fit concealed surface of panel. Material shall be both non-flammable and sound-absorptive.
    a. Fire Class shall be Class A, with surface-burning characteristics for flame-spread rating of 25 or less and smoke developed rating of 50 or less. Provide independent accredited lab test results showing compliance with Class A rating as per ASTM E 84.
    b. Achieve absorption value of not less than .70 - .80 NRC. Provide independent accredited laboratory test results illustrating compliance with acoustical requirements as per ASTM C 423. Mounting method for measuring Noise Reduction Coefficient (NRC) should be Type E-400 as directed by ASTM E 795. Provide one or both of the following as required to meet the specified NRC.
       1) Acoustical metal panel ceilings to provide recycled cotton, “Ultrasorb” in sufficient thickness to achieve NRC rating specified. COLOR
       2) OR
       3) Acoustical metal panel ceilings to provide “Soundtex” fiber fleece to achieve NRC rating specified. COLOR
       4) Permanently laminate fleece (Install acoustical pads) to the backside of the perforated panels, unless otherwise directed by the Design Agent.
16. The plenum shall be 100% accessible. Every panel must be removable. Progressive panel access is not acceptable. Heavy duty torsion springs and steel clip assemblies to be mounted to every panel for downward access, without potential for damage to panel face or hinge assembly. Hinge assembly shall be mounted to every panel with minimum two flush to face, counter sunk chamfered fasteners. Attaching torsion spring directly to panel with fastener will not be acceptable.
17. Fire Tests: Complete system test including suspension, primed aluminum and finish shall meet ASTM E 84 Class A.
18. Provide and install matching finish trim on each side of each suspended area (or as specified). Profile of trim to be minimum 4 ½” tall @ floating conditions or as detailed.

2.03 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension Standard: Provide panel manufacturers (pre-curved) metal suspension systems of types, structural classifications, materials, and finishes indicated that comply with applicable ASTM C 635 requirements; along with local code requirements (LARR #24299)
   1. Main and cross runners to be Standard "Heavy Duty" tee bar (as per ASTM C 635).
   2. Face of main and cross runners to be factory finished matte black unless known otherwise.
   3. Face of main runners to be factory slotted to receive torsion springs
   4. Provide suspension system made from steel sheet with an average recycled content such that post consumer recycled content plus one half or pre consumer content is not less than 25 percent.

B. Suspension Systems: Provide complete suspensions systems with main runners, cross runners, hangers, trim molding, seismic retention clips, load resisting struts and other suspension components required to support ceiling and other ceiling supported construction (some of these parts may be supplied by the installer).

C. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, "Direct-Hung", unless otherwise indicated (supplied by installer).
   1. Provide anchor, for use in the particular application, as approved by the "Structural Engineer of record".
   2. Structural substrate, as indicated to support attachment device, also to be approved by the "Structural Engineer of record".
   3. Anchors specified must provide corrosion resistance as per metal type and application. Carbon steel anchors with zinc plating to comply with ASTM B 633. Stainless steel fasteners to comply with ASTM F 593 and F 594.
      a. Anchors into Concrete (with or without steel deck).
         1) Pre-installed - Cast in Place Anchors.
         2) Post-installed - Expansion Anchors.*
         3) Post-installed - Chemical Anchors.*
         4) Post-installed - Powder Actuated Fasteners.*
         5) * - fasteners require ten times load imposed by ceiling construction as detailed by testing to comply with ASTM E 1190.
      b. Anchors into Wood.
         1) ¼" min diameter with 1 ¼" minimum penetration.
      c. Anchors into Steel.
         1) Clip or Clamp.
         2) Shot Pin.
      d. Anchors into Steel Deck: This option requires written approval from both the "Structural Engineer of record" and the Professional Engineered retained to provide structural documents in order to coordinate detailing required to provide anchoring device.
   4. "Direct-Hung" Suspensions Systems: System composed of main runners supported by hangers attached directly to building structure.
      a. Hangers: 1/8" minimum anodized aluminum (or same material as main runners) angles or channels, as standard for ceiling system manufacturer, sized to comply with structural classification indicated.
   5. "Indirect-Hung" Suspension Systems: System composed of main runners connected to carrying channels that are attached by hangers to building structure, and complying with the following requirements:
      a. Hangers: Type and metal standard with ceiling system manufacturer, sized to comply with structural classification indicated.
      b. Wire Hangers, where applicable, Braces, and Ties: Provide wires complying with the following requirements:
         1) Zinc-Coated Carbon-Steel Wire: ASTM A 641 (ASTM A 641M), Class 1 zinc coating, soft temper. Size: Select wire diameter so its stress at three times

hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than yield stress of wire, but provide not less than 2mm diameter wire (12 gage unless indicated otherwise).

2) Extruded Aluminum members shall comply with ASTM B 209.

c. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

d. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

e. Angle Hangers: Angles with legs not less than 22mm wide, formed with 1mm thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 coating designation, with bolted connections.

2.04 FINISHES, GENERAL

A. Comply with “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes. Provide manufacturers standard factory-applied finish for type of system indicated unless specified otherwise.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

C. Surface preparation of aluminum surfaces shall include cleaning and pre-treating of surface to comply with AAMA 620-02, Voluntary Specifications for High Performance Organic Coatings on Coil Coated Aluminum Substrates.

D. Appearance of finished work - Painted or Anodized:

1. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half range of approved samples.
2. Noticeable variation in same piece is not acceptable.
3. Variations in appearance of other components are acceptable if they are within range of approved samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and structural framing to which metal panels attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect installation and anchorage, and other conditions affecting performance of metal panel ceilings.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 3.2 PREPARATION

A. Coordination: Furnish layouts for cast-in-place anchors, clips, and other ceiling anchors whose installation is specified in other Sections.

B. Measure each ceiling area and establish layout of metal pan units to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width units at borders, and comply with layout shown on reflected ceiling plans.

C. Survey substrate for wall attachment to assure squareness and proper elevation for wall panel installation.

3.03 INSTALLATION

A. General: Install metal pan ceilings, per manufacturers shop drawings provided, per manufacturers written instructions and to comply with publications referenced below.

1. CISCA "Ceiling Systems Handbook”.
2. Standard for Ceiling Suspension System Installations - ASTM C 636.
3. Standard for Ceiling Suspension Systems Requiring Seismic Restraint - ASTM E 580.
4. IBC (International Building Code) standard for Seismic Zone for local area.

B. Suspend ceiling hangers from building's approved structural substrates and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means.

3. Where width of ducts and other construction within ceiling plenum produce hanger spacings that interfere with location of hangers at spacing required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
4. Where used secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure; that are appropriate for substrate; and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Space hangers not more than 48 inches on center, along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 8 inches from ends of each member. Supply supporting calculations from licensed Structural Engineer verifying hanger spacing meet requirements, when spacing exceed those recommended.
6. Fine level grid to 1/8 inch in 10 feet from specified elevation(s), square and true.
7. Adjust suspension system runners so they are square (within .5 degree from 90 degrees) and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

C. Secure bracing wires to ceiling suspension members and to supports acceptable to Design Agent / Engineer and or inspector. Suspend bracing from building's structural members and / or structural deck, as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs(unless directed otherwise).

D. Install edge moldings and trim of type indicated at perimeter of ceiling area and where necessary to conceal edges of metal pan. Method of edge trim attachment and design of edge trims to be approved by Design Agent.
1. Screw attach moldings to substrate at intervals not more than 18” O.C. and not more than 6” from ends, leveling with ceding suspension system to a tolerance of 1/8” in 10’. Miter corners accurately and connect securely.
2. Do not use exposed fasteners, including pop rivets, on moldings and trim without prior written approval. Or unless detailed otherwise.

E. Scribe and cut metal panel units for accurate fit at penetrations by, other work through ceilings. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness exceeding referenced standards for stretcher-leveled metal sheet.

F. Install metal panel units in coordination with suspension system.
1. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions, unless otherwise indicated. Install directionally patterned or textured panels in directions indicated on approved shop drawings. Panel-joints shall flow smoothly and in a straight line within 1/8” in 10’. Intersections shall be continuous.
2. Fit adjoining units to form flush, tight joints (as applicable). Scribe and cut units for accurate fit at borders and around construction penetrating ceiling.
3. Remove protective film from panels only when space is completely clean and free of airborne particles. Use white cotton gloves for final installation of panels into grid system.

3.04 ADJUSTING AND CLEANING

A. Adjust ceiling components to provide a consistent finish and appearance in conformity with established tolerances and requirements.

B. Clean exposed surfaces of metal panel ceilings and walls. Comply with manufacturers written instructions for cleaning and touchup of minor finish damage.

C. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and bent units.

END OF SECTION

SECTION 09 6500
RESILIENT BASE AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient base.

B. Installation accessories.

1.02 REFERENCE STANDARDS

A. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Selection Samples: Submit manufacturer's complete set of color samples for Design Agent's initial selection.

D. Verification Samples: Submit two samples, 12” long in size illustrating color and pattern for each resilient flooring product specified.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Protect roll materials from damage by storing on end.

1.05 FIELD CONDITIONS

A. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.01 RESILIENT BASE

A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
   1. Height: 4 inch.
   2. Thickness: 0.125 inch.
   3. Finish: Satin.
   4. Length: Roll.
   5. Color: To be selected by Design Agent from manufacturer's full range.
   6. Accessories: Premolded external corners and internal corners.
   7. Manufacturers:
      a. Johnsonite, a Tarkett Company: www.johnsonite.com.
      b. Mannington
      c. Roppe
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ACCESSORIES

A. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.

B. Moldings, Transition and Edge Strips: to match base.

C. Filler for Coved Base: Plastic.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

3.02 PREPARATION

A. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed. Apply primer to concrete surfaces.

3.03 INSTALLATION - GENERAL

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install in accordance with manufacturer's written instructions.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Fit joints and butt seams tightly.

E. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
   1. Resilient Strips: Attach to substrate using adhesive.

3.04 INSTALLATION - RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Install base on solid backing. Bond tightly to wall and floor surfaces.

C. Scribe and fit to door frames and other interruptions.

3.05 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

END OF SECTION

SECTION 09 6813
TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Carpet tile, fully adhered.

1.02 RELATED REQUIREMENTS

A. Section 01 7320 - Construction Waste Management and Disposal: Reclamation/Recycling of new carpet tile scrap.

1.03 REFERENCE STANDARDS

A. CRI (CIS) - Carpet Installation Standard; Carpet and Rug Institute; 2009.

B. CRI (GLA) - Green Label Testing Program - Approved Adhesive Products; Carpet and Rug Institute; Current Edition.

1.04 SUBMITTALS: COMPLY WITH SECTION 013300 SUBMITTAL PROCEDURES

A. Product Data: For each type of product indicated, including finishing materials.
   1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.

B. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
   1. Carpet: 12-inch- square Sample, mounted on similar substrate with adhesive
   2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- long Samples.
   3. Carpet Seam: 6-inch Sample, mounted on similar substrate with adhesive, with Seam Sealer
   4. Mitered Carpet Border Seam: 12-inch- square Sample. Show carpet pattern alignment.
   5. Adhesive, Each Type: Manufacturer's recommended adhesive. Container no greater than pint.

C. Maintenance Data: Include in maintenance manuals. Include the following:
   1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
   2. Precautions for cleaning materials and methods that could be detrimental to carpet.

D. Extra Materials: Deliver to Owner

E. Shop Drawings: Indicate layout of joints

1.05 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 01 Closeout Submittals (Maintenance Materials) Section.
   1. Quantity: Full-width rolls equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.
   2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra materials.

1.06 DELIVERY, STORAGE, AND HANDLING: COMPLY WITH DIVISION 01 AND THE FOLLOWING:

A. As recommended by manufacturer's instructions and recommendations.

B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
   1. Material should be stored in areas that are fully enclosed, weathertight with the permanent HVAC with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 85 deg F .

1.07 COORDINATION

A. Completely coordinate the work of this Section with the Work of other Sections. Verify dimensions and work of other trades which adjoin materials of this Section before the installation of items herein specified.

B. Installation of flooring to be done in phases due to continued building operations. Contractor to coordinate with CCRI to determine phasing sections for demolition of existing flooring and installation of new flooring.

1.08 PROJECT CONDITIONS

A. Install resilient products after other finishing operations, including painting, have been completed.

B. Environmental Limitations: Do not deliver or install carpet until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained during the remainder of the construction period.

C. Do not install carpet over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.

D. Maintain ambient temperatures within range recommended by manufacturer, but not less than 65 deg F (18 deg C) or more than 85 deg F (29 deg C) in spaces to receive resilient products during the following time periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

E. Maintain the ambient relative humidity between 40% and 60% during installation.

F. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

1.09 SUBMITTALS

A. See Section 01 3300 for submittal procedures.

B. Shop Drawings: Indicate layout of joints.

C. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color mix under consideration. Resubmit until approval.

1.10 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Product:
   1. Forbo Flotex Modular.
   2. a. Two Custom Colors, see finish plan for pattern.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet manufacturer; maximum VOC of 50 g/L; CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable.

C. Seam Adhesive: Product recommended by carpet manufacturer for sealing seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

2.03 TRANSITION STRIPS

A. Transition Strips: Rubber. See Drawings for details.
   1. Color: Match Mannington Bedrock #942
   2. Manufacturers:
      a. Mannington Commercial: Mannington.com
      b. Johnsonite, a Tarkett Company: www.johnsonite.com.
      c. Roppe Corp: www.roppe.com.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Examine carpet for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
   1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet manufacturer.
   2. Subfloor finishes comply with requirements specified in Division 03 Section "Cast Underlayment" for slabs receiving carpet.
   3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for flooring installation by testing for moisture and pH.
   1. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer's written instructions.

B. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet manufacturer.

C. Broom and vacuum clean substrates to be covered immediately before installing carpet.

3.03 INSTALLATION

A. Comply with carpet manufacturer's written installation instructions

B. Comply with carpet manufacturer's written recommendations and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile.

C. Seam Locations at Doors: Center seams under the door in closed position.

D. Do not bridge building expansion joints with carpet.

E. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture Including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.

F. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable Flanges, alcoves, and similar openings.

G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

H. Do not install carpet until it is the same temperature as the space where they are to be installed
   1. Move carpet and installation materials into spaces where they will be installed at least 48 hours prior to installation.

I. Sweep and vacuum clean substrates to be covered by carpet products immediately before Installation.

J. Dye Lots: Confirm lots - use only one dye lot for all carpet.

K. Seams: Locate seams to avoid major traffic lanes.

L. Walls: Layout carpet patterns parallel and perpendicular to walls.

M. Bumps and Wrinkles: Prohibited.

N. Seams: Fit tightly. Apply seam adhesive.

O. Rolling: Roll entire carpet area slowly and thoroughly in both directions with 100-pound roller.

3.04 CLEANING

A. Perform the following operations immediately after install:
   1. Remove excess adhesive, seam sealer, and other surface blemishes from floor, base and wall surfaces using cleaner recommended by manufacturer.
   2. Remove strands that protrude from carpet surface.
   3. Vacuum carpet using commercial machine recommended by manufacturer.

B. Protect carpet from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
   1. No traffic for 24 hours after installation, or as recommended by carpet manufacturer
   2. No heavy traffic, rolling loads, or furniture placement for 72 hours after installation.

C. Cover carpet until Substantial Completion

D. Wait 72 hours after installation before performing initial cleaning

E. A regular maintenance program must be started after initial cleaning. Contractor is responsible for maintenance program up until Substantial Completion.

END OF SECTION

SECTION 09 7200
WALL COVERINGS

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes the following types of wall protection systems:
   1. Wall Covering. May be referred to as “vinyl wall covering” or “protective wall covering”.

1.02 REFERENCES

A. National codes (IBC, UBC, SBCCI, BOCA and Life Safety)

B. American Society for Testing and Materials (ASTM)

C. Underwriters Laboratories (UL)

D. California 01350 specification

1.03 SUBMITTALS

A. General: Submit the following in accordance with conditions of contract and Division 1 specification section 01 33 00 “Submittal Procedures”:

B. Product data and detailed specifications for each system component and installation accessory required, including installation methods for each type of substrate.

C. Shop drawings showing locations, extent and installation details of wall covering products.

D. Color samples: Submit 3 full selection chains for color choice.

E. Samples for verification purposes: Submit the following samples, as proposed for this work, for verification of color, texture, pattern and thickness:
   1. Sample of each product specified, 12” square. Include three colors in range selected.

F. Product test reports from a qualified independent testing laboratory showing compliance of each component with requirements indicated.

G. Maintenance data for wall protection system components for inclusion in the operating and maintenance manuals specified in Division 1.

1.04 QUALITY ASSURANCE

A. Installer qualifications: Engage an installer who has no less than 3 years experience in installation of systems similar in complexity to those required for this project.

B. Manufacturer’s qualifications: Not less than 5 years experience in the production of specified products and a record of successful in-service performance.

C. Code compliance: Assemblies should conform to all applicable codes including IBC, UBC, SBCCI, BOCA, Life Safety and CA 01350.

D. Fire performance characteristics: Provide engineered PETG wall protection system components with UL label indicating that they are identical to those tested in accordance with ASTM E84 for Class A/1 characteristics listed below:
   1. Flame spread: 25 or less
   2. Smoke developed: 450 or less

E. Impact strength: Provide wall protection components that have been tested in accordance with the applicable provisions of ASTM F476.

F. Chemical and stain resistance: Provide wall protection system components with chemical and stain resistance in accordance with ASTM D543.

G. Color match: Provide wall protection components that are color matched in accordance with the following:
   1. Delta Ecmc of no greater than 1.0 using CIELab color space. (Specifier note: Construction Specialties’ colors are matched under cool white fluorescent lighting and computer controlled within manufacturing tolerances. Color may vary if alternate lighting sources are present.)

H. Single source responsibility: Provide all components of the wall protection system manufactured by the same company to ensure compatibility of color, texture and physical properties.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the project site in unopened original factory packaging clearly labeled to show manufacturer.

B. Store materials in undamaged packaging in a clean, dry place out of direct sunlight and exposure to the elements. A minimum room temperature of 40ºF (4ºC) and a maximum of 100ºF (38ºC) should be maintained.

C. Materials must be stored flat.

1.06 PROJECT CONDITIONS

A. Materials must be acclimated in an environment of 65-75ºF (18-24ºC) for at least 24 hours prior to beginning the installation.

B. Installation areas must be enclosed and weatherproofed before installation commences.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Interior surface protection products specified herein and included on the submittal drawings shall be manufactured by Construction Specialties, Inc. or equal.

2.02 MATERIALS – Basis of Design

A. Engineered PETG: Rigid sheet should be high-impact Acrovyn 4000 with standard Suede texture, nominal .040" (1.02mm) thickness. Chemical and stain resistance should be per ASTM D543 standards as established by the manufacturer. Colors to be indicated in the finish schedule from one of manufacturer's available colors and patterns.

B. Aluminum: Aluminum trims to be alloy 6063 T5 with clear anodized finish; minimum strength and durability properties as specified in ASTM B221.

C. Sheets: 4' x 8' sheet sizes in standard Suede texture. Color to be selected by Design Agent and Owner from full range.

2.04 FABRICATION

A. General: Fabricate wall covering to comply with requirements indicated for design, dimensions, detail, finish and sizes.

B. Finishes
   1. General: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applications and designations of finishes.

2.05 ACCESSORIES

A. Adhesive: Acrovyn wall covering shall be furnished as a complete packaged system, including appropriate standard adhesive.

B. Provide all primer, caulk and trims, including aluminum vertical trim.

C. Aluminum trim pieces at edge of panels.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
   1. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface preparation: Prior to installation, clean substrate to remove dirt, debris and loose particles. Perform additional preparation procedures as required by manufacturer's instructions.

B. Protection: Take all necessary steps to prevent damage to material during installation as required in manufacturer's installation instructions.

3.03 INSTALLATION

A. Install the work of this section in strict accordance with the manufacturer's recommendations using approved adhesive.

B. Temperature at the time of installation must be between 65-75ºF (18-24ºC) and be maintained for at least 48 hours after the installation to allow for proper adhesive set-up.

C. Relative humidity shall not exceed 80%.

D. Do not expose wall covering to direct sunlight during or after installation. This will cause the surface temperature to rise, which in turn will cause bubbles and delamination.

E. Install sheets vertically, with first full sheet centered in each column bay. Trim outside sheets to equal size as necessary.

F. Apply trims at all outside edges.

3.04 CLEANING

A. General: Immediately upon completion of installation, clean material in accordance with manufacturer's recommended cleaning method.

B. Remove surplus materials, rubbish and debris resulting from installation as work progresses and upon completion of work.

3.05 PROTECTION

A. Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

END OF SECTION

SECTION 09 8000
SPECIAL COATINGS

PART 1 - GENERAL

1.01 SUMMARY

A. This specification describes the use of a 3-component, epoxy-modified, cementitious, anti-corrosion coating for reinforcing steel in concrete restoration.

1.02 RELATED REQUIREMENTS

A. Section 03 7300 - Concrete Rehabilitation

1.03 QUALITY ASSURANCE

A. Manufacturing qualifications: The manufacturer of the specified product shall be ISO 9001 certified and have in existence a recognized ongoing quality assurance program independently audited on a regular basis.

B. Contractor qualifications: Contractor shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. Contractor shall maintain qualified personnel who have received product training by a manufacturer's representative.

C. Install materials in accordance with all safety and weather conditions required by manufacturer, or as modified by applicable rules and regulations of local, state, and federal authorities having jurisdiction. Consult Material Safety Data Sheets for complete handling recommendations.

1.04 DELIVERY, STORAGE, AND HANDLING

A. All materials must be delivered in original, unopened containers with the manufacturer's name, labels, product identification, and batch numbers. Damaged material must be removed from the site immediately.

B. Store all materials off the ground and protect from rain, freezing, or excessive heat until ready for use.

C. Condition the specified product as recommended by the manufacturer.

1.05 JOB CONDITIONS

A. Environmental Conditions: Do not apply material if it is raining or snowing, or if such conditions appear to be imminent. Minimum application temperature 40°F (5°C) and rising.

B. Protection: Precautions should be taken to avoid damage to any surface near the work zone due to mixing and handling of the specified coating.

1.06 SUBMITTALS

A. Submit two copies of manufacturer's literature, to include: Product Data Sheets and appropriate Material Safety Data Sheets (MSDS).

1.07 WARRANTY

A. Provide a written warranty from the manufacturer against defects of materials for a period of one (1) year, beginning with date of substantial completion of the project.

PART 2 - PRODUCTS

2.01 BASIS OF DESIGN

A. Sika Armatec 110 EpoCem, as manufactured by Sika Corporation, is considered to conform to the requirements of this specification.

2.02 MATERIALS

A. Epoxy resin/portland cement adhesive shall be Sika Armatec 110 EpoCem or equal if accepted during bidding.
   1. Component "A" shall be an epoxy resin/water emulsion containing suitable viscosity control agents. It shall not contain butyl glycidyl ether.
   2. Component "B" shall be primarily a water solution of a polyamine.

3. Component “C” shall be a blend of selected portland cements and sands.
4. The material shall not contain asbestos, PCBs or lead.

2.03 PERFORMANCE CRITERIA

A. Properties of the mixed epoxy resin/portland cement adhesive.
   1. Pot Life: 90 minutes @ 73°F
   2. Contact Time: 95°F (35°C) 6 hours
      a. 80-95°F (26-35°C) 6 hours
      b. 65-79°F (18-26°C) 12 hours
      c. 50-64°F (10-17°C) 16 hours
      d. 40-49°F (4-9°C) wet on wet
   3. Color: dark gray

B. Properties of the cured epoxy resin/portland cement adhesive.
   1. Compressive Strength (ASTM C-109)
      a. 3 day: 4500 psi (31.0 MPa)
      b. 7 day: 6500 psi (44.8 MPa)
      c. 28 day: 8500 psi (58.6 MPa)
   2. Splitting Tensile Strength (ASTM C-496)
      a. 28 days: 600 psi (4.1 MPa)
   3. Flexural Strength (ASTM C-348)
      a. 1250 psi (8.6 MPa)
   4. Bond Strength ASTM C-882 at 14 days
      a. Wet on Wet, 0-hr. open time: 2800 psi (19.3 MPa)
      b. 24-hr. open time: 2600 psi (17.9 MPa)
   5. Bond of Steel Reinforcement to Concrete (Pullout Test)
      a. Sika Armatec 110 EpoCem coated 625-psi (4.3 MPa)
   6. The epoxy resin/portland cement adhesive shall not produce a vapor barrier.
   7. Material must be proven to prevent corrosion of reinforcing steel when tested under the procedures as set forth by the Federal Highway Administration Program Report No. FHWA/RD86/193. Proof shall be in the form of an independent testing laboratory corrosion report showing prevention of corrosion of the reinforcing steel.

2.04 NOTE: TEST ABOVE WERE PERFORMED WITH MATERIAL AND CURING CONDITIONS AT 73°F AND 45-55% RELATIVE HUMIDITY.

PART 3 - EXECUTION

3.01 PREPARATION

A. Clean existing rebar to be coated in accordance with epoxy coating manufacturer’s recommendations.

3.02 MIXING AND APPLICATION

A. Mixing the epoxy resin: Shake contents of Components “A” and Component “B”. Completely empty both components into a clean, dry mixing pail. Mix thoroughly for 30 seconds using a jiffy paddle with a low-speed (400-600 rpm) drill. Slowly add the entire contents of Component “C” while continuing to mix for 3 minutes until uniform with no lumps. Mix only that quantity that can be applied within its pot life.

B. Placement procedure:
   1. Apply to prepared steel surface with a stiff-bristle brush, or “hopper type” spray equipment at 20 mils minimum thickness. Properly coat the underside of the totally exposed steel. Allow to dry (approximately 2-3 hours), then apply a second coat at 20 mils minimum thickness. Allow drying time again before placing repair mortar.

C. Adhere to all instructions, recommendations and limitations and cautions for the epoxy resin/portland cement adhesive in the manufacturer’s current printed literature.

3.03 CLEANING

A. Clean uncured epoxy resin/portland cement adhesive with water. The cured epoxy resin/portland cement adhesive can only be removed mechanically.

B. Leave finished work and work area in a neat, clean condition without evidence of spillovers onto adjacent areas.

END OF SECTION

SECTION 09 9123
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints, stains, and varnishes.

C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
   1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
   2. Paint plaster ceiling in vestibule.
   3. Paint all structural steel not enclosed in walls, including steel supporting desck above acoustic panels.
   4. Prime surfaces to receive wall coverings.
   5. Mechanical and Electrical:
      a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
      b. In finished areas, paint shop-primed items.
      c. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
      d. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.

D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
   5. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, and lead items.
   6. Marble, granite, slate, and other natural stones.
   7. Floors, unless specifically indicated.
   8. Glass.
   9. Acoustical materials, unless specifically indicated.
   10. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: Shop-primed items.

B. Section 21 0553 - Identification for Fire Suppression Piping and Equipment: Painted identification.

1.03 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2014.

B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2012).

C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.

E. SSPC V1 (PM1) - Good Painting Practice: Painting Manual, Volume 1; Fourth Edition.

F. SSPC V2 (PM2) - Systems and Specifications: Steel Structures Painting Manual, Volume 2; Fourth Edition.

G. SSPC-SP 1 - Solvent Cleaning; 2015.

H. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).

I. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

J. SSPC-SP 13 - Surface Preparation of Concrete; (Reaffirmed 2015); 2003.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
   4. Manufacturer's installation instructions.
   5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.
   2. Where sheen is not specified, discuss sheen options with Design Agent before preparing samples, to eliminate sheens definitely not required.
   3. Allow 30 days for approval process, after receipt of complete samples by Design Agent.
   4. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as masonry, have been approved.

D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

E. Manufacturer's Instructions: Indicate special surface preparation procedures.

F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
   3. Label each container with color in addition to the manufacturer's label.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 5 years experience and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply materials when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.

D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.

E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior, unless required otherwise by manufacturer's instructions.

F. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
   1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Design Agent is obtained using the specified procedures for substitutions.
   2. Substitution of MPI-approved products by a different manufacturer is preferred over substitution of unapproved products by the same manufacturer.
   3. Substitution of a different paint system using MPI-approved products by the same manufacturer will be considered.

B. Paints:
   1. PPG Paints: www.ppgpaints.com/sle.
   2. Pratt & Lambert Paints: www.prattandlambert.com.
   3. Sherwin-Williams Company: www.sherwin-williams.com.
   4. Benjamin Moore.

C. Transparent Finishes:
   1. Behr Process Corporation: www.behr.com.
   2. PPG Paints Deft Interior Clears/Polyurethanes: www.ppgpaints.com/sle.
   3. Sherwin-Williams Company: www.sherwin-williams.com.

D. Primer Sealers: Same manufacturer as top coats.

E. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Supply each paint material in quantity required to complete entire project's work from a single production run.
   3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Flammability: Comply with applicable code for surface burning characteristics.

C. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Design Agent from the manufacturer's full line.

D. Colors: To be selected from manufacturer's full range of available colors.
   1. Selection to be made by Design Agent after award of contract.
   2. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
   3. Extend colors to surface edges; colors may change at any edge as directed by Design Agent.
   4. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.
   5. In utility areas, finish equipment, piping, conduit, and exposed duct work in colors according to the color coding scheme indicated.

2.03 PAINT SYSTEMS - INTERIOR

A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete, concrete masonry units, brick, wood, plaster, uncoated steel, shop primed steel, galvanized steel, and aluminum.
   1. Two top coats and one coat primer.
   2. Top Coat(s): High Performance Architectural Interior Latex; MPI #138, 139, 140, or 141.
      a. Products:
         1) Behr Marquee Interior Matte [No. 1450]. (MPI #138)
         2) PPG Paints Pitt-Glaze WB1 Pre-Catalyzed Water-Borne Acrylic Epoxy, 16-310 Series, Eggshell.
         3) PPG Paints Break-Through Interior/Exterior Satin Water-Borne Acrylic, V51-410 Series.
         4) PPG Paints Break-Through Interior/Exterior Gloss Water-Borne Acrylic, V71-610 Series.
         5) Sherwin-Williams Pre-Catalyzed Waterbased Epoxy, Eg-Shel. (MPI #139)
         6) Sherwin-Williams Pre-Catalyzed Waterbased Epoxy, Semi-Gloss. (MPI #141)
         7) Substitutions: Section 01 6000 - Product Requirements.
   3. Top Coat Sheen:
      a. Satin: MPI gloss level 4; use this sheen for items subject to frequent touching by occupants, including door frames and railings.
      b. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
   4. Primer: As recommended by top coat manufacturer for specific substrate.

B. Paint CI-OP-3L - Concrete/Masonry, Opaque, Latex, 3 Coat:
   1. One coat of block filler.
   2. Semi-gloss: Two coats of latex enamel

C. Paint MI-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:
   1. One coat of latex primer.
   2. Semi-gloss: Two coats of latex enamel

D. Paint MI-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
   1. Touch-up with latex primer.
   2. Semi-gloss: Two coats of latex enamel

E. Paint MgI-OP-3L - Galvanized Metals, Latex, 3 Coat:
   1. One coat galvanize primer.
   2. Semi-gloss: Two coats of latex enamel

F. Paint MaI-OP-3L - Aluminum, Unprimed, Latex, 3 Coat:
   1. One coat etching primer.
   2. Gloss: Two coats of latex enamel
   3. Semi-gloss: Two coats of latex enamel

G. Paint I-TR-F - Fire-Retardant Coating, Intumescent:
   1. One coat of fire-retardant primer sealer.
   2. Gloss: One coat of intumescent coating, flame/smoke rating of 25/50

2.04 PRIMERS

A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

D. If substrate preparation is the responsibility of another installer, notify Design Agent of unsatisfactory preparation before proceeding.

E. Test shop-applied primer for compatibility with subsequent cover materials.

F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Gypsum Wallboard: 12 percent.
   2. Plaster and Stucco: 12 percent.
   3. Masonry, Concrete, and Concrete Masonry Units : 12 percent.
   4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Concrete:
   1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
   2. Clean concrete according to ASTM D4258. Allow to dry.
   3. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.

F. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

G. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

H. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.

I. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

J. Galvanized Surfaces:

1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
2. Prepare surface according to SSPC-SP 2.

K. Ferrous Metal:
1. Solvent clean according to SSPC-SP 1.
2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

L. Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

F. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

G. Sand wood and metal surfaces lightly between coats to achieve required finish.

H. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

I. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

J. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 10 1010
FALL PROTECTION SYSTEM

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Comply with the conditions of the Contract and Division 1 - General Requirements

1.02 SECTION INCLUDES

A. Work of this section includes the design, supply and installation of fall protection maintenance equipment

1.04 REFERENCES

A. AISC S342L-1993, with Supplement No.1 “Load and Resistance Factor Design Specification for Structural Steel Buildings”.
B. AISI SG-971-1996, with 2000 Supplement “Specification for Design of Cold-Formed Steel Structural Members”.
C. Aluminum Association AA ADM-1-Aluminum Design Manual, 2000” and AWS D1.2-1997 Structural
Welding Code - Aluminum.
D. AWS D1.1-2000 Structural Welding Code - Steel.

1.05 DESIGN REQUIREMENTS

A. Design restraint system to suit building and in accordance with plans, specifications, standards, and regulations/codes contained in sections 1.04 and 1.08.
B. Locate anchorages to suit equipment that will be used on the building with respect to items such as reach, spacing, roof edge condition, and similar items.
C. Design all anchor components to provide adequate attachment to the building and suited to maintenance practices. Ensure compatibility with industry standard equipment.
D. Ensure all anchor components conform to proper engineering principles and have been designed by a Professional Engineer qualified in the design of restraint maintenance equipment, its application and safety requirements.
E. Design system fall arrest safety anchors and equipment supports to comply with the following structural requirements:
1. Fall Arrest Safety Anchors: designed to a maximum fall arresting force of typically 1800 lbs. (8.0 kN) when wearing a body harness with a safety factor of 2 without any permanent deformation and to 5000 lbs. (22.24 kN) against fracture or detachment.

1.06 SHOP DRAWINGS AND ENGINEERING CERTIFICATION

A. Submit shop drawings showing complete layout and configuration of complete restraint maintenance system, including all components and accessories. Clearly indicate design and fabrication details, hardware, and installation details.
B. Shop drawings to include installation and rigging instructions and all necessary Restrictive and Non-Restrictive Working Usage Notes and General Safety Notes.
C. Shop drawings to be reviewed by a professional engineer, and upon request, complete with calculations and/or test reports.

1.07 QUALIFICATIONS

A. Manufacturer: Work of this Section to be executed by manufacturer specializing in the design, fabrication and installation of restraint maintenance systems having a minimum of 5 years documented experience.
B. Loading and safety assurance: Work of this Section to meet the requirements of governing codes and jurisdiction and to comply with properly engineered loading and safety criteria for the intended use.
C. Insurance: Manufacturer to carry specific liability insurance (products and completed operations) in the amount of $5,000,000.00 to protect against product/system failure.
D. Welding to be executed by certified welders in accordance with AWS requirements.

1.08 REGULATORY REQUIREMENTS

A. Comply with the following OSHA regulations:
1. 1910, Subpart D (Walking and Working Surfaces).
2. Appendix C to 1910 Subpart F (Personal Fall Arrest Systems).

1.09 MAINTENANCE DATA

A. Submit 1 copy of system Equipment Manual & Inspection Log Book, with “Initial Inspection - Certification for Use” and “Inspection Sign-Off” forms completed.
B. Submit 2 copies of a reduced plastic laminated as-built shop drawing showing equipment locations and details. This drawing is to be posted near exits onto the roof.

PART 2 - PRODUCTS

2.01 MANUFACTURER – BASIS OF DESIGN

A. This specification is based on systems currently being manufactured by PRO-BEL ENTERPRISES LTD. Toll free: 1-800-461-0575. Telephone: 905-427-0616, Fax: 905-427-2545, info@pro-bel.ca.
B. Other manufactured products meeting this specification may be substituted provided that manufacturers show proof of product insurance. Equipment details to be approved by the architect and/or consultant. Companies, such as miscellaneous metal fabricators, who are not normally engaged in the design and manufacture of window cleaning/suspended maintenance equipment are not permitted to bid.

2.02 HORIZONTAL CABLE LIFELINE SYSTEM SUPPORTS

A. Hollow steel (HSS) pier supports: galvanized mild steel as above with yield strength of 50 Ksi (300 MPa). Wall thickness to suit application.
B. Base plate and all other sections: galvanized mild steel as above with yield strength of 44 Ksi (300 MPa). Thickness and securement to suit application.
C. Securement bolts: mild steel, Type 300W with yield strength of 44 Ksi (300 MPa), hot-dip galvanized to ASTM A123/A123M-2002.

D. Safety U-bars: Type 304 stainless steel with yield strength of 35 Ksi (240 MPa. U-bar to be not less than 3/4“ (19 mm) diameter material with 1-1/2” (38 mm) eye opening.
E. Seamless spun aluminum flashing (for steel pier supports): Type 6061-T6 alloy to ASTM B221-2000 with deck flange flashed in to NRCA recommendations. Seal top of aluminum flashing with conformable mastic tape and torch applied heat-shrink rubber collar flashing.
F. Miscellaneous bolts, nuts and washers: mild steel, Type 300W with yield strength of 44 Ksi (300 MPa), hot-dip galvanized to ASTM A123/A123M-2002 or Type 304 stainless steel with yield strength of 35 Ksi (240 MPa).

PART 3- EXECUTION

3.01 EXAMINATION

A. Examine surfaces and areas upon which the work of this section depends. Report to the Contractor in writing, defects of work prepared by other trades and other unsatisfactory site conditions, which would cause defective installation of products, or cause latent defects in workmanship and function.
B. Verify site dimensions.
C. Commencement of work will imply acceptance of prepared work.

3.02 INSTALLATION

A. Install equipment in accordance with approved shop drawings and manufacturer’s recommendations.
B. Co-ordinate installation with work of related trades.
C. Install all work true, level, tightly fitted and flush with adjacent surfaces as required.
D. Deform threads of tail end of anchor studs after nuts have been tightened to prevent accidental removal or vandalism.
E. Manufacturer to assist and/or supervise installation maintenance equipment installed by others.
F. Structural steel to receive safety anchors to have adequate bearing surface as indicated on shop drawings and/or to ensure 100% weld.

3.03 FINAL ADJUSTING AND INSPECTION

A. Adjust and leave equipment in proper working order.
B. Complete “Initial Inspection – Certification for Use” form included in Equipment Manual & Inspection Log Book.

3.04 TESTING

A. All anchors relying upon chemical adhesive fasteners to be 100% tested on site using load cell test apparatus in accordance with manufacturer’s recommendations.

END OF SECTION

SECTION 10 1400
SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior directional and informational signs.

B. Building identification signs.

1.02 RELATED REQUIREMENTS

A. Section 26 0000 - Identification for Electrical Systems.

B. Section 26 0000- Interior Lighting: Exit signs required by code.

C. Landscape drawings and specifications: Wheelchair sign at exterior ramp.

1.03 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

1.04 SUBMITTALS

A. See Section 01 3300 for submittal procedures.

B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.

1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
2. When content of signs is indicated to be determined later, request such information from Owner through Design Agent at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
3. Submit for approval by Owner through Design Agent prior to fabrication.

D. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.

E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

F. Verification Samples: Submit samples showing colors specified.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

PART 2 PRODUCTS

2.01 SIGNAGE APPLICATIONS

A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.

C. Exterior Logo: Cast aluminum with Kynar painted CCRI logo in color

D. Building Identification Sign – “Community College of Rhode Island”:

1. Use individual metal letters.
2. Mount on outside wall in location indicated on drawings.

2.02 SIGN TYPES

A. Logo Color and Font:
1. Character Font: to match CCRI logo
2. Character Case: Upper case only.
3. Background Color: mill anodized
4. Character Color: Contrasting color CCRI green. Match Owner sample.

2.03 DIMENSIONAL LETTERS

A. Metal Letters:
1. Metal: Aluminum casting.
2. Finish: Kynar Coated in CCRI green.
3. Mounting: shield anchors to concrete

2.05 ACCESSORIES

A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install neatly, with horizontal edges level.

C. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.

D. Protect from damage until Substantial Completion; repair or replace damaged items.

END OF SECTION

SECTION 10 1500
VIDEO DISPLAY SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Panelized LED video display systems.

1.02 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: Support structure.

B. Section 26 0000- Conduit for Electrical Systems.

C. Section 26 0000 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

A. ANSI/Infocomm 10 - Audiovisual Systems Performance Verification; 2013.

B. UL 879 - Electric Sign Components; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3300 for submittal procedures.

B. Product Data: Provide manufacturer's data sheets on panelized LED display systems including recommendations for preparation, storage and handling, and installation.

C. Shop Drawings: Indicate cable routing, connections between equipment, anchor and support details, and adjacent construction.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

E. Project Record Documents: Provide quantities, type, and location for components, cabling and accessories.

F. System Setting Backup: Provide an electronic file of all system settings.

G. Security Items:
   1. Provide one set of keys for each locked equipment enclosure.
   2. Provide passwords to access control functions for hardware and software user interfaces.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Authorized Manufacturer Representative: System shall be configured and commissioned by an authorized manufacturer representative.

C. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in compliance with manufacturer instructions.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide six year manufacturer warranty for LED monitor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Barco, Inc.: www.barco.com

B. Daktronics, Inc.: www.daktronics.com.

C. NanoLumens: www.nanolumens.com.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PANELIZED LED VIDEO DISPLAY

A. Performance Requirements:
   1. Comply with performance standards based on tests conducted in accordance with ANSI/Infocomm 10.
   2. Provide products that are listed and labeled as complying with UL 879, where applicable.

B. System Type: Flat.
   1. Pixel Pitch: 3.8 mm
   2. Refresh Rate: 960 Hz adjustable.
   3. Horizontal Viewing Angle: 170 degrees (plus/minus 85 degrees off center).
   4. Vertical Viewing Angle: 160 degrees (plus/minus 80 degrees off center).
   5. Brightness: 1000 Nits adjustable
   6. Mount Type: Custom Wall Mount.
   7. Location: Indoor and Outdoor.
   8. Panel Height: 31.5 inches.
   9. Panel Length: 67 inches.
   10. Panel Depth: 4.09 inches.
   11. Service Access: Front.
   12. Data Connections: Shielded twisted pair CAT 5e/6e (Ethercon) or Fiber Optic.
   13. Input Source Compatibility: DVI, HDMI, S-Video, and Composite.
   14. Power Consumption: 7.50 watts/sf.
   15. Working Voltage: 120 VAC / 240 VAC at 60Hz.
   16. Heat Flow: 24 BTU/hr/sf.

2.03 CONTROLS

A. Interface Unit:
   1. With the following abilities; scale media, rotate media, adjust brightness, loop output, and input selection.
   2. Input source supports DVI, HDMI, PC, VGA, and S-Video.
   3. Output to Cat5.
   4. Working Voltage: 120 VAC / 240 VAC at 60Hz.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrates and support structure is in place and properly prepared.

B. Verify that required power and data sources are provided.

C. Verify that space is available for centrally located components.

D. Notify Design Agent of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Prepare substrates using the methods recommended by the manufacturer for achieving the best result under the project conditions.

B. Do not proceed with installation until support structure and substrates have been prepared using the methods recommended by the manufacturer and deviations from manufacturer's recommended tolerances are corrected. Commencement of installation constitutes acceptance of conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions .

B. Install message center and signs level and plumb with fasteners recommended by the manufacturer.

C. Custom Mounting: Coordinate with support structure specified in 05 5000 and on the drawings for mounting and support.

D. Record any necessary changes to the system design.

3.04 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. Demonstrate proper operation and maintenance of equipment to Owner's designated representative.

C. Review service and support contacts.

3.05 PROTECTION

A. Protect installed products from subsequent construction operations.

END OF SECTION

SECTION 10 2601
WALL AND CORNER GUARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Corner guards. May be referred to a single word “Cornerguard”.

1.02 RELATED REQUIREMENTS

A. Section 05 5213 - Pipe and Tube Railings.

B. Section 06 1000 - Rough Carpentry: Blocking for wall and corner guard anchors.

C. Section 09 7200 - Wall Coverings: Terminating wall covering at corner guard.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.

C. Samples: Submit two sections of corner guard,12 inches long, illustrating component design, configuration, color and finish.

D. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wall and Corner Guards:
   1. Babcock-Davis: www.babcockdavis.com/sle.
   2. Construction Specialties, Inc: www.c-sgroup.com.
   3. Nystrom, Inc: www.nystrom.com/sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 COMPONENTS

A. Corner Guards - Surface Mounted:
   1. Material: Polyethylene terephthalate (PET or PETG); PVC-free with full height extruded aluminum retainer.
   2. Width of Wings: 2 inches.
   3. Corner: Square.
   4. Color: As selected from manufacturer's standard colors.
   5. Length: One piece.
   6. Preformed end caps.

B. Mounting Brackets and Attachment Hardware: Appropriate to component and substrate.

2.03 FABRICATION

A. Fabricate components with tight joints, corners and seams.

B. Pre-drill holes for attachment.

C. Form end trim closure by capping and finishing smooth.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.

B. Verify that field measurements are as indicated on drawings.

3.02 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members only.

B. Coordinate installation of vinyl fabric wall covering with corner guard frame and cover.

3.03 TOLERANCES

A. Maximum Variation From Required Height: 1/8 inch.

B. Maximum Variation From Level or Plane For Visible Length: 1/8 inch.

END OF SECTION

SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets. May be noted as “FEC” or “FE”.

C. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

1.03 REFERENCE STANDARDS

A. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2013a.

B. FM (AG) - FM Approval Guide; current edition.

C. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.

D. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.

C. Product Data: Provide extinguisher operational features, color and finish, and anchorage details.

1.05 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Extinguishers:
   1. Ansul, a Tyco Business: www.ansul.com.
   2. Kidde, a unit of United Technologies Corp: www.kidde.com.
   3. Nystrom, Inc: www.nystrom.com/sle.

B. Fire Extinguisher Cabinets and Accessories:
   1. JL Industries, Inc: www.jlindustries.com.
   2. Larsen's Manufacturing Co; Product Vertical Duo Clear Acrylic Door with Larsen-Loc: www.larsensmfg.com. Is equal to be matched.
   3. Potter-Roemer: www.potterroemer.com.

2.02 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent. Provide one per cabinet.
   1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.

B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gage.
   1. Class: A:B:C type.
   2. Size: 10 pound.

2.03 FIRE EXTINGUISHER CABINETS

A. Cabinet Construction: Non-fire rated.
   1. Formed primed steel sheet; 0.036 inch thick base metal.
   2. Formed Stainless steel door construction, 0.036 inch metal thickness,.

B. Cabinet Configuration: Semi-recessed type.
   1. Size to accommodate accessories.
   2. Trim: Rolled edge, with 2 inch wide face.
   3. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.

E. Door: reinforced for flatness and rigidity with nylon catch. Hinge doors with continuous piano hinge.

F. Door Glazing: Acrylic plastic, clear, 1/8 inch thick, flat shape and set in resilient channel glazing gasket.

G. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.

H. Weld, fill, and grind components smooth.

I. Finish of Cabinet Exterior Trim and Door: No. 4 - Brushed stainless steel.

J. Finish of Cabinet Interior: White colored enamel.

2.04 ACCESSORIES

A. Extinguisher Brackets: Formed steel, chrome-plated.

B. Extinguisher Theft Alarm: Battery operated alarm, 10 second delay for disarming, activated by opening cabinet door.

C. Cabinet Signage: Fire Extinguisher vertical black.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cabinet plumb and level in wall openings.

C. Secure rigidly in place.

D. Place extinguishers in cabinets.

E. Position cabinet signage at door edge opposite window.

F. See drawings for locations.

END OF SECTION

SECTION 12 4813
ENTRANCE FLOOR MATS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Stainless steel entrance floor gratings. May be referred to as “Walk-off mat” or “Floor Grid”.

B. Recessed mat frames.

1.02 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating properties of walk-off surface, component dimensions and recessed frame characteristics.

C. Shop Drawings: Indicate dimensions and details for recessed frame.
   1. For recessed frames located within a dimensionally restricted area, show dimensions of space within which the frame will be installed.

D. Samples: Submit two samples, 12 by 12 inch in size illustrating pattern, color, finish, edging and texture.

E. Maintenance Data: Include cleaning instructions, stain removal procedures and fastener instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Entrance Floor Grilles and Gratings: Basis of Design
   1. Construction Specialties: https://www.c-sgroup.com/entrance-flooring/entrance-grids/g4

      Type: Peditred SA, Catalog Number: G4
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ENTRANCE FLOOR GRILLES AND GRATINGS

A. Entrance Floor Gratings: Recessed stainless steel bar grating with longitudinal bars running perpendicular to traffic flow and perimeter frame forming sides of recess; grating hinged for access to recess.
   1. Grating: Longitudinal bars 0.09 inch, nominal, in width, spaced at less than twice the bar width apart; cross bars set below for pronounced linear appearance.
   2. Grating Depth: 3/8 inches, nominal.
   3. Recess Depth Below Bottom of Grating: 1 inches.
   4. Length in Direction of Traffic Flow: 24 inches.
   5. Width Perpendicular to Traffic Flow: Full width of entrance door opening.
   6. Frame: Stainless steel for embedding in concrete; minimal exposed trim; stud or hook concrete anchors.
   7. Pan: liner for system by grating manufacturer. Tie into overflow tube drains.

B. Mounting: Top of non-resilient members level with adjacent floor.

C. Structural Capacity: Capable of supporting a rolling load of 1000 pounds without permanent deformation or noticeable deflection.

D. Vibration Resistant Fabrication: All members welded, riveted, or bolted; no snap or friction connections.

E. Warranty: Provide 5 year warranty on grille system.

2.03 FABRICATION

A. Construct recessed mat frames square, tight joints at corners, rigid. Coat surfaces with protective coating where in contact with cementitious materials.

B. Fabricate mats in single unit sizes; fabricate multiple mats where indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that floor opening for mats are ready to receive work.

3.02 PREPARATION

A. Mats: Verify size of floor recess before fabricating mats.

B. Vacuum clean floor recess.

3.03 INSTALLATION

A. Install pan and frames to achieve flush plane with finished floor surface.

B. Install walk-off surface in floor recess flush with finish floor after cleaning of finish flooring.

3.04 TOLERANCES

A. Maximum Gap Formed at Recessed Frame From Mat Size: 1/8 inch.

END OF SECTION

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FIRE PROTECTION

PART 1 - GENERAL

1.01 REFERENCES

A. This is a performance specification. It requires performance of design work, preparation and submission of shop drawings and submittal of all system components, procurement of approvals, and provision of complete functional system of automatic sprinklers. As a result, this Section serves a dual purpose of providing specifications and indicating design criteria for Contractor's use and guidance in designing systems and preparing fabricated sprinkler drawings for approvals from all authorities having jurisdiction.

1.02 SCOPE

A. Work shall include, but shall not be limited to, the following:

1. Modification to the existing wet pipe sprinkler system and all components in accordance with NFPA 13, FM Global Data Sheet 3-26 and 2-0.
2. Sprinkler heads, piping, fittings, hangers and valves to be installed in accordance with NFPA 13, FM Global Data Sheet 3-26 and 2-0.
3. Preparation of complete and detailed Shop Drawings in accordance with NFPA 13, FM Global Data Sheet 3-26 and 2-0.
4. Preparation of complete and detailed working plans in accordance with NFPA 13, FM Global Data Sheet 3-26 and 2-0.
5. Submitting drawings and obtaining necessary approval, permits and certificates.
6. Tests.
7. Removal and relocation of existing Fire Department Connection.
8. New post type Fire Department Connection
9. Hydrant flow test.
10. Hydraulic calculations.
11. Miscellaneous steel support.
12. Assisting the Owner in preparing a fire protection impairment plan.
13. Coordination drawings.

1.03 CONTRACT DOCUMENTS

A. Work to be performed under this Section is in conjunction with work shown on the Drawings.

1.04 RELATED WORK IN OTHER SECTIONS

A. The following work is not included in this section and will be performed under other Sections.

1. Fire alarm system and controls.

1.05 SUBMITTALS

A. Materials and equipment requiring Shop Drawing Submittals and/or individual sheet submittals shall include, but not be limited to:

1. Wet pipe sprinkler system and all components including pipe, fittings, sprinkler heads, etc.
2. Manufacturers recommended design/installation instructions

B. Definitions

1. Shop Drawings are information prepared by the Contractor to illustrate portions of the work in more detail than shown in the Contract Documents.

2. Coordination Drawings are detailed, large-scale layout Shop Drawings showing HVAC, Electrical, Plumbing and Fire Protection work superimposed in order to identify conflicts and ensure inter-coordination of Mechanical, Electrical, Architectural, Structural and other work.

3. Individual Submittal sheets are manufacturer cut-sheets that are detailed in nature and provide all necessary “technical” information (i.e. physical size, operating weight and/or pressure, compatibility, color, etc.).

C. Submittal Cover Sheet

1. Shop Drawings shall be submitted according to specification section with a separate cover sheet completed for each product, rather than one cover sheet for multiple products, whether or not supplied by one manufacturer or vendor.

D. Submittal Procedures and Format

1. Review submittal packages for compliance with the Contract Documents and then submit to Architect for review.

2. Provide additional copies of reviewed shop drawings as required for full distribution.

3. Shop Drawings showing layouts of systems shall contain sufficient plans, elevations, sections, details and schematics to describe work clearly. They shall be ¼” = 1’ – 0” scale unless specified otherwise. Fire Protection shop drawings shall be 1/4” = 1’ – 0 and shall indicate work of other sections where interferences are possible. Provide larger scale details as necessary. Fire Protection drawings shall show elements of Architects reflected ceiling plan, sprinkler heads, walls, partitions, pipes, equipment and sleeves and other aspects of construction as necessary for coordination.

4. Shop drawings showing manufacturer’s product data shall contain detailed dimensional drawings, accurate and complete description of construction materials, manufacturer’s published performance characteristics and electrical requirements. Drawings shall clearly indicate location of all drops and rises, the size of all pipe and other information necessary to demonstrate compliance with all requirements of Contract Documents.

5. Provide shop drawing submittals showing details of all equipment. If equipment

submittals are not submitted and equipment is found to be installed incorrectly in the field, this contractor shall reinstall them within the original contract price.

E. Acceptable Manufacturers

1. Alternate Manufacturers are acceptable only if, as a minimum, they:

   a. Meet all performance criteria listed in the schedules and outlined in the specification.
   b. Have identical operating characteristics to those called for in the specification.
   c. Fit within the available space it was designed for, including space for maintenance and component removal, with no modification to either space or the product. Clearances to walls, ceilings and other equipment shall be at least equal to those shown on the design drawings.
   d. Fit within the specified design criteria.

F. Deviations

1. Concerning deviations other than substitutions, proposed deviations from Contract Documents shall be requested individually in writing whether deviations result from field conditions, standard shop practice, or other cause. Submit letter with transmittal of Shop Drawings, which flags the deviation to the attention of the Architect.

2. Without letters flagging the deviation to the Architect, it is possible that the Architect may not notice such deviation or may not realize its ramifications. Therefore, if such letters are not submitted to the Architect, the contractor shall hold the Architect and his consultants harmless for any and all adverse consequences resulting from the deviations being implemented. This shall apply regardless of whether the Architect has reviewed or approved shop drawings containing the deviation, and will be strictly enforced.

3. Approval of proposed deviations, if any, will be made at the discretion of the Architect.

G. Responsibility

1. Intent of Submittal review is to check for capacity, rating, and certain construction features. Contractor shall ensure that work meets requirements of Contract Documents regarding information that pertains to fabrication processes or means, methods, techniques, sequences and procedures of construction; and for coordination of work of this and other Sections. Work shall comply with submittals marked “REVIEWED” to extent that they agree with Contract Documents. Submittal review shall not diminish responsibility under this Contract for dimensional coordination, quantities, installation, wiring, supports and access for service, nor shop drawing errors or deviations from requirements of Contract Documents. The Architect’s noting of some errors while overlooking others will not excuse the contractor from proceeding in error. Contract Documents requirements are not limited, waived nor superseded in any way by review.

2. Inform subcontractors, manufacturers, suppliers, etc. Of scope and limited nature of review process and enforce compliance with contract documents.

H. Schedule

1. Incorporate shop drawing review period into construction schedule so that work is not delayed. Contractor shall assume full responsibility for delays caused by not incorporating the following shop drawing review time requirements into his project schedule. Working days listed reference the time in the Engineer's office. It does not include transmittal time for review each time shop drawing is submitted or resubmitted.

I. List of Proposed Equipment and Materials

1. Within four weeks after Award of Contract and before ordering materials or equipment, submit complete list of proposed materials and equipment and indicate manufacturer's names and addresses. No consideration will be given to partial lists submitted out of sequence.

1.06 DESIGN CRITERIA

A. Provide wet-pipe sprinklers in all areas.

B. Secure waterflow test data taken from fire hydrants nearest site. If recent flow test data is not available from city records, make necessary tests as required by NFPA Standards to determine character of water supply. Minimum of 20 psi drop in pressure between static and residual pressure shall be required in order to obtain accurate data.

C. Design sprinkler system in accordance with NFPA 13 requirements and FM Global Data Sheet 2-0 and 3-26.

D. Design sprinkler system in office areas by the following light hazard criteria:

1.	Density	0.1 gpm / sq. ft.
2.	Sprinkler spacing	225 max
3.	Hose allowance	100 gpm

E. Run piping horizontally and at right angles to walls and ceilings. Center sprinkler heads with respect to ceiling components, such as ceiling grid, lighting fixtures, HVAC diffusers and speakers, as directed by Architect.

F. Fire Protection system shop drawings shall include separate and complete reflected ceiling plans indicating location of each sprinkler head, as well as piping layouts. Provide additional sprinkler heads (over code minimum quantities) if requested by Architect, to obtain symmetrical ceiling layouts.

G. Add 10 psi safety factor to hydraulic calculations for a cushion against future pipe main deterioration.

H. Provide test connections at highest point of main portion of each sprinkler system with 1" pipe and valve. Test pipe shall be connected to sprinkler pipe at least 1 – ¼" in size and shall discharge outside building through ½" smooth bore brass outlet, where it can be easily seen.

I. Provide sprinklers in all areas except where exempted by code of AHJ.

1.07 FIRE PROTECTION FABRICATION DRAWINGS

A. Submit working plans signed and sealed by professional engineer registered in Rhode Island to the Engineer and Authorities Having Jurisdiction.

B. Submit fabrication drawings to indicate actual sprinkler system piping layout to the Architect/Engineer.

C. Submit Fabrication plans in one complete package. When it is not possible to submit entire system design in one package due to job conditions, submit plans of entire building indicating area not yet defined.

D. Fabrication plans shall be at least 1/8” = 1” scale on sheets of uniform size. Fabrication

E. Plans shall show all data required by NFPA 13, FM Global Data Sheet 3-26 and 2-0.

F. Fabrication Plans will be subject to Architect’s final approval. Submit to Architect after review by other authorities. If necessary to submit plans to Architect before review by other authorities, identify authorities that have not reviewed plans and resubmit for final approval when review by all parties is complete.

G. Pipe sizing shall be based on Hydraulically Designed System for fire protection, sprinkler and/or combination systems.

H. Fire Protection contractor shall provide piping layout on measured drawings. For renovation projects, this may require Contractor to field survey existing building and prepare reproducible drawings on which to show building background and all Fire Protection work.

I. Fabrication Plans shall show all hangers and supports from floors, walls, underside of slabs and structural steel members. Where piping cannot be supported from walls or slabs, contractor shall provide additional structural steel bracing to support pipe.

1.08 UNIT PRICES

A. Subcontractor shall list the following unit prices in bid proposal, which shall include the complete installation (labor and materials) for each item:

1. Cost for addition of flush pendant head.
2. Savings or deduction for eliminating a sprinkler head.

B. Above prices shall include 10 feet of 1” piping, connection, sprinkler heads, fittings, hangers, labor, drawing involvement, and any other associated costs for the addition or deletion of a sprinkler head.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS

A. Piping shall meet applicable ANSI or ASTM standards requirements and shall have manufacturer's name and standard marked on each length. Joints shall meet applicable ANSI or ASTM standards requirements. Where ANSI or ASTM standard does not exist, joints and fittings shall bear UL listing symbol.

Pipe Material Specification Index					
Service	**Code**	**Pressure Rating (psig)**	**Temperature Rating (ºF)**	**Class**	**Material**
Wet Pipe Sprinkler and Standpipe	SP1	175	70	F11	Carbon Steel
General Material Notes: System components shall be rated for the maximum working pressure to which they are exposed, but not less than 175 psig. Pipe, tube valves and fittings shall meet or exceed ASTM/ANSI standards listed in the National Fire Protection Pipe, Codes and specifically in NFPA-13, FM Global Data Sheet 3-26 and 2-0. All threaded piping and fittings shall conform to thread cuts listed in American Welding Society document D10.9, Levels AR-3.					

Pipe Class F11 Item	**2" and smaller**	**2 ½" and larger**
Pipe	Welded or seamless black steel pipe conforming to ASTM/ASTM A135.	Welded or seamless black steel pipe conforming to ASTM A53 Schedule 40 or Schedule 10. ASTM A120 ANSI/ASTM A135.
Fittings	Cast Iron Class 125 fittings ANSI/ASME B16.1 and screw fittings per ANSI/ASME B16.4. Mechanical grooved couplings with malleable iron housing clamps to engage and lock, "C" shaped composition sealing gasket, steel bolts, nuts and washers.	Cast Iron Class 125 fittings ANSI/ASME B16.1 and screw fittings per ANSI/ASME B16.4. Mechanical grooved couplings with malleable iron housing clamps to engage and lock, "C" shaped composition sealing gasket, steel bolts, nuts and washers.
Joints	Roll groove, cut groove or thread. Apply joint compound or Teflon tape to male pipe threads on threaded systems.	Weld, roll groove, or thread. Apply joint compound or Teflon tape to male pipe threads on threaded systems. Welding procedures shall conform to the requirements of AWS D10.9, level AR3.
Flanges	Flanges shall be plain faced and shall be CI 150 and shall conform to ANSI B16.5.	Flanges be plain faced and shall be CI 150 and shall conform to ANSI B16.5
Gaskets/Bolts	Gaskets shall be full-face rubber 1/8 in. thick. Bolts and nuts shall conform to ANSI B18.2.1 and B18.2.2 respectively.	Gaskets shall be full-face rubber 1/8 in. thick. Bolts and nuts shall conform to ANSI B18.2.1 and B18.2.2 respectively.

Notes:

1. Pipe material and fittings shall meet the standards set forth for pipe and tube in the National Fire Code NFPA 13 Section 2-3, FM Global Data Sheet 3-26 and 2-0.

2.02 HANGERS, ANCHORS, CLAMPS, AND INSERTS

A. Hangers shall meet NFPA Standards, FM Global Data Sheet 3-26 and 2-0. Provide adjustable swivel rings for piping 3" and smaller.

B. Adjustable clevis hangers for 4" and larger piping. Support piping from building structure, to maintain required grade, and pitch, of pipelines, prevent vibration secure piping in place. Secure hangers to inserts where practical. Hanger rods shall have machine threads.

C. Hanger rods shall be connected to beam clamp, UL Listed concrete inserts or Phillips or approved equal expansion shields. Ramset or power driven inserts will not be allowed.

D. Hanger spacing shall meet requirements of state and local codes.

E. Pipe supports, vertical and horizontal, shall bear on sleeves.

2.03 SPRINKLER HEADS

A. Provide UL-listed and/or FM-approved, quick response sprinkler heads.

B. Heads shall have ordinary degree temperature ratings, except in areas subject to abnormal heating conditions, where sprinkler heads shall have temperature ratings high enough to prevent discharge. Minimum fusing shall be 165ºF.

C. The following table indicates head types:

Sprinkler Head Specifications

PART 1 - Equipment Tag		
Quick Response Standard Coverage Recessed Pendent	Finish: Temperature Rating: Link: Orifice coefficient: Approvals:	Chrome (coordinate with Architect) 155ºF Glass Bulb Per hydraulics UL, FM Local AHJ

2.04 SPRINKLER CABINET

A. Provide enameled steel sprinkler cabinet with approved number of sprinkler heads as required by NFPA. Provide appropriate sprinkler wrench with each type of head in each cabinet.

2.05 SLEEVES AND PENETRATIONS

A. Pipe Sleeve Materials
   1. Sleeves through partitions and non-fire rated construction shall be 26-gauge, galvanized steel with lock longitudinal seams, or approved plastic pipe.

B. Packing for sleeves that do not require maintenance of fire rating shall be oakum, silicate foam, ceramic fiber or mineral fiber with approved sealant. Pack or foam to within one inch of both wall surfaces. Seal penetration packing with approved caulking and paintable waterproof mastic surface finish or silicone caulking.

C. Wall and floor penetration firestops shall be UL listed, FM approved.

PART 3 - EXECUTION

3.01 SPECIAL RESPONSIBILITIES

A. Cooperate and coordinate with work of other Sections in execution work of this Section.

B. Verify conditions and take field measurements as required to ensure work shall fit actual conditions. Field corrections to fabricated work and adjustments to adjacent work where required for proper installation of work shall be subject to Architect's approval. Corrections and adjustments shall be permitted only when not detrimental to appearance and function of work.

C. Coordinate final sprinkler system inspection with engineer of record, local authorities and FM Global.

3.02 SHUT DOWNS

A. Work with Owner in maintaining integrity of new or existing fire protection system. Coordinate and minimize any and all shut downs of fire protection system as follows:

1. Give proper notice to Owner when making shut downs, a minimum of two full weeks.

2. Perform any duties required as by Owner when making a shut down.

3. Fill out a shut down notice form answering all items requested such as time and location of shut down, systems affected, areas affected, etc. when requesting a shut down.

4. Provide fire watch as required during a shut down.

5. Duration of shut downs shall be kept to a minimum.

6. Coordinate work with fire alarm contractor for shut-downs.

7. This contractor is to pay all costs associated with shut-downs.

8. In no case shall the fire protection system be shut down during off hours of workday without a fire watch.

9. System shall be returned to normal operating conditions at end of workday.

3.03 TESTS

A. Test sprinkler system as required by NFPA Code, Fire Underwriters, Factory Mutual and agencies that have jurisdiction.

B. All test shall be witnessed by FM Global representative.

C. Test sprinkler system under pressure of 200 psi for two hours. Correct defects and leaks.

D. Submit written approval of tests from authorities that have jurisdiction over installation to Owner before Final Acceptance of work.

E. Notify Architect and various departments and bureaus 48 hours before tests are to be made.

F. Operating test of sufficient duration shall be made for systems, equipment, fixtures and accessories to Owner's satisfaction.

G. If inspection or test shows defects, such defective work or material shall be replaced and inspection and tests shall be repeated. Repairs to piping shall be made with new material.

H. Final acceptance of sprinkler installation will be subject to final inspection by FM Global, completion of FM Global Form 85A, Contractors Material & Test Certificate for Aboveground Piping, and FM Global witnessing all sprinkler system water flow alarm testing. Sprinkler acceptance will be verified by a FM Global Field Engineer during the a scheduled visit.

3.04 PIPE IDENTIFICATION

A. Provide color-coded pipe identification markers. Pipe markers shall be snap-on laminated plastic with acrylic coating. Pipe markers shall be applied after Architectural painting.

B. Provide arrow marker with each pipe content marker to indicate direction of flow. If flow can be in either direction, use double-headed arrow marker.

C. Mains shall be labeled at points of entrance and exit from mechanical room, next to valves, on risers, at tee fittings, at points of entrance and exit from building, at least once in each room, and at intervals not longer than 20'.

D. In general, 2" high legend shall be used for pipe lines 4" diameter and larger, and ¾" high legend shall be used for pipe lines 3" diameter and smaller.

E. Markers shall be Seton Setmark or approved equal.

F. Color banding shall meet latest ANSI and OSHA requirements.

G. Markers shall have legend and with black letters:

Service	Legend	Background Color
Sprinkler	Sprinkler	Red

3.05 ANCHORS AND INSERTS

A. Inserts shall be UL-listed and FM-approved and shall be steel of type to receive machine bolt head or nut after installation. Inserts shall permit adjustment of bolt in one horizontal direction and shall develop strength of bolt when installed properly cured concrete.

B. Provide anchors as necessary for attachment of equipment supports and hangers.

END OF SECTION

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SECTION 23 00 00

HEATING, VENTILATING AND AIR CONDITIONING

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

A. All sections of Division I General Condition requirements shall hereby be made part of this section of the specification.

B. Examine all drawings and all other sections of the specification for the requirements for the work of this section.

C. All work shown in the drawings and specifications shall be included under the base bid, except where there is specific reference to exclusion and incorporation in other quotations.

D. HVAC work is indicated diagrammatically. Exact locations of all components shall be determined in the field and by actual building conditions. Equipment or ducts interfering with other installations shall be relocated as required at no additional cost to the owner.

1.02 DESCRIPTION OF WORK

A. The HVAC scope for this project includes generally, but is not limited to the following:

1. Low pressure ductwork distribution systems
2. Double-wall duct systems
3. Ductwork insulation systems
4. Packaged rooftop heat pump unit (ground mounted).
5. Testing and balancing – Air systems
6. Controls tie-in with existing BAS
7. Design of double-wall, duct support and restraint systems. The Contractor shall hire a licensed Professional Engineer to design such systems, provide the necessary calculations for the Engineers review, and stamp the drawings. All these services shall be included in the Contractor's initial bid. No additional payments or charges will be allowed.

1.03 CODES, PERMITS, AND INSPECTIONS

A. All work shall meet or exceed the latest requirements of all national, state, country municipal and other authorities exercising jurisdiction over construction work of the project.

B. All required inspection certificates shall be obtained, paid for, and made available at the completion of the work. Municipal permit and inspection fees are waived although all applicable permits and inspections are required.

C. Any portion of the work, which is not subject to the approval of an authority having jurisdiction, shall be governed by the applicable sections of the overall National Fire Protection Association.

D. Installation procedures, methods, and conditions shall comply with the latest requirements of the Federal Occupational Safety and Health Act (OSHA).

1.04 GUARANTEES AND CERTIFICATIONS

A. The HVAC contractor shall guarantee work in writing for one year from date of final acceptance against defects in materials, workmanship and installation. The HVAC contractor shall correct defective work at no additional cost to the owner and provide equipment warranties to the owner in full force. Provide five-year warranty for compressors. See product specification paragraphs for more information on warranties.

B. Certification shall be submitted attesting to the fact that specified performance criteria are met by all items of heating and air conditioning equipment.

1.05 SHOP DRAWINGS AND OTHER INFORMATION REQUIRED

A. Prior to purchasing any equipment or materials, six (6) copies of complete submittals shall be submitted for review, including the following minimum information:

1. Drawings, dimensions, and weights.

2. Minimum clearances for proper operation and service.

3. Minimum performance data as required by the drawings and specifications. Submitted information shall include symbols shown on drawing EF-1, RTU-1, etc. The purpose of showing the symbols is identification which specified product is submitted for review. Without proper symbols indicated, the submittals will not be reviewed.

B. Prior to assembling or installing the work, the following shall be submitted for review:

1. Scale drawings showing all piping and duct runs with sizes and elevations shown on composite drawings with indication of coordination with other trades. This submission shall consist of 3 paper prints. If requested by General Contractor, AutoCad files of MEP/FP drawings will be made available for a cost of $50.00 per drawing. Files will be made available after General Contractor signs a WB&A disclaimer provided by WB&A.

2. Catalog information, factory assembly drawings and field installation drawings as required for a complete explanation and description of all items of equipment.

Note: The HVAC contractor shall provide a duplicate copy of the operating manuals for all controls, a duplicate copy of the maintenance manuals for all equipment and controls, and reduced scale drawings showing the HVAC distribution system.

1.06 SEPARATION OF WORK BETWEEN TRADES

A. The following items shall be furnished and installed by the HVAC contractor:

1. Motors for mechanical equipment
2. Controls for mechanical equipment
3. Hoisting and rigging
4. Fastenings and supports
5. Roof opening flashing
6. Field touch up painting of damaged shop coats
7. Rubbish removal

B. The following items shall be furnished and installed by other trades:

1. Cutting of openings in floor, walls and roof
2. Concrete pads for equipment
3. Power for HVAC equipment

C. The Heating, Ventilating and air Conditioning Trade is required to supply all necessary supervision and coordination information to any other trades who are to supply work to accommodate the Heating, Ventilating and Air Conditioning installations.

1.07 EQUIPMENT AND MATERIALS

A. All equipment and materials shall be new and without blemish or defect.

B. It is the intent of these specifications that wherever a manufacturer of a product is specified, and the terms “other approved” or “or approved equal” or “equal” are used, the substituted item must conform in all respects to the specified item.

C. Substituted equipment or optional equipment where permitted and approved, must conform to space requirements. Any substituted equipment that cannot meet space requirements, whether approved or not, shall be replaced at the Contractor's expense. Any modifications of related systems as a result of substitutions shall be made at the Contractor's expense.

1.08 INTERPRETATION OF THE DRAWINGS AND SPECIFICATIONS

A. As used in the drawings and specifications for this work, certain non-technical words shall be understood to have specific meanings as follows regardless of indications to the contrary in the general conditions or other documents governing the work.

“Furnish”: Purchase and deliver to the project site complete with every necessaryappurtenance and support, all as part of this work. Purchasing shall include payment of all sales taxes and other surcharges as may be required to assure that purchased items are free of all liens, claims or encumbrances.

“Install”: Unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project, all as part of this work.

“Provide”: “Furnish” and “Install”.

“New” : Manufactured within the past two years and never before used.

B. Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of any item in the drawings or specifications for this work carries with it the instruction to furnish, install and connect the items as part of the work, regardless of whether or not this instruction is explicitly stated.

C. To the extent that they govern the basic work, the specifications also govern change order work.

D. No exclusion from, or limitation in, the symbolism used on the drawings for this work or the language used in the specifications for this work shall be interpreted as a reason for

omitting the appurtenances or accessories necessary to complete any required system or item of equipment.

E. The drawings for this work utilize symbols and schematic diagrams which have no dimensional significance. The work shall, therefore, be installed to fulfill the diagrammatic intent expressed on the drawings, but in conformity with the dimensions indicated on the final working drawings; field layouts and shop drawings of all trades.

F. Certain details appear on the drawings for this work which are specific with regard to the dimensions and positioning of the work. These are intended only for general information purposes. They do not obviate field coordination for individual items of the indicated work.

G. Information as to general construction and architectural features and finishes shall be derived from structural and architectural drawings and specifications only.

H. The use of words in the singular shall not be considered as limiting where other indications denote that more than one item is referred to.

1.09 COORDINATION

A. Work shall be performed in cooperation with other trades on the project and so scheduled as to allow speedy and efficient completion of the project.

B. This Contractor shall furnish to other trades advance information on locations and sizes of all frames, boxes, sleeves, and openings needed for his own work, and also furnish information and shop drawings necessary to permit trades affected by this Contractor's work to install their work properly and without delay.

C. Where there is evidence that work of this Contractor will interfere with the work of other trades, this Contractor shall assist in working out space conditions to make satisfactory adjustments.

D. This Contractor shall, with the approval of the Engineer and without extra cost to the Owner, make modifications in his work as required by structural interference. This Contractor shall pay all expenses to the General Contractor for additional openings, or relocating or enlarging existing openings through concrete floors, walls, beams and roof required for this work which was not properly coordinated.

E. If this Contractor installs his work before coordinating with other trades so as to cause interference with the work such trades, he shall make all necessary changes in his work to correct the conditions without extra cost to the Owner.

F. This Contractor shall visit the site to ascertain and apprise himself of the actual field conditions under which the work has to be performed. All work shown on the drawings is diagrammatic in nature and their actual location and elevation shall be verified in the field. Any deviations necessary as a result of field interferences shall be brought to the attention of the Engineer and resolved expeditiously, at no additional cost to the Owner.

G. The Contractor shall protect all materials and work of other trades form damage that may be caused by his work and shall be responsible for repairing any damages without extra cost to the Owner.

H. Sleeves, inserts, anchor bolts and similar items set into the masonry structure or the work of other trades shall be furnished and installed by this Contractor. This Contractor shall

be responsible for all such items necessary to hanged or support his equipment.

I. When, in order to accommodate this Contractor's work, finished materials and work of other trades must be cut or fitted in the shop this Contractor shall furnish the necessary drawings for transmittal to the trades whose materials must be cut or fitted.

J. Cutting, coring, drilling and patching of holes and openings for the work of sub-trades shall be performed by the particular subcontractor when the largest dimension of the opening is less than 4.5 inches. If the largest dimension of the opening is 4.5 inches or more, the General Contractor shall perform the cutting and patching for the work of the subcontractor. For cutting and patching see Section 01045.

K. Exact location of diffusers, grilles and thermostats shall be approved by the architect before their installation. See architect's drawings for more information.

L. All piping and ductwork shall be insulated as per code. Weather proof material over the insulation shall be provided on components exposed to outside

M. All work shall be installed so that parts requiring periodic inspection, operation, maintenance and repair are readily accessible. Minor deviation from the drawings may be made to accomplish this, but changes of substantial magnitude shall not be made prior to written approval from the Engineer. The contractor shall determine locations of all access panels required for the project. Locations shall be coordinated with the General Contractor and approved by the Architect. Access panels shall be furnished by HVAC trade and installed by General Contractor.

PART 2 - PRODUCTS

2.01 SHEET METAL DUCTWORK

A. Reference Standards

1. Material, construction and installation shall meet requirements of most recent editions of the following standards and references, except for more stringent requirements specified or shown on Drawings.

Standard	As Applicable to
SMACNA HVAC Duct Construction Standards (Metal and Flexible)	Sheet Metal Ductwork; Duct Liners; Adhesives; Fasteners; Flexible Ductwork
SMACNA HVAC Air Duct Leakage Test Manual	Duct Leakage Testing
NFPA 90A	Fire Dampers; Fire Resistance Standards for Ducts and Liners
SMACNA Guidelines for Welding Sheet Metal	Welded Galvanized, Black Iron and Stainless Steel Ductwork

B. General

1. Provide supporting and hanging devices necessary to attach entire HVAC system including ductwork and equipment, and to prevent vibration.

2. Provide vertical and horizontal supports as required by codes to meet minimum applicable earthquake resistance standards.

3. Ductwork shall be free from vibration under all conditions of operation.

4. Dimensions shown on Drawings for lined ductwork are net inside dimensions. Increase ductwork to accommodate lining requirements.

5. Pipe or conduit crossing duct

a. No pipe, conduit, hanger, Architectural element nor structural member shall pass through duct without Architect's written approval.

b. Where it is impossible to re-route pipe or conduit and when written approval has been obtained, increase duct size to maintain constant cross-sectional area at point of interference. Provide streamlined enclosure for pipe or conduit, as illustrated in SMACNA.

6. When making offsets and transformations necessary to accommodate structural conditions, preserve full cross-sectional area of ductwork shown on Drawings.

7. Ductwork Construction

a. All ductwork systems shall be constructed and sealed in accordance with SMACNA standards for the specified pressure-velocity classifications.

b. Ductwork systems shall have pressure-velocity classifications as follows:

Duct System	Material	SMACNA Pressure Class	Press	SMACNA Seal Class	Velocity (FPM)	Method of Construction
Supply and return ductwork for low pressure systems (Interior Only)	Galvanized Steel	2”	Pos / Neg	B	<2500	Ductmate Or Equal
Double-wall duct systems (Exterior Only)	Inner Liner: Galv. Steel Outer Jacket: Aluminim Provide R=12 Insulation	2”	Pos/ Neg	B	<2500	Factory System

8. Support

a. Space hangers as required by SMACNA (8 ft max) for horizontal duct on 8 ft. centers, unless concentrated loadings require closer spacing.

b. Support vertical duct on each floor or slab it penetrates.

c. Supports for ductwork and equipment shall be galvanized unless specified otherwise.

9. Connections

a. Connect inlets and outlets of heat recovery units and fans to ductwork with flexible connections unless fan has vibration isolator mounts inside unit with flexible connections.

b. Indoors, flexible connections shall be neoprene-coated fibrous glass fire retardant fabric, by Ventfabrics, or Durodyne. Outdoors, flexible connections shall be Dupont hypalon-coated fibrous glass fire-, weather-, and UV-resistant by Ventfabrics or Durodyne.

c. Secure flexible connections tightly to air handlers with metal bands. Bands shall be same material as duct construction.

d. Connections from trunk to branch ducts shall be as detailed on Drawings.

10. Construction

a. No sharp metal edges shall extend into air streams.

b. Install drive slips on air-leaving side of duct with sheet metal screws on 6" centers.

c. Spin in collars shall NOT be used.

11. Joints

    a. Longitudinal lock seams shall be double-locked and flattened to make tight joints.

    b. Make transverse joints, field connections, collar attachments and flexible connections to ducts and equipment with sheet metal screws or bolts and nuts. Do not use rivets and staples.

12. Prefabricated Transverse Duct Joints

    a. Transverse joints in galvanized sheet metal ductwork may be made with galvanized gasketed frame and angle duct joint system by Ductmate, TDF, TDC, or approved equal. Angles shall be at least 20 gauge. Prefabricated transverse duct joints shall not be used for duct 16 GA. and heavier, nor for duct 23 GA. or lighter.

    b. Secure angles to duct with screws (using clutched arbor) or spot-welds spaced as recommended by manufacturer for duct pressure class.

13. Elbows and Bends

    a. Elbows and bends for rectangular ducts shall have centerline radius of 1.5 times duct width wherever possible. Elbows for grease exhaust shall be full radius. Turning vanes and mitered elbows are not allowed in grease ducts.

    b. Where centerline radius is less than 1.5 times duct width (on supply, return and exhaust ductwork), elbows shall be radius throat with radius heel and full length splitter vanes when required. When centerline radius (r) divided by the duct width (w) is less than 1.5, provide the following number of splitter vanes: r/w between 1.49 and 0.7 = 1; r/w between 0.69 and 0.6 = 2; r/w between 0.59 and 0.55 = 3. Minimum inside radius (not centerline) shall be 2". Install vanes in accordance with SMACNA.

    c. For round ductwork provide stamped elbows, with centerline radii equal to 1-1/2 times duct diameter, or gored elbows as follows:

Elbow Angle	No. of Gores
0 –36	2
37 –72	3
73 –90	5

14. Plenums and connections to louvers:

    a. Shall be 18 ga. minimum cross-broken and properly reinforced with galvanized angle irons to SMACNA requirements.

    b. Shall have bottom and corner seams soldered watertight at least 12" up from bottom.

    c. Shall have neoprene gaskets or other non-corrosible material to make connections to louvers watertight.

d. Shall pitch connection back towards the louver. Provide half-coupling drain connection at bottom of plenum unless noted otherwise. Pipe drain to nearest floor drain.

e. Shall have unused portions of louvers blocked-off with sheet metal; sealed air- and water-tight; insulated with 2" thick 6-lb. density rigid or board insulation.

15. Flexible Ductwork

a. Flexible ductwork, connecting to uninsulated or unlined duct, shall be vinyl coated fiberglass cloth 0.0057" minimum thickness, 25 strands per inch minimum thread count with corrosion-resistant helical wire reinforcement. Flex duct shall be U.L. rated for 12" W.C. positive pressure, 2" W.C. negative pressure with a maximum velocity of 4000 FPM. Flexduct must be listed as a Class 1 Connector according to UL 181 and shall meet the requirements of NFPA 90A - maximum ASTM E-84 fire hazard rating shall be 25 flame spread, 50 fuel contributed and 50 smoke developed. Uninsulated flexible duct shall be equivalent to Flexmaster Type 4.

b. Flexible duct connected to insulated or lined duct shall be insulated with 1-1/2", 1/2 lb. density fiberglass insulation and flame retardant (UL Listed) vapor barrier, meeting ASTM E-84 rating.

c. Submittals shall include data on core, in addition to other data listed above required to ensure that submitted product meets the requirements of these specifications.

d. If flexduct other than the models listed above is submitted, a sample of the flex shall be submitted to the Architect. The Architect shall have sole discretion in determining whether the submitted flex is equivalent to that of the named above.

e. Flexible duct shall be airtight, triple lock mechanically spiral formed with spiral corrugation. Material shall be 3003 zero temper aluminum, .0065" minimum thickness.

f. Provide sealing compound and metal draw bands for installation. See further paragraphs in this specification, and details for other installation requirements.

C. Volume Dampers

1. Provide volume dampers at all branch supply air take-offs.

2. Provide manual adjustable volume dampers, with extended mount indicating and locking quadrants:

a. On each supply, return and exhaust duct take-off.

b. At each take-off to register, grille or diffuser (these are not shown on the drawings). Volume damper shall be as far away from diffuser or grille as possible for system balancing.

3. Dampers shall be ½" smaller in both dimensions or 1" smaller diameter than size of duct in which they are installed; e.g., use 23-½" by 23-½" damper for 24" square duct.

4. Dampers larger than 12" in height shall be opposed multi-blade.

5. Damper blades shall be two gauges heavier than adjoining ductwork, and shall be riveted to supporting rods. Hem over edges parallel to rods.

6. Brackets shall be galvanized metal, secured to ductwork with sheet metal screw with locking quadrant arms (see seal class section for additional requirements). Provide 2" handle extension for all dampers on externally insulated ductwork.

D. Diffusers, Registers, and Grilles

1. Provide steel diffusers, registers and grilles for supply, return and exhaust outlets, of size, type and design shown on Drawings. Acceptable manufacturers shall be Titus, Metalaire, Nailor, or approved equal.

2. Equipment shall be tested and rated per ASHRAE 91-70.

3. Equipment shall handle air quantities at operating velocities:

   a. With maximum diffusion within space supplied or exhausted.

   b. Without objectionable air movement as determined by Architect.

   c. With sound pressure level not to exceed NC 30 or as specified on Drawings.

4. Supply, return and exhaust outlets shall have opposed blade volume dampers operable from front.

5. Supply registers shall have two sets of directional control blades.

6. Diffusers within same room or area shall be of same type and style to provide Architectural uniformity.

7. Surface mount diffusers, registers and grilles shall be furnished with gaskets and installed with faces set level and plumb, tightly against mounting surface.

8. Finish shall be as directed by Architect.

9. Coordinate diffusers, registers and grilles with ceiling and wall construction. Refer to Architectural Drawings for exact lengths and for framing and mitering arrangements that may differ from those shown on HVAC Drawings.

2.02 ACOUSTICAL DUCT LINING

Provide 1" thick acoustical lining by Certain-Teed, Knauf, Owens Corning or Johns Manville for following ductwork: ***Return air plenum only.***

A. Increase duct dimensions to accommodate lining while maintaining inside clear dimensions shown on the drawings.

B. Materials and installation shall meet following standards, as applicable:

1. NFPA-90A, UL723, NFPA-255

2. SMACNA Duct Liner Applications Standard

3. SMACNA Mechanical Fasteners Standard

4. Adhesive and Sealant Council: Adhesives Standard for Duct Liner - ASC-A-7001A

   a. ASTM E-84 fire hazard classifications of 25 flame spread, 50 smoke developed, and 50 fuel contributed.

C. Lining shall be as follows:

Lining for	**Material**	**Minimum NRC**	**Maximum K-Factor at 75°F Mean**
Low Pressure Ductwork	Black, matfaced, 2 pound density, flexible glass	0.75	0.24
Medium And High Pressure Ductwork	Black, matfaced, 3 pound density, rigid board	0.75	0.23

D. Duct liner shall be installed without interruptions or gaps, using 100% coverage of adhesive and mechanical fasteners. Mechanical fasteners shall be welded or secured mechanically to duct on 12" maximum centers.

E. Cut liner to ensure overlapped and compressed longitudinal joints at corners. Transverse joints in liner shall abut precisely. Seal joints against fiber entrainment with approved adhesive, as recommended by manufacturer. Use sheet metal nosing at beginning of lining (in direction of flow) to minimize erosion.

F. Friction coefficient correction factor at 1000 FPM shall be no greater than 1.1. Liner shall be Certain-Teed Ultra Liner, Knauf Duct Liner M or Manville Linacoustic. Other liners from these manufacturers with friction coefficient correction factors greater than listed above are not acceptable.

G. Mylar used for vapor barrier shall meet ASTM E-84 classification.

H. Any cut liner due to duct takeoffs and branches shall be totally sealed at edges (with sheet metal nose pieces) to prevent entrainment of loose fibers.

2.03 FLEXIBLE CONNECTIORS

A. Provide flexible connectors at supply and return air connections at HP-1.

B. The flexible connections shall be a maximum of 12" long and held in place with heavy metal bands, securely attached, to prevent any leakage at the connection points.

C. Flexible connections shall be fabricated from approved flame proved fabric conforming to 90A of the NFPA Asbestos cloth is not permitted.

2.04 ESCUTCHEONS AND DUCT COLLARS

A. Provide adjustable escutcheons on exposed piping that passes through finished floors, walls and ceilings. Escutcheons shall be chromium-plated cast brass, sized to cover sleeve opening and to accommodate pipe and insulation.

B. Provide 4" wide 20 gauge galvanized sheet metal collars at sleeves and prepared openings, sized to cover entire duct penetration including sleeve and seal, and to accommodate duct and insulation as necessary. Edges shall have milled lips ground smooth. Paint to match finish of duct or as directed by Architect.

2.05 PACKAGED HEAT PUMP UNIT (GROUND MOUNTED)

A. General

1. Provide packaged heat pump, ground-mounted unit.
2. Unit exceeds ASHRAE 90.1-2001 Energy Standards. Units 004-012 are Energy Star qualified.
3. Unit shall be rated in accordance with ARI Standards 210 or 360. Designed in accordance with UL Standard 1995.
4. Unit shall be designed to conform to ASHRAE 15, latest revision.
5. Unit shall be UL tested and certified in accordance with ANSI Z21.47 Standards and UL listed and certified under Canadian standards as a total package for safety requirements.
6. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
7. Unit casing shall be capable of withstanding 500-hour salt spray exposure per ASTM B117 (scribed specimen).
8. Unit shall be designed in accordance with ISO 9001:2000, and shall be manufactured in a facility registered to ISO 9001:2000.
9. Each unit shall be subjected to a completely automated run testing on the assembly line. Units contain a factory-supplied printout indicating tested pressures, amperages, data, and inspectors; providing certification of the unit status at the time of manufacture.
10. Unit shall be stored and handled per manufacturer's recommendations.
11. Factory assembled, single-piece heating and cooling unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, refrigerant charge (R-22), and special features required prior to field start-up.

B. Unit Cabinet

1. Unit cabinet shall be constructed of galvanized steel, and shall be bonderized and coated with a prepainted baked enamel finish on all externally exposed surfaces.

2. Evaporator fan compartment interior cabinet surfaces shall be insulated with a minimum ½ in. thick, 1 lb density, flexible fiberglass insulation, neoprene coated on the air side. Aluminum foil-faced fiberglass insulation shall be used in the gas heat compartment.
3. Cabinet panels shall be easily removable for servicing.
4. Holes shall be provided in the base rails for rigging shackles to facilitate maneuvering and overhead rigging.
5. Unit shall have a factory installed, sloped condensate drain pan made of a non-corrosive material, providing a minimum $^{3}/_{4}$-in.-14 NPT connection with both vertical and horizontal drains, and shall comply with ASHRAE Standard 62.
6. Unit shall have a factory installed filter access panel to provide filter access with tool-less removal.
7. Unit shall have standard thru-the-bottom gas and power connection capability (accessory kit is required).

C. Fans

1. Evaporator Fan:

   a. Fan shall be direct or belt driven as shown on the equipment drawings. Belt drive shall include an adjustable-pitch motor pulley.

   b. Fan wheel shall be double-inlet type with forward-curved blades.

   c. Bearings shall be sealed, permanently lubricated ball-bearing type for longer life and lower maintenance.

2. Evaporator fan shall be made from steel with a corrosion-resistant finish and shall be dynamically balanced.
3. Condenser fan shall be of the direct-driven (with totally enclosed motors) propeller type and shall discharge air vertically.
4. Condenser fan shall have aluminum blades riveted to corrosion-resistant steel spiders and shall be dynamically balanced.
5. Induced-draft blower shall be of the direct-driven, single inlet, forward-curved centrifugal type, made from steel with a corrosion-resistant finish and shall be dynamically balanced.

D. Compressor(s)

1. Fully hermetic type, internally protected scroll-type.
2. Factory mounted on rubber grommets and internally spring mounted for vibration isolation.
3. On dual electrically and mechanically independent circuits (008-014).

E. Coils

1. Coils

   a. Provide copper fins mechanically bonded to copper tubes and copper tube sheets. Galvanized steel tube sheets shall not be acceptable. A polymer strip shall prevent coil assembly from contacting the sheet metal coil pan to minimize potential for galvanic corrosion between coil and pan. All copper construction shall provide protection in moderate coastal environments.

2. Testing

   a. Evaporator and condenser coils shall be qualified to UL 1995 burst test at 2,200 psi.

b. Evaporator and condenser coils shall be leak tested to 150 psig and pressure tested to 400 psig.

F. Heating Section

1. Heat pump.

G. Refrigerant Components

1. Refrigerant circuit components shall include:

a. Fixed orifice metering system.

b. Refrigerant filter drier.

c. Service gage connections on suction, discharge, and liquid lines.

H. Filter Section

1. Standard filter section shall consist of factory-installed, low velocity, throwaway 2-in. thick fiberglass filters of commercially available sizes.
2. Filter face velocity shall not exceed 320 fpm at nominal airflows.
3. Filter section should use only one size filter.
4. Filters shall be accessible through an access panel with “no-tool” removal.

I. Controls and Safeties

1. Unit Controls

a. Unit shall be complete with self-contained low-voltage control circuit protected by a fuse on the 24-v transformer side.

b. ***Existing BAS is Honeywell Tridium / Niagara AX Platform. Interconnect unit controls with this existing system.***

2. Safeties

a. Unit shall incorporate a solid-state compressor protector which provides anti-cycle reset capability at the space thermostat, should any of the following standard safety devices trip and shut off compressor.

1) Compressor overtemperature, overcurrent.
2) Loss-of-charge/low-pressure switch.
3) Freeze-protection thermostat, evaporator coil.
4) High-pressure switch.
5) Automatic reset motor thermal overload protector.
6) The lockout protection shall be easily disconnected at the control board, if necessary.

J. Operating Characteristics

1. Unit shall be capable of starting and running at 125 F ambient outdoor temperature, meeting maximum load criteria of ARI Standard 210/240 or 360 at + 10% voltage.

2. Compressor with standard controls shall be capable of operation down to 25 F ambient outdoor temperature.

K. Electrical Requirements

1. All unit power wiring shall enter unit cabinet at a single factory-predrilled location.

L. Motors

1. Compressor motors shall be cooled by refrigerant gas passing through motor windings and shall have line break thermal and current overload protection.

2. Evaporator-fan motor shall have permanently lubricated bearings and inherent automatic-reset thermal overload protection. Evaporator motors are designed specifically for Carrier and do *not* have conventional horsepower (HP) ratings listed on the motor nameplate. Motors are designed and qualified in the “air-over” location downstream of the cooling coil and carry a maximum continuous bhp rating that is the maximum application bhp rating for the motor; no “safety factors” above that rating may be applied.

3. Totally enclosed condenser-fan motor shall have permanently lubricated bearings, and inherent automatic-reset thermal overload protection.

4. Induced-draft motor shall have permanently lubricated sealed bearings and inherent automatic-reset thermal overload protection.

M. Accessories

1. Economizer

a. Integrated integral modulating type capable of simultaneous economizer and compressor operation.

b. Includes all hardware and controls to provide cooling with outdoor air.

c. Equipped with low-leakage dampers, not to exceed 2% leakage at 1 in. wg pressure differential.

d. Capable of introducing up to 100% outdoor air.

e. Dry bulb outdoor-air temperature sensor shall be provided as standard. Outdoor air sensor set-point is adjustable and shall range from 45 -70 F.

2. Condenser Coil Hail Guard Assembly

Hail guard shall protect against damage from hail and flying debris.

3. Unit-Mounted, Non-Fused Disconnect Switch

   Shall be factory-installed, internally mounted. NEC and UL approved non-fused switch shall provide unit power shutoff. Shall be accessible from outside the unit and shall provide power off lockout capability.

4. Convenience Outlet

   Shall be factory installed and internally mounted with easily accessible 115-v female receptacle. Shall include 15 amp GFI receptacle with independent fuse protection. Voltage required to operate convenience outlet shall be provided by a factory-installed stepdown transformer. Shall be accessible from outside the unit.

5. Condenser Coil Grille

   The grille protects the condenser coil from damage by large objects without increasing unit clearances.

6. Compressor Cycle Delay

   Unit shall be prevented from restarting for minimum of 5 minutes after shutdown.

7. Hinged Panel Option

   Hinged panel option provided hinged access panels for the filter, compressor, evaporator fan, and control box areas. Filter hinged panels permit tool-less entry for changing filters. Each hinged panel is permanently attached to the rooftop unit.

8. Provide programmable thermostat with Heating, Cooling, and Fan fuctions.

PART 3 - EXECUTION

3.01 SYSTEM TESTING, ADJUSTING, AND BALANCING

A. Summary

1. Testing, adjusting and balancing (TAB) of the air conditioning systems and related ancillary equipment will be performed by an impartial technically qualified TAB firm.

2. The firm shall be capable of performing the services specified at the location of the facility described within the time specified, of preparing and submitting the detailed report of the actual field work performed, and following up the basic work as may be required.

B. Qualifications

1. The Firm shall be one which is organized to provide professional services of this specified type in the State of Rhode Island.

2. The Firm shall have operated a minimum of five (5) years under its current Firm name, and shall be in good standing with the State of RI. The firm shall submit their full incorporated name, Charter Number and Taxpayer's I.D. Number for proper verification of the firm's status.

3. The Firm shall be capable of providing a performance bond, by a bonding company licensed to do business in the State of RI, if determined by the Owner that such a bond is required. The amount of the bond which may be required shall be equal to the cost of the proposal submitted, or in the case of more than one proposal, the sum of all such proposals and any awarded work in progress.

4. All personnel used on the job site shall be either professional engineers or engineering technicians, who shall have been permanent, full time employees of the firm for a minimum of six (6) months prior to the start of work for this specific project.

C. References

1. AABC - National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems, Sixth Edition 2002.

2. ASHRAE - 2011 HVAC Applications Chapter 38: Testing, Adjusting and Balancing.

3. ANSI/ASHRAE Standard 111 – 2008 - Practices for Measurement, Testing, Adjusting and Balancing of Buildings, Heating, Ventilation, Air Conditioning and Refrigeration Systems.

D. Documents

1. The TAB firm shall, as a requirement of the TAB contract, arrange with the Architect / Owner / Engineer to compile one set of mechanical, specifications, all

pertinent change orders, and the following:

a. One complete set of Drawings less the structural sheets.

b. One set of mechanical floor plans of the conditioned spaces. These Drawings shall be ozalid type (blue or black on light background) reproductions to facilitate marking.

2. Approved submittal data on equipment installed, and related changes as required to accomplish the test procedures outlined in Paragraphs 1.06 through 1.10 of this Specification will be available through the Construction Supervisor.

E. Responsibilities of the Tab Firm

1. The TAB personnel shall check, adjust, and balance the components of the air conditioning system which will result in optimal noise, temperature, and airflow conditions in the conditioned spaces of the building while the equipment of the system is operating economically. This is intended to be accomplished after the system components are installed and operating as provided for in the contract documents. It is the responsibility of the Mechanical Contractor to place the equipment into service.

F. Final Air Balance

General: When systems are complete and ready for operation, the TAB Consultant will perform a final air balance for all air systems and record the results. The outside, supply, and return air volume for each air handling unit, shall be adjusted to within +5% of the value shown on the drawings. Air handling unit and fan volumes shall be adjusted by changing fan speed and adjusting volume dampers associated with the unit.

a. Filters: Check air filters and filter media and balance only system with essentially clean filters and filter media. The Contractor shall install new filters and filter media prior to the final air balance.

b. Blower Speed: Measure RPM at each fan or blower to design requirements. Where a speed adjustment is required, the Contractor shall make any required changes.

c. Ampere Readings: Measure and record full load amperes for motors.

d. Static Pressure: Static pressure gains or losses shall be measured across each supply fan, cooling coil, heating coil, return air fan, air handling unit filter and exhaust fan. These readings shall be measured and recorded for this report at the furthest air device or terminal unit from the air handler supplying that device. Static pressure readings shall also be provided for systems which do not perform as designed.

e. Equipment Air Flow: Adjust and record exhaust, return, outside and supply air CFM (s) and temperatures, as applicable, at each fan, blower and coil.

f. Coil Temperatures: Set controls for full cooling and for full heating loads. Read and record entering and leaving dry bulb and wet bulb temperatures (cooling only) at each cooling coil, heating coil and HVAC terminal unit. At the time of reading record water flow and entering and leaving water temperatures (In variable flow systems adjust the water flow to design for all the above readings).

g. Pitot Tube Traverses: For use in future troubleshooting by maintenance personnel, all exhaust ducts, main supply ducts and return ducts shall have air velocity and volume measured and recorded by the traverse method. Locations of these traverse test stations shall be described on the sheet containing the data.

G. Reports

1. The activities described in this section shall culminate in a report to be provided in quadruplicate (4) individually bound. Neatly type and arrange data. Include with the data the date tested, personnel present, weather conditions, nameplate record of test instrument and list all measurements taken after all corrections are made to the system. Record all failures and corrective action taken to remedy incorrect situation. The intent of the final report is to provide a reference of actual operating conditions for the Owner's operations personnel.

2. All measurements and recorded readings (of air, water, electricity, etc.) that appear in the reports must have been made onsite by the permanently employed technicians or engineers of the firm.

3. At the option of the Construction Supervisor, all data sheets tabulated each day by TAB personnel shall be submitted for initial by the Construction Inspector. Those work sheets so initialed, or copies thereof, shall be presented as a supplement to the final TAB report.

3.02 CLEANING AND PROTECTING

A. It shall be this trade's responsibility to store his materials in a manner that will maintain an orderly clean appearance. If stored on-site in open or unprotected areas, all equipment and material shall be kept off the ground by means of pallets or racks, and covered with tarpaulins.

END OF SECTION

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SECTION 26 0000

ELECTRICAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. All of the Contract Documents, including General and Supplementary conditions and Divisions 1 General requirements, apply to the work of this section.

B. Examine all Drawings and all other Sections of the Specifications for requirements affecting the work of this Section.

1.02 SCOPE

A. Provide all labor, materials, tools and equipment for the installation of the complete and fully operational electrical system as shown on the drawings and as specified herein.

B. The work includes, but is not limited to the following:

1. Branch circuit wiring and raceways.
2. Conduit, wire, boxes, fittings, hangers and supports.
3. Nameplates on all electrical equipment and components.
4. Obtain all permits and associated fees.
5. Testing of all electrical systems.
6. Coordination between electrical and other trades.
7. All other systems hereinafter specified or indicated on the Contract Drawings, complete, leaving ready an electrical system in perfect operating condition.

1.03 DEFINITIONS

A. As used in this Section, “provide” means “furnish and install” and “POS” means “Provided Under Other Sections”.

B. As used in the drawings and specifications for electrical work, certain non-technical words shall be understood to have specific meanings as follows regardless of indications to the contrary in the general conditions or other documents governing the electrical work.

“Furnish” Purchase and deliver to the project site complete with every necessary appurtenance and support, all as part of this work. Purchasing shall include payment of all sales taxes and other surcharges as may be required to assure that purchased items are free of all liens, claims or encumbrances.

“Install” Unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project, all as part of this work.

“Provide” “Furnish” and “Install”.

“New” Manufactured within the past two years and never before used.

C. Except where modified by a specific notation to the contrary, it shall be understood that

the indication and/or description of any electrical item in the drawings or specifications for electrical work carries with it the instruction to furnish, install and connect the item as part of the electrical work, regardless of whether or not this instruction is explicitly stated.

D. It shall be understood that the specifications and drawings for electrical work are complimentary and are to be taken together for a complete interpretation of the electrical work except that indications on the drawings, which refer to an individual element of work, take precedence over the specifications where they conflict with same.

1.04 WORK BY OTHERS

A. The following is related work specified elsewhere:

1. Access panels, where required, are furnished by the General Contractor and coordinated with this section.

1.05 CODES, PERMITS, AND STANDARDS

A. Provide all permits and licenses. Obtain and pay all certificates of inspection as required by regulatory agencies and submit for approval.

B. All materials and equipment shall be new and designed, constructed, installed and tested in accordance with the specification and the following standards:

1. National Electrical Code (NEC)
2. Occupational Safety and Health Act (OSHA)
3. Underwriters Laboratory (UL)
4. American National Standards Institute (ANSI)
5. National Electrical Manufacturers Association (NEMA)
6. Americans with Disabilities Act (ADA)
7. National Electric Safety Code (NESC)
8. NEC Article 110 – Flash Protection
9. International Building Code (IBC)

1.06 PROTECTION AND CLEANING

A. All electrical equipment and devices in the existing building in which the electrical work is to be done under Contract, shall be protected from damages, scratches, paint, cement, etc. until the work is completed.

B. Where electrical equipment and/or devices are indicated to be abandoned and the Owner elects to salvage specific items, said items should be delivered to storage on site at a location designated by the Owner.

C. Exposed surfaces of electrical equipment & lighting fixtures shall be cleaned upon completion of the work.

D. All debris and material resulting from electrical work shall be removed from the property each and every day and shall be disposed of in a legal manner. Workspace shall be left clean as electrical work is completed.

E. Damages to covers and trims of electrical equipment shall be repaired and painted with touch-up paint supplied by the equipment manufacturer to the satisfaction of the owner's

designated representative or the Architect or the equipment shall be replaced with new.

1.07 SHOP DRAWINGS

A. Definitions

1. Shop Drawings are information prepared by the Contractor to illustrate portions of the work in more detail than shown in the Contract Documents.

2. Coordination Drawings are detailed, large-scale layout Shop Drawings showing HVAC, Electrical, Plumbing and Fire Protection work superimposed in order to identify conflicts and ensure inter-coordination of Mechanical, Electrical, Architectural, Structural and other work.

B. Submittal Cover Sheet

1. Shop Drawings shall be submitted according to specification section with a separate cover sheet completed for each product, rather than one cover sheet for multiple products, whether or not supplied by one manufacturer or vendor.

C. Submittal Procedures and Format

1. Review submittal packages for compliance with the Contract Documents and then submit to Architect for review.

2. Provide additional copies of reviewed shop drawings as required for full distribution.

3. Shop Drawings showing layouts of systems shall contain sufficient plans, elevations, sections, details and schematics to describe work clearly. They shall be ¼" = 1' –0" scale unless specified otherwise. Sheet metal shop drawings shall be 3/8" = 1' –0 and shall indicate work of other sections where interferences are possible. Provide larger scale details as necessary. Sheet metal drawings shall show elements of Architects reflected ceiling plan, exposed ductwork, walls and partitions, diffusers, registers, grilles, fire dampers, sleeves and other aspects of construction as necessary for coordination.

4. ALL FIREWALLS AND SMOKE PARTIONS MUST BE HIGHLIGHTED ON THE SHEET METAL DRAWINGS FOR APPROPRIATE COORDINATION.

5. Shop drawings showing manufacturer's product data shall contain detailed dimensional drawings, accurate and complete description of construction materials, manufacturer's published performance characteristics and capacity ratings (performance data, alone, is not acceptable), electrical requirements and wiring diagrams. Drawings shall clearly indicate location (terminal block or wire number), voltage and function for all field terminations, and other information necessary to demonstrate compliance with all requirements of Contract Documents.

D. Acceptable Manufacturers

1. Alternate Manufacturers are acceptable only if, as a minimum, they:

a. Meet all performance criteria listed in the schedules and outlined in the specification.

b. Have identical operating characteristics to those called for in the specification.

c. Fit within the available space it was designed for, including space for maintenance and component removal, with no modification to either space or the product. Clearances to walls, ceilings and other equipment shall be at least equal to those shown on the design drawings.

d. For rooftop mounted equipment and for equipment mounted in areas where structural matters are a consideration, the products must have a weight no greater than the product listed in the schedules or specifications.

e. Products must adhere to all architectural considerations including, but not limited to: being of the same color as the product scheduled or specified, fitting within architectural enclosures and details, and for diffusers, lighting and plumbing fixtures-being the same size and of the same physical appearance as schedule or specified products.

E. Deviations

1. Concerning deviations other than substitutions, proposed deviations from Contract Documents shall be requested individually in writing whether deviations result from field conditions, standard shop practice, or other cause. Submit letter with transmittal of Shop Drawings, which flags the deviation to the attention of the Architect.

2. Without letters flagging the deviation to the Architect, it is possible that the Architect may not notice such deviation or may not realize its ramifications. Therefore, if such letters are not submitted to the Architect, the contractor shall hold the Architect and his consultants harmless for any and all adverse consequences resulting from the deviations being implemented. This shall apply regardless of whether the Architect has reviewed or approved shop drawings containing the deviation, and will be strictly enforced.

3. Approval of proposed deviations, if any, will be made at the discretion of the Architect.

F. Responsibility

1. Intent of Submittal review is to check for capacity, rating, and certain construction features. Contractor shall ensure that work meets requirements of Contract Documents regarding information that pertains to fabrication processes or means, methods, techniques, sequences and procedures of construction; and for coordination of work of this and other Sections. Work shall comply with submittals marked “REVIEWED” to extent that they agree with Contract Documents. Submittal review shall not diminish responsibility under this Contract for dimensional coordination, quantities, installation, wiring, supports and access for service, nor shop drawing errors or deviations from requirements of Contract Documents. The Architect’s noting of some errors while overlooking others will

not excuse the contractor from proceeding in error. Contract Documents requirements are not limited, waived nor superseded in any way by review.

2. INFORM SUBCONTRACTORS, MANUFACURERS, SUPPLIERS, ETC. OF SCOPE AND LIMITED NATURE OF REVIEW PROCESS AND ENFORCE COMPLIANCE WITH CONTRACT DOCUMENTS.

3. It shall be the responsibility of the Contractor to review all drawings and specifications thoroughly during BID process. The contractor shall notify the Engineer/Architect via RFI (request for information) if any conflicts arise. Failure to identify the discrepancies during the BID process shall disqualify the Contractor for claiming any additional compensation.

4. Shop drawings for entire distribution system will not be submitted until after the completion of the Short Circuit Study. Equipment AIC rating shall match with the results of the study.

G. Schedule: Incorporate shop drawing review period into construction schedule so that work is not delayed. Contractor shall assume full responsibility for delays caused by not incorporating the following shop drawing review time requirements into his project schedule. Working days listed reference the time in the Engineer's office. It does not include transmittal time for review each time shop drawing is submitted or resubmitted.

H. List of Proposed Equipment and Materials

1. Within four weeks after Award of Contract and before ordering materials or equipment, submit complete list of proposed materials and equipment and indicate manufacturer's names and addresses. No consideration will be given to partial lists submitted out of sequence.

I. Submit shop drawings in pdf format and electronically for the following:

1. Light Fixtures
2. Conduit, wire, feeders, cables and branch circuit wiring
3. Wire ways, outlet boxes, covers
4. Fire alarm devices

1.08 SUBMITTAL DOCUMENTATION REQUIREMENTS

A. Furnish documentation associated with this bid proposal and Contract including submittals, shop drawings, O&M manuals, and test reports as follows. These requirements are in addition to submittal requirements stated elsewhere and shall not deprive the Owner of rights under other provisions of the Contract Documents.
1. Submit six (6) hard copies of documentation for review.
2. Submit documents in portable document format (PDF).
3. Submit documents in AutoCAD - Latest version for Drawings and Microsoft Word (latest version) for text format when requested.

B. Provide a Compliance Review of each section of the Specifications, Drawings and Addenda. The Compliance Review shall be a paragraph-by-paragraph review of the Specifications with the following information; "C", "D" or "E" marked in the margin of the original Specifications and any subsequent Addenda.

1. "C": Comply with no exceptions.

2. "D": Comply with deviations. For each and every deviation, provide a numbered footnote with reasons for the proposed deviation and how the intent of the Specification can be satisfied.
3. "E": Exception, do not comply. For each and every exception, provide a numbered footnote with reasons and possible alternatives.

C. Unless a deviation or exception is specifically noted in the Compliance Review, it is assumed that the Bidder is in complete compliance with the plans and Specifications. Deviations or exceptions taken in cover letters, subsidiary documents, by omission or by contradiction do not release the Bidder from being in complete compliance, unless the exception or deviation has been specifically noted in the Compliance Review. Bidders may submit the latest state-of-the-art components and their standard control components in lieu of the specified items. The A/E and Owner will review deviations from the Specifications.

1.09 CONTINUITY OF SERVICES

A. Work under this section includes new work and work on existing systems within existing building. Perform such work so as not to interfere with the Owners operation. Where work necessitates interruption of service(s), schedule outages with the Owner and Engineer and perform the work at such time(s) as they shall direct. All shutdowns shall be conducted on off hours.

1.10 RECORD DRAWINGS

A. For the duration of the contract, the Electrical Contractor shall maintain a complete set of contract drawings. All completed work and all deviations from the contract documents shall be recorded clearly and accurately. Record drawings shall be turned over to the Owner upon completion of the work.

B. Electronic files are available to facilitate the preparation of Record Drawings. These files are solely for use of the Electrical Contractor and may not be a full representation of the Scope of work.

1.11 COORDINATION

A. It shall be the responsibility of the Electrical Contractor to coordinate with all other trades and parties to avoid conflicts. No additional charges will be approved due to LACK OF COORDINATION OR FIELD VERIFICATION OF THE EXISTING CONDITIONS.

B. It shall be the responsibility of the Electrical Contractor to coordinate with all final connections of equipment with all sub-consultants including but not limited to plumbing, fire protection, mechanical, kitchen, pool, communication and security equipment and all other systems.

1.12 COORDINATION DRAWINGS

A. Before materials are purchased or work begun, the Electrical Contractor shall prepare coordination drawings showing the size and location of electrical equipment and conduit runs and other equipment related to the electrical work.

B. Coordination drawings are for the General Contractor's and the Engineer's use during construction and shall not be construed as replacing any shop, as built or record drawings required elsewhere in this Contract Document.

1.13 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

A. Instruct to the Owner's satisfaction such persons as the Owner designates, in the proper operation and maintenance of the systems and their parts.

B. Furnish operating and maintenance manuals and forward same to the Engineer for transmittal to the Owner.

C. Operating instructions shall be specific for each system and shall include copies of posted specific instructions.

D. For maintenance purposes, provide Shop Drawings, parts lists, specifications and manufacturer's maintenance bulletins for each piece of equipment.

E. Provide name, address and telephone number of the manufacturer's representative and service company for each piece of equipment so that service or spare parts can be readily obtained.

1.14 WORKMANSHIP

A. The entire work installed in this Specification and as shown on the drawings shall be constructed and finished in every respect in a workmanlike and complete manner. It is the responsibility of the Electrical Contractor to install complete systems. All such parts as required completing the systems in accordance with the best trade practice and the satisfaction of the Owner's Engineer shall be installed.

B. Obtain detailed information from the manufacturers of apparatus as to the proper method of installing and connecting equipment. Obtain all information from the General Contractor and other Subcontractors, which may be necessary to facilitate work and the completion of the whole project.

C. Remove daily, all rubbish and debris and all refuse from workmen's lunches and at completion remove all his surplus materials, and leave in clean condition acceptable to the Owner's Engineer.

1.15 EXAMINATION OF SITE AND CONTRACT DOCUMENTS

A. Before submitting prices or beginning work, thoroughly make an examination of the site.

B. No claim for extra compensation will be recognized if difficulties are encountered which an examination of site conditions prior to executing contract would have revealed.

C. These specifications along with contract documents describe the electrical systems. The Electrical Contractor is required to provide complete and operating systems for all equipment mentioned.

D. Electrical equipment required for the successful operation of any of the particular types of Owner's equipment mentioned shall be furnished and installed.

E. Be responsible for all materials delivered to the site in connection with the work and pay all charges for cartage, scaffolds, planking, rigging and erecting. Take every precaution necessary to protect equipment and installation in addition to plugging and protecting open ends of all pipes, outlet boxes, panel boxes, and junction boxes. All equipment shall be stored in a clean dry place to preserve the quality of material being used. Equipment and/or materials damaged during construction shall be replaced at no additional cost to the Owner. Any scaffolding over 8'-0" in height will be supplied by the General Contractor.

F. All materials and equipment required by this Specification shall be new, clean and free from defects at the time of installation. The Manufacturer and Underwriter's label shall appear on all material and equipment unless otherwise approved, in writing, by Owner.

1.16 SUBSTITUTION OF MATERIALS OR EQUIPMENT

A. If the Electrical Contractor wishes to use materials or equipment other than those specifically designated herein, as being equal to those so specifically designated: BEFORE PURCHASING AND/OR FABRICATION, he shall submit the proposed substitution in accordance with the requirements of the General Conditions, and the decision of whether or not it is equal to that specified shall be determined by the owner.

B. Unless requests for substitution are made in accordance with the above instructions and the instructions of the General Conditions, supported by sufficient proof of equality, the successful Contractor will be required to furnish specifically named items designated under the base bid.

C. If the apparatus or materials substituted for those specified necessitate changes or additional connections, piping supports or construction: same shall be provided and the Electrical Contractor shall assume the cost and the entire responsibility thereto.

D. The Electrical Contractor shall coordinate with the HVAC, Plumbing and Fire Protection Contractors with regard to feeder, raceway, and circuit breaker and disconnect switch sizes. If a substitution of HVAC, Plumbing and Fire Protection equipment is proposed by a Subcontractor, it shall become the responsibility of that Subcontractor to coordinate with the Electrical Contractor any and all changes with regard to feeder, raceway, and circuit breaker and disconnect switch sizes. The shop drawings shall clearly indicate what changes are required and any additional costs associated with this change. If coordination does not occur, the Subcontractor proposing the change shall be responsible for all costs that occur due to the substitution.

E. Whenever the Contractor secures approval for changing any items and such change involves a corresponding change or adjustment in any adjacent or related item, the responsibility for making the required change, or seeing that it is made, rests with the Contractor. The cost of these changes and/or adjustments shall be paid for by the Contractor unless it is otherwise agreed, in writing, at the time the change is approved. The acceptance of any change will not, in any way, relieve the Contractor from full compliance with the Contract Documents.

1.17 PERMITS, LAWS, ORDINANCES & CODES

A. The Electrical Contractor shall give all necessary notices, obtain all permits, and pay all taxes, fees and other costs in connection with his work; file all necessary plans, prepare all necessary documents and obtain all necessary approvals of state authorities, all local, town, city or county departments having jurisdiction; obtain all required certificates of inspection for his work.

B. The Electrical Contractor shall include in the work, without extra cost to the Owner, any labor, materials, services, apparatus, drawings in addition to the drawings prepared by the Project Engineer and Documents, in order to comply with all applicable laws, ordinances, rules and regulations whether or not shown on the drawings and/or specified.

1.18 DAMAGE TO OTHER WORK

A. Each Contractor shall be held responsible for and shall pay for all damage to other work caused by his work or workmen.

B. Repairing of such damage shall be done by the General Contractor or Contractors who installed the work and so directed by the Owner's Engineer.

1.19 GUARANTEE

A. Attention is directed to provisions of the General Conditions and Special Conditions regarding guarantees and warranties for work under this Contract.

B. Electrical Contractor's guarantees shall be the same as the General Contractors.

C. All material, items of equipment and workmanship furnished under this section shall carry for this standard warranty against all defects in material and workmanship. Any fault due to defective or improper material, equipment, workmanship or design which may develop shall be made good, forthwith, by and at the expense of the Electrical Contractor, including all other damage done to areas, materials and other systems resulting from this failure.

D. Electrical Contractor shall guarantee that all elements of the systems are of sufficient capacity to meet the specified performance requirements as set forth herein or as indicated.

E. Upon receipt of notice from the Owner of failure of any part of the systems or equipment during the guarantee period, the affected part or parts shall be replaced by the Electrical Contractor at no additional cost to the Owner.

F. Furnish, before the final payment is made, a written guarantee covering the above requirements.

1.20 INSTALLATION REQUIREMENTS

A. The arrangement of all electrical work shown on the drawings is diagrammatic only and indicates the minimum requirements of the work. Conditions at the building including actual measurements shall determine the details of the installation. All work shall be laid out and installed so as to require the least amount of cutting and patching.

B. Check the Architectural plans and specifications before ordering any material and equipment. Any discrepancies shall be brought to the attention of the Architect for his determination prior to proceeding with the work.

1.21 TYPICAL DETAILS

A. Typical details where shown on the drawings shall apply to each and every item of the project where such items are applicable. They are not repeated in full on the drawings, which in many cases are diagrammatic only, but with the intention that such details shall

be incorporated in full. Any alternate method proposed for use by the Contractor shall have the prior approval of the Architect.

1.22 TYPICAL PART PLANS

A. Typical part plan where shown on the drawings shall apply to each and every item of the project where such items are applicable. They are not repeated in full on the drawings, which in many cases are diagrammatic only, but with the intention that such details shall be incorporated in full. Any alternate method proposed for use by the Contractor shall have the prior approval of the Architect.

B. Where typical part plans are shown on the drawings, it is the Contractor's responsibility to install all wiring devices in accordance with State and National Codes. Where Architectural deviations occur, additional devices will be required and shall be the responsibility of the Contractor to confirm wall layouts with the latest Architectural floor plans.

1.23 SLEEVES, INSERTS

A. Furnish and install all sleeves, inserts, anchor bolts and similar items to be set into masonry or concrete, as required for mechanical and electrical work. Internal diameter of sleeve shall be 2" larger than the outside diameter of the pipe or insulation covered line passing through it.

1.24 CORING, DRILLING

A. Cutting, coring, drilling and patching of holes and openings for the work of sub-trades shall be performed by the particular subcontractor when the largest dimension of the opening is less than 4.5 inches. If the largest dimension of the opening is 4.5 inches or more, the General Contractor shall perform the cutting and patching for the work of the subcontractor. For cutting and patching see Section 017000.

1.25 ACCESSIBILITY

A. Install all work such that parts, receptacles, equipment, devices etc. requiring periodic inspection, operation, maintenance and repair are readily accessible.

B. All GFCI receptacles shall be mounted in readily accessible location as required by NEC 210.8

C. Furnish all access panels appropriate to particular conditions, to be installed by trades having responsibility for the construction of actual walls, floors or ceilings at required locations.

1.26 TOOLS AND EQUIPMENT

A. Provide all tools and equipment required for the fabrication and installation of the mechanical and electrical equipment at the site.

1.27 PORTABLE AND DETACHABLE PARTS

A. Contractors shall retain in their possession all portable and/or detachable parts and portions of materials, devices, equipment etc. necessary for the proper operation and maintenance of the mechanical and electrical systems until final completion of the work, at which time they shall be handed over to the Owners.

1.28 RECORD DRAWINGS, PROJECT CLOSEOUT

A. As work progresses and for the duration of Contract, maintain a complete and separate set of prints of Contract Drawings at job site at all times. Record work completed and all changes from original Contract Drawings clearly and accurately including work installed as a modification or addition to the original design. Work shall be updated on a weekly basis and shall be made available for review by Architect at bi-weekly project meetings. Failure to perform this work shall be reason for withholding requisition payments. In addition, take photographs of all concealed equipment in gypsum board ceilings, shafts, and other concealed, inaccessible work. At completion of work, make copies of photographs with written explanation on back. These shall become part of Record Documents.

B. At completion of work prepare a complete set of record drawings in the latest AutoCAD® Release 12 or higher format showing all systems as actually installed, including all fire alarm and electrical circuitry. Record drawings shall be submitted to the Owner on CD-ROM formatted discs.

C. THE ARCHITECT WILL NOT CERTIFY THE ACCURACY OF THE RECORD DRAWINGS - THIS IS THE SOLE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.

D. This trade shall submit the record set for approval by the fire and building departments in a form acceptable to the departments, when required by the jurisdiction.

E. Drawings shall show record condition of details, sections, riser diagrams, control changes and corrections to schedules. Schedules shall show actual manufacturer and make and model numbers of final equipment installation.

F. Refer to SECTION 017200 – CLOSEOUT SUBMITTALS.

1.29 QUALITY ASSURANCE

A. The requirements of the State Building Code and local regulations establish the minimum acceptable quality of workmanship and materials, and all work shall conform thereto unless more stringent requirements are indicated or specified herein.

B. All work shall comply with the latest editions of the codes as referenced herein.

C. Follow manufacturer's directions for articles furnished, in addition to directions shown on drawings or specified herein.

D. Protect all work, materials, and equipment from damage during process of work. Replace all damaged or defective work, materials and equipment without additional cost to Owner.

E. All equipment and materials for permanent installation shall be the products of recognized manufacturers and shall be new.

F. Equipment and materials shall:

1. Where normally subject to Underwriters Laboratory Inc. listing or labeling services, be so listed or labeled.
2. Be without blemish or defect.

3. Not be used for temporary light and power purposes.
4. Be in accordance with the latest applicable NEMA standards.
5. By products which will meet with the acceptance of all authorities having jurisdiction over the work. Where such acceptance is contingent upon having the products examined, tested and certified by Underwriters or other recognized testing laboratory, the product shall be so examined, tested and certified.

G. Except for conduit, conduit fittings, outlet boxes, wire and cable, all items of equipment or material of one generic type shall be the product of one manufacturer throughout.

H. For items which are to be installed but not purchased as part of the electrical work, the electrical work shall include:

1. The coordination of their delivery.

2. Their unloading from delivery trucks driven into any point on the property line at grade level.
3. Their safe handling and field storage up to the time of permanent placement in the project.

4. The correction of any damage, defacement or corrosion to which they may have been subjected. Replacement if necessary shall be coordinated with Contractor who originally purchased the item.

5. Their field make-up and internal wiring as may be necessary for their proper operation.

6. Their mounting in place including the purchase and installation of all dunnage, supporting members, and fastenings necessary to adapt them to architectural and structural conditions.

7. Their connection to building wiring including the purchase and installation of all termination junction boxes necessary to adapt and connect them to this wiring. Included also shall be the purchase and installation of any substitute lugs or other wiring terminations as may be necessary to adapt their terminals to the building wiring as called for and to the connection methods set forth in these specifications.

I. Items which are to be installed but not purchased as part of the electric work shall be carefully examined upon delivery to the project. Claims that any of these items have been received in such condition that their installation will require procedures beyond the reasonable scope of the electric work will be considered only if presented in writing within one week of the date of delivery to the project of the items in question. The electric work includes all procedures, regardless of how extensive, necessary to put into satisfactory operation, all items for which no claims have been submitted as outlined above.

1.30 DELIVERY, STORAGE, AND HANDLING

A. All materials for the work of this section shall be delivered, stored and handled so as to preclude damage of any nature. Manufactured materials shall be delivered and stored in their original containers, plainly marked with the products' and manufacturer's name. Materials in broken containers or in packages showing watermarks or other evidence of damage shall not be used and shall be removed from the site.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials and equipment necessary to make the installation complete in every detail shall be furnished and installed under this contract whether or not specifically specified herein. All materials and equipment shall be new. The Electrical Contractor shall include all wiring for mechanical, plumbing and fire protection systems, wiring protection systems and wiring for all equipment specified.

B. It is the intent of the Specifications that one manufacturer be selected, not a combination, for any particular system. For example, all wire of one manufacturer, all switches of one manufacturer, etc., except specific material classifications in which delivery time becomes a problem the Owner's Engineer may; give specific exemption from the requirements.

C. Where materials, equipment, apparatus or other products are specified by manufacturer, brand name, type or catalog number, such designation is to establish standards of performance, quality, type and style.

2.02 PULL BOXES, WIREWAYS, AND CHANNELS

A. Pull boxes shall be code gauge galvanized steel with screw covers to match. Pull boxes and wire ways shall be as shown on Drawings and/or as required by NEC and/or job conditions, with steel barriers separating systems.

B. Wire ways shall be galvanized steel, manufactured standard sections and fittings, with combination hinged and screw covers.

C. Steel channel supports shall be minimum 1-5/8 inch mold strip with minimum .105 inch wall thickness, Unistrut P1000, Kindorf, Husky Products, or equal.

2.03 RACEWAYS

A. Electric metallic tubing (EMT) shall be electro galvanized or sheradized steel. Tubing shall be as manufactured by Pyle National, Allied Tube and Conduit Corp., Wheatland Tube Company or equal.

B. All EMT shall be a minimum of 1/2" including branch circuits for lighting, power, data and telephone systems.

C. Intermediate metal conduit (IMC) shall be used where subject to damage.

D. Flexible metal conduit shall be galvanized steel with separate copper grounding conductor. Liquid-tight flexible metal conduit shall be similar, but with extruded moisture and oil proof outer jacket of polyvinyl chloride plastic. Flexible metal conduit less than 6-feet long may be used to connect all lighting fixtures. Motors and other equipment may be connected in length; not exceeding 18 inches. Liquidtight flexible metal conduit shall be used for all mechanical equipment or other rotating equipment subjected to moisture.

E. Couplings and connectors for electrical metallic tubing shall be galvanized steel compression type.

F. Steel support rods or support bolts for conduits shall be 1/8" diameter for each inch or fraction thereof of diameter of conduit size, but no rod or bolt shall be less than 1/4" in diameter.

G. Conduit ends shall be cut square and reamed to remove burrs and sharp edges. Offsets and bends for changes in elevation of exposed conduit runs shall be made at walls or beams and not in open spaces between walls or beams. Conduits shall be routed so as not to interfere with the operation or maintenance of any equipment. The entire job shall be done in a neat and workmanlike manner, as approved by the Engineer. Steel supports or racks shall be galvanized steel channel and fittings, Unistrut, Kindorf, Husky Products Company, or equal.

H. Conduits shall be routed in the field so as to be coordinated with the building structure. Exposed conduit shall be run in straight lines parallel to walls, beams and columns and with right angle bends and threaded conduit fittings.

I. For 20 ampere branch circuit wiring furnish and install the number of individual conduits required to limit the number of conductors in each conduit to a number which will not require derating to a value below 100 percent of the current rating of the circuit over current protective device.

2.04 WIRE AND CABLE

A. All wire and cable shall be copper, minimum of #12 AWG solid.

B. Provide single conductor wire and cable with 600V insulation. Wire size #8 AWG and larger shall be stranded. Wire of size smaller than #8 AWG shall be solid. Conductors shall be soft drawn copper with conductivity of not less than 98% of ANSI Standard for annealed copper.

C. Wire and cable shall be Type THWN-THHN building wire, 600V, rated for 75 degrees C. in wet locations and 90 degrees C. in dry locations.

D. Flexible metal clad cable Type MC with green equipment ground may be used in areas above hung ceilings and in wall partitions where allowed by code. MC Cable shall be manufactured by AFC or equal.

E. Wire and cable shall be manufactured by Phelps Dodge Copper Products Corp., General Cable Co., Triangle Conduit and Cable Co., AFC/ A Monogram Co. or equal.

2.05 OUTLET BOXES AND ACCESSORIES

A. Provide galvanized sheet steel outlet boxes for all outlets unless otherwise noted.

B. Fixture outlet boxes shall have 3/8" solid male fixture studs and auxiliary fixture stems shall be supported from 3/8" male fixture studs.

C. All outlet boxes for concealed work shall be galvanized, stamped steel; those for fixtures, furnished with a fixture stud.

D. Outlet boxes shall be of size and type to accommodate (1) structural conditions; (2) size and number of raceways, conductors or cables entering and (3) devices or fixtures for which required.

E. Install blank plates on all outlet boxes, in which no apparatus is installed, which do not integrally provide a cover for the box.

F. Special care shall be taken to set all boxes correctly square and true with the building finish.

G. Outlet boxes and accessories shall be as manufactured by Steel City, Appleton, Raco or equal.

2.06 NAMEPLATES

A. Nameplates consisting of black plastic with white center, lettering to be 1/4" high, engraved through to white layer and properly fastened with brass screws shall be provided for the following equipment:

1. All panel boards and distribution equipment.

2. Terminal cabinets.

3. Junction boxes larger than 4-11/16".

2.07 GROUNDING REQUIREMENTS

A. Ground all systems and equipment in accordance with best industry practice, the requirements of NFPA 70.

2.08 PHASING AND COLOR CODING

A. The insulation or covering of each wire or cable shall be color coded so as to provide for circuit identification as specified below:

120/208 V Circuits	277/480V	Phase Circuits
Black	Brown	A
Red	Orange	B
Blue	Yellow	C
White	Grey	Neutral
Green	Green w/yellow tracer	Equipment Ground

B. Color coding shall be achieved by one of the following methods:

1. The insulation or covering shall be coded during manufacture by use of one of the following methods:

a. Colored compounds.
b. Colored coatings.

2. In sizes and insulation types where factory applied colors are not available, wires and cables shall be color coded by the application of colored plastic tapes in overlapping turns at all terminal points, and in all boxes in which splices are made.

C. The same colored cable shall be connected to the same phase throughout the project.

D. In general, building load centers and panelboards shall be phased "A", "B", "C", left to right. The neutral, although it may be in different locations for different equipment, shall be identified.

2.09 WIRING DEVICES

A. Available manufacturers: subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work included, but not limited, to the following:

1. Wiring Devices

a. Pass and Seymour/legrand
b. Bryant Electric
c. Cooper Industries
d. Hubbell
e. Leviton

B. Wiring devices and components shall be designed, manufactured, tested and installed to comply with FPA 70 (National Electrical Code), UL Standards: UL498 receptacles; UL20 switches; UL508 industrial control equipment; UL 943 ground fault circuit interrupters (2003 revision); and, UL 1449 surge suppressor; NEMA standards, state and local codes and requirements of authorities having jurisdiction. Federal specifications apply to certain receptacles (WC596) and switches (WS896). Furnish and install Federal Specification grade wiring devices, complete with all accessories as indicated on the drawings and as specified hereunder.

C. Color

1. As determined by Architect, except as otherwise indicated or required by code.

D. Duplex receptacles shall be Heavy Duty Federal Specification rated for 125 volts, 20 amperes unless otherwise indicated on contract drawings and conform to WC596 standards. Receptacles shall have wire bundling clamps on all terminals including ground; terminal screws shall be #10. A full wraparound brass bridge strap shall be provided with locking finger tabs to secure the face.

1. Pass & Seymour: PS5362
2. Hubbell: HBL5352
3. Leviton: 5362

E. Duplex receptacles with ground fault circuit interrupter characteristics shall be rated for 125 volts, 20 amperes with 20 ampere feed through amperes unless otherwise indicated on contract drawings, and shall conform to the revised 2003 UL 943 standard. All receptacles shall have “SafeLock” protection that will disconnect power to the receptacle if critical components are damaged and ground fault protection is lost. All receptacles shall have “trip indicator” light to identify a tripped condition. All receptacles in bathrooms/toilets, within 6’ 0” of sink locations, exterior outlets, utility vault, in wet areas, etc. shall be ground fault type whether indicated on the drawings or not. Provide weatherproof While-in-Use covers for exterior outlets.

1. Pass & Seymour: 2094
2. Cooper: XGF20

3. Leviton: 8898

F. Toggle switches shall be full sized, heavy duty AC type rated for 120/277 volts, 20 amperes and comply with Federal Specification WS 896. Mounting strap shall be one-piece nickel plated steel with integral ground. Terminals shall external screw-pressure plate back and side wired to accept # 14 - #10 AWG wire. Contacts shall be silver alloy.

G. Combination Switch and Receptacle: Both devices in a single gang configuration with removable tab connector that permits separate or common feed connection.

	Single Pole	Double Pole	3-Way	4-Way	Locking
1. Pass & Seymour:	PS20ACI	PS20AC2	PS20AC3	PS20AC4	PS20AC-L
2. Hubbell:	HBL1221	HBL1222	HBL1223	HBL1224	HBL1221-L
3. Leviton:	1221-2	1222-2	1223-2	1224-2	1221-2L

H. Dimmers Switches: Modular full wave solid-state units with integral, quiet ON/OFF switches with audible and electromagnetic noise filters.

1. Wattage rating exceeds connected load by 30% minimum except as otherwise indicated.

2. Control: Continuously adjustable slide, toggle or rotary knob. Single pole or 3-way switch to suit connections.

3. Incandescent Lamp Dimmers: Modular dimmer switches for incandescent fixtures; switch poles and wattage as otherwise indicated, 120 volt, 60 hertz, with continuously adjustable rotary knob, toggle, or slide; single pole with soft tap or other quiet switch. Equipped with electromagnetic filter to eliminate noise, RF and TV interference, and 5-inch (127 mm) wire connecting leads.

4. Fluorescent Lamp Dimmers: Modular dimmer switches compatible with dimmer ballasts. Trim potentiometer adjusts low end dimming. Dimmer ballast combination is capable of consistent dimming to a maximum of 10 % of full brightness.

I. Pendant Cord/Connector Devices: Matching, Locking Type, Plug and Plug Receptacle Body Connector, NEMA L5-20P, L5-20R and L5-20C, Heavy Duty Grade.

1. Bodies: Nylon with screw-open cable-gripping jaws, and provision for attaching external cable grip.

2. External Cable Grip: Woven wire mesh type made of high strength galvanized steel wire strand and matched to cable diameter and with attachment provision designed for the corresponding connector.

J. Cord and Plug Sets: Match voltage, current ratings and number of conductors to requirements of equipment being connected.

1. Cord: Rubber insulated, stranded copper connectors, with type SOW-A jacket. Grounding conductor has green insulation. Ampacity is equipment rating plus

30% minimum.

2. Plug: Male configuration with nylon body and integral cable clamping jaws. Match to cord and to receptacle type intended for connection.

K. All wiring devices shall be installed in accordance with NEC Article 210 and 406.

L. Provide foam seals around all wiring device boxes in the building envelope.

2.10 WIRING DEVICE PATES

A. All normal power wiring device plates shall be high impact nylon.

1. Pass & Seymour: TP Series (3/16 ” wider/longer than standard size; captive screws for single gang)

2. Hubbell: P Series

3. Leviton: 80700 Series

B. Device plate screws shall be of the same color finish as the device plate.

2.11 OUTLET BOXES AND ACCESSORIES

A. Provide galvanized sheet steel outlet boxes for all outlets unless otherwise noted.

B. Fixture outlet boxes shall have 3/8" solid male fixture studs and auxiliary fixture stems shall be supported from 3/8" male fixture studs.

C. All outlet boxes for concealed work shall be galvanized, stamped steel; those for fixtures, furnished with a fixture stud.

D. Outlet boxes shall be of size and type to accommodate (1) structural conditions; (2) size and number of raceways, conductors or cables entering and (3) devices or fixtures for which required.

E. Install blank plates on all outlet boxes, in which no apparatus is installed, which do not integrally provide a cover for the box. Series rating of devices will not be accepted.

F. Special care shall be taken to set all boxes correctly square and true with the building finish.

G. Outlet boxes and accessories shall be as manufactured by Steel City, Appleton, Raco or equal.

2.12 DISCONNECT SWITCHES

A. All safety switches shall be NEMA Type HD and Underwriters' Laboratories listed.

B. All switches shall have switch blades which are fully visible in of OFF position with the door open. All current carrying parts shall be plated through electrolytic processed to resist corrosion and promote cool operation.

C. Switches shall be quick-make and quick-break such that, during normal operation of the switch, the operation of the contacts shall be not capable of being restrained by the operating handle after the closing or opening action of the contacts has started. The handle and mechanism shall be an integral part of the box, not the cover, with positive padlocking provisions in the OFF position.

D. Switches shall be furnished in NEMA 1 general purpose enclosures unless NEMA 3R (raintight) or NEMA 4 as required by environment. Enclosures shall be of code gauge (UL 98) sheet steel (NEMA 1) or code gauge phosphate treatment and gray baked enamel finish.

E. Switches shall be horsepower rated for 600 volts AC and all switches shall be fused type with dual element fuses.

F. Safety switches shall be Square D Class 3130 or approved equal as manufactured by General Electric or Cutler Hammer.

2.13 FUSES

A. Fuses shall be non-renewable type, UL Class J up to 600 amp, and Class L over 600 amp. Fuses shall be current limiting type with a minimum interrupting rating of 200,000 rms amp.

B. Fuses shall not be used in any switchboards or panel boards unless adequate A.C. rated circuit breakers are not available.

C. Fuses shall be manufactured by Bussman, Gould Shawmut, Little Fuse or equal.

2.14 MOLDED CASE CIRCUIT BREAKERS

A. Molded case type circuit breakers shall consist of manually operated quick-make quick-break mechanically trip free operating mechanisms for simultaneous operation of all poles, with contacts, arc interrupters and trip elements for each pole, all enclosed in molded phenolic plastic cases.

1. Their tripping units shall be of the "thermal magnetic" type having bimetallic elements for time delay overload protection and magnetic elements for short circuit protection.

2. They shall be manually operable by means of toggle type operating handles having "tripped" position midway between the "on-off" position.

3. They shall each be contained in an individual case enclosing only the number of poles required for the particular breaker.

4. All panels and individually mounted circuit breakers shall have short circuit ratings exceeding the available short circuit or the values indicated in the <u>Power System Studies</u> in this section by a factor of 1.2 with a <u>minimum</u> as follows:

a. 240V class panels/breakers

1) 10 kAIC where shown fed by a 150 kVA or less transformer
2) 22 kAIC where shown fed by a 300 kVA or less transformer

b. 480V Class Panels/Breakers shall be 65 kAIC.

5. They shall be of the "bolted-in" type.

6. Where necessary, to accommodate other requirements, their frame sizes shall be increased to conform to such requirements, frame sizes being indicated only as a reference to the minimum acceptable interrupting ratings noted above.

7. Where single pole in trip sizes 20 amps or less, they shall be rated for switching duty.

8. They shall be equipped with 5 milliamp sensitivity ground fault interrupting features where so indicated.

B. They shall be manufactured by Square D, Cutler Hammer, or General Electric.

2.15 CARTRIDGE FUSES

A. Cartridge fuses shall be as follows:

1. Provide a complete set of fuses for each item of fusible type equipment. Fusible equipment furnished by other contractors will be complete with fuses.

2. Secondary system fuses, rated at 600 volts or less, shall be UL listed and constructed in conformance with the applicable standards set forth by NEMA and ANSI. All fuses of a particular class shall be of same manufacturer.

3. Regardless of actual fault current, they shall, at full recovery voltage, be capable of safely interrupting fault currents of 200,000 amperes RMS symmetrical or 340,000 amperes RMS asymmetrical, deliverable at the line side of the fuse.

4. Circuits 0-600 amperes shall be protected by the equal of Bussman "Low Peak" current limiting fuses, LPN-RK (250 volts), LPS-RK (600 volts), UL class RK-1.

5. Fuses shall be suitable for application to fuse gaps which reject other types of fusing.

6. Supply 10 per cent spare fuses of each size and type 60 amps and less. Supply three spare fuses for each size and type over 60 amps.

B. Cartridge fuses shall be manufactured by Bussman, Gould, or EFCO.

2.16 LIGHTING FIXTURES

A. Furnish all labor, materials and equipment required for a complete installation of lighting equipment specified.

B. This Contractor shall assume all responsibility for the safe handling of all lighting fixtures, which are furnished under this Section and other accessories and lamps, until the final inspection has been made by the Owner's Engineer.

C. Special fittings and materials that may be required to support fixtures shall be supplied as well as supports or grounds required securing surface or pendant mounted fixtures on suspended ceilings unless otherwise noted. Where ductwork, pipes, type of building construction materials and structural framing members provide obstructions or difficult

support means, hanger rods shall be used in association with horizontal sections of steel support channels in a manner approved by the Owner's Engineer. Steel support channels shall be Unistrut, Kindorf, Husky Products Co., or equal. The exact mounting height of all stem supported lighting fixtures shall be determined on the job, by the Owner's Engineer.

D. Ballasts for fluorescent fixtures shall be high power factor energy savings, electronic type. Multiple lamp ballasts shall be used whenever possible. Ballasts shall be of high power factor type. The proper ballast shall be furnished and installed for all lighting fixtures normally designed for operation with ballasts, whether or not such ballasts are specifically itemized on the Fixture Schedule.

E. Furnish and install a complete set of new lamps for all fixtures. Lamps used during the construction period shall be removed and replaced with new lamps. All fluorescent lamps to be warm white or approved equal. Lamps shall be Osram / Sylvania.

F. Fixtures, part or parts thereof (including lamps) determined to be defective upon completion of the electrical installation shall be replaced by the Electrical Contractor free of charge.

G. In addition to fixture supports, surface mounted lighting fixtures shall be secured to the surface to which they mount at a minimum to two points on each 4 foot length of fixture housing, as approved, to prevent rotation or movement of the fixture out of its square and level position of alignment.

H. This Contractor shall include all fixtures, wiring, hanging, uncrating, connecting up and making ready for operation. This Contractor shall include the cost of furnishing and installing all lamps for all fixtures under this Contract. All T-8 tubes for instant-start fixtures shall be General Electric, Phillips, Osram / Sylvania or equal. All lamps shall be U.L. approved.

I. All fluorescent fixtures installed in suspended ceilings shall be supported from the building structure by chains at either end of fixture.

J. All fixtures installed in insulated ceilings shall be IC rated. Coordinate with the Architects reflected ceiling plans.

K. All fixtures installed in rated ceilings shall be one or two hour rated. Coordinate with the Architects reflected ceiling plans for ceiling rating.

L. All lighting fixtures shall be individually supported from the structural slab or structural building member. Fixtures will not be permitted to be supported from suspended ceiling or roof deck. Fixtures shall be supported in accordance with seismic requirements.

2.17 OCCUPANCY SENSORS

A. Work Included

1. Contractor's work to include all labor, materials, tools, appliances, control hardware, sensor, wire, junction boxes and equipment necessary for and incidental to the delivery, installation and furnishing of a completely operational occupancy sensor lighting control system, as described herein.

2. Contractor/Supplier shall examine all general specification provisions and drawings for related electrical work required as work under Division 16.

3. Contractor shall coordinate all work described in this section with all other applicable plans and specifications, including but not limited to wiring, conduit, fixtures, HVAC systems and building management systems.

B. Equipment Qualification

1. Products supplied shall be from a single manufacturer that has been continuously involved in the manufacturing of occupancy sensors for a minimum of five (5) years. Mixing of manufacturers shall not be allowed.

2. All components shall be U.L. listed, offer a five (5) year warranty and meet all state and local applicable code requirements.

3. Products shall be manufactured by an ISO 9002 certified manufacturing facility and shall have a defect rate of less than 1/3 of 1%.

4. Wall switch products must be capable of withstanding the effects of inrush current. Submittals shall clearly indicate the method used.

C. System Description

1. The objective of this section is to ensure the proper installation of the occupancy sensor based lighting control system so that lighting is turned off automatically after reasonable time delay when a room or area is vacated by the last person to occupy said room or area.

2. The occupancy sensor based lighting control shall accommodate all conditions of space utilization and all irregular work hours and habits.

3. Contractor shall warrant all equipment furnished in accordance to this specification to be undamaged, free of defects in materials and workmanship, and in conformance with the specifications. The supplier’s obligation shall include repair or replacement, and testing without charge to the owner, all or any parts of equipment which are found to be damaged, defective or non-conforming and returned to the supplier. The warranty shall commence upon the owner's acceptance of the project. Warranty on labor shall be for a minimum period of one (1) year.

D. Submittals

1. Manufacturer shall substantiate conformance to this specification by supplying the necessary documents, performance data and wiring diagrams. Any deviations to this specification must be clearly stated by letter and submitted.

2. Submit a lighting plan clearly marked by manufacturer showing proper product, location and orientation of each sensor.

3. Submit any interconnection diagrams per major subsystem showing proper wiring.

4. Submit standard catalog literature, which includes performance specifications indicating compliance to the specification

5. Catalog sheets must clearly state any load restrictions when used with electronic

ballasts.

E. System Operation

1. It shall be the contractor's responsibility to make all proper adjustments to assure owner's satisfaction with the occupancy system. Unless specified otherwise, the contractor shall set all time delays to no less than 15 (fifteen) minutes. Or;

a. Factory Commissioning

1) It shall be the manufacturer's responsibility to verify all proper adjustments and train owner's personnel to ensure owner's satisfaction with the occupancy system. This service is provided at an additional cost.

F. Acceptable Manufacturers

1. Hubbell Building Automation, Watt Stopper or Pre-Approved Equal: For pre-approval, provide all the information listed under section 1.04A and 1.04D a minimum of ten (10) working days prior to initial bid date.

2. The listing of any manufacturer as "acceptable" does not imply automatic approval. It is the sole responsibility of the electrical contractor to ensure that any price quotations received and submittals made are for sensors, which meet or exceed the specifications included herein.

G. Products

1. All products shall be Watt Stopper product numbers:

a. Ceiling Sensors:

W-500A, W-1000A, W-2000A, W-2000H, WPIR, DT-200, DT-205, DT-300, DT-305, DT-355, CX-100, CX-105, CI-200, CI-205, WT600, WT-05, WT1100, WT-1105, WT2200, WT-2205, WT-2250, HB-100, HB-150

b. Wall Sensors:

WI-200, WI-300, WS-200, WA-200, WA-300, WD-170, WD-180, WD-270, WD-280, WN-100

c. Power and Slave Packs:

B120E-P, B277E-P, A120E-P, A277E-P, A120C-P, A277C-P, C120E-P, C277E-P, S120/277-P, AT-120, AT-277, BZ-100

d. Low Temperature: CB-100 Outdoor Sensors: EW, EN series.

e. InteliSwitch: TS-400, TS-400-24, AS-100, AS-110

f. Daylighting Controls: LCO, LCD, LCE, LS-100, LS-301.

2. Wall switch sensors shall utilize Passive Infrared sensing technology only to detect motion.

3. Wall switch sensors shall be capable of detection of occupancy at desktop level up to 300 square feet, and gross motion up to 1000 square feet.

4. Wall switch sensors shall accommodate loads from 0 to 800 watts at 120 volts; 0 to 1200 watts at 277 volts and shall have 180˚ coverage capability.

5. Wall switch products shall utilize Zero Crossing Circuitry, which increases relay life, protects from the effects of inrush current, and increases sensor's longevity.

6. Wall switch sensors shall have no leakage current to load, in manual or in Auto/Off mode for safety purposes and shall have voltage drop protection.

7. Where specified, wall switch sensors shall provide a field selectable option to convert sensor operation from automatic-ON to manual-ON.

8. Where specified, vandal resistant wall switch sensors shall utilize a hard lens with a minimum 1.0mm thickness. Products utilizing a soft lens will not be considered.

9. Passive infrared sensors shall utilize Pulse Count Processing and Digital Signature Analysis to respond only to those signals caused by human motion.

10. Passive infrared sensors shall utilize mixed signal ASIC which provides high immunity to false triggering from RFI (hand-held radios) and EMI (electrical noise on the line), superior performance, and greater reliability.

11. Passive infrared sensors shall have a multiple segmented Lodif Fresnel lens, in a multiple-tier configuration, with grooves-in to eliminate dust and residue build-up.

12. Where specified, passive infrared and dual technology sensors shall offer daylighting foot-candle adjustment control and be able to accommodate dual level lighting.

13. Dual technology sensors shall be corner or recessed mounted to avoid detection outside the controlled area when doors are left open. Sensors shall have "auto on" or "manual on" feature.

14. Dual technology sensors shall consist of passive infrared and ultrasonic technologies for occupancy detection. Products that react to noise or ambient sound shall not be considered.

15. Ultrasonic sensors shall utilize Advanced Signal Processing to adjust the detection threshold dynamically to compensate for constantly changing levels of activity and airflow throughout controlled space.

16. Ultrasonic operating frequency shall be crystal controlled to within plus or minus 0.005% tolerance to assure reliable performance and eliminate sensor cross-talk. Sensors using multiple frequencies are not acceptable.

17. All sensors shall be capable of operating normally with electronic ballasts, PL lamp systems and rated motor loads.

18. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air

conditioner or heating fans.

19. All sensors shall have readily accessible, user adjustable settings for time delay and sensitivity. Settings shall be located on the sensor (not the control unit) and shall be recessed to limit tampering.

20. In the event of failure, a bypass manual override shall be provided on each sensor. When bypass is utilized, lighting shall remain on constantly or control shall divert to a wall switch until sensor is replaced. This control shall be recessed to prevent tampering.

21. All sensors shall provide an LED as a visual means of indication at all times to verify that motion is being detected during both testing and normal operation.

22. Where specified, sensor shall have an internal additional isolated relay with Normally Open, Normally Closed and Common outputs for use with HVAC control, Data Logging and other control options. Sensors utilizing separate components or specially modified units to achieve this function are not acceptable.

23. All sensors shall have UL rated, 94V-0 plastic enclosures.

H. Circuit Control Hardware - CU

1. Control Units - For ease of mounting, installation and future service, control unit(s) shall be able to externally mount through a 1/2" knock-out on a standard electrical enclosure and be an integrated, self-contained unit consisting internally of an isolated load switching control relay and a transformer to provide low-voltage power. Control unit shall provide power to a minimum of two (2) sensors.

2. Relay Contacts shall have ratings of:

   a. 13A - 120 VAC Tungsten
   b. 20A - 120 VAC Ballast
   c. 20A - 277 VAC Ballast

3. Control wiring between sensors and controls units shall be Class II, 18-24 AWG, stranded U.L. Classified, PVC insulated or TEFLON jacketed cable suitable for use in plenums, where applicable.

4. Minimum acceptable wire gauge from the circuit control hardware relays shall be #14 AWG.

I. Installation

1. It shall be the contractor's responsibility to locate and aim sensory in the correct location required for complete and proper volumetric coverage within the range of coverage(s) of controlled areas per the manufacturer's recommendations. Rooms shall have ninety (90) to one hundred (100) percent coverage to completely cover the controlled area to accommodate all occupancy habits of single or multiple occupants at any location within the room(s). The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms, which are to be provided with sensors. The contractor shall provide additional sensors if required to properly and completely cover the respective room. Power/switch packs may or may not be indicated on the drawings. It shall be the contractor’s responsibility to provide and install all power/switch

packs required to make the system fully operational. Locations of power/switch packs may be determined in the field by the contractor unless specified otherwise, but must be readily accessible for future servicing. Usually, a minimum of one (1) power/switch pack is required per circuit and/or area of control. However, in some cases additional power/switch packs may be required. Contact manufacturer for final determination of power/switch packs required for this project.

2. It is the contractor's responsibility to arrange a pre-installation meeting with the manufacturer's factory authorized representative, at the owner's facility, to verify placement of sensors and installation criteria.

3. Proper judgment must be exercised in executing the installation so as to ensure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference of structural components. The contractor shall also provide, at the owner's facility, the training necessary to familiarize the owner's personnel with the operation, use, adjustment, and problem solving diagnosis of the occupancy sensing devices and systems.

J. Factory Commissioning

1. Upon completion of the installation, the system shall be completely commissioned by the manufacturer's factory authorized technician who will verify all adjustments and sensor placement to ensure a trouble-free occupancy-based lighting control system. This service is provided at an additional cost.

2. The electrical contractor shall provide both the manufacturer and the electrical engineer with 15 working days written notice of the scheduled commissioning date. Upon completion of the system fine-tuning the factory authorized technician shall provide the proper training to the owner's personnel in the adjustment and maintenance of the sensors. The contractor shall provide all lifts and/or ladders and one technician to assist in the commissioning. Prior to commissioning, the contractor shall verify that all sensors and associated power supplies/relays are installed and all wiring properly terminated.

3. The system must be completely operational and all time delays adjusted per the specification

4. The manufacturer's factory authorized technician shall, upon completion of the commissioning, provide a written report to the electrical contractor and the electrical engineer indicating completion of the work.

5. This report shall also indicate any corrective actions required on the part of the electrical contractor to the system.

2.18 FIRE ALARM SYSTEM – EXTENSION

A. General: The present building is equipped with a selective coded/non-coded fire alarm system manufactured by Notifier. The New Addition's fire alarm system shall be an extension of this system, integrated to provide a complete complex system.

1. Furnish and install an addition to the existing closed circuit, electrically supervised automatic and manual, (zone coded) local energy, auxiliary fire alarm system, according to the following Specification. The system shall be wired, connected, tested and left in first class operating condition. The equipment and

completed installation shall be in compliance with local and national codes, authorities having jurisdiction and in accordance with applicable sections of the latest edition of NFPA 72 for auxiliary fire alarm systems. All equipment shall be listed by Underwriters' Laboratories, Incorporated and shall meet Americans with Disabilities Act (ADA), NFPA72 and with the approval of the State Fire Marshal.

2. Contractor shall provide a budgetary allowance for fire watch in his bid. If the existing system is off-line for more than 4 hours the Contractor shall be responsible to negotiate with local AHJ for hours, fees and number of personnel to perform the fire watch with associated project. No additional compensations shall be permitted.

3. All new equipment shall be provided by the manufacturer of the existing equipment for complete number compatibility with the existing system and to provide one (1) manufacturer with total responsibility for the entire system operation, warranty and maintenance. No other manufacturer will be considered acceptable. Match existing devices to whatever extent is possible.

4. All final connections, programming, testing and adjusting of the system shall be done under the direct supervision of the system supplier. After completion of the installation, a trained technician employed by the system supplier shall demonstrate the system to be satisfaction of the Owner's Representative and shall make all additional adjustments to the system operation as required by the Owner's Representative as a result of this demonstration.

5. Warrant the new equipment to be free from defects in material and workmanship and within one (1) year from date of installation, repair or replace all or any part of the equipment found to be defective at no cost to the Owner.

B. Shop Drawings

1. System Shop Drawings are required to be submitted for approval, containing the following information:

   a. A detailed list of each new piece of equipment with model numbers for each component.
   b. Manufacturer's Specification Sheets on each item of equipment.
   c. Confirmation that the manufacturer's representative will provide jobsite supervision during the installation of the system, perform the final testing of the system and instruct the operating personnel on the operation of the system.
   d. Detailed one (1) line schematic wiring diagrams of the system and its interconnecting wiring. Typical wiring diagram will not be accepted. All data submitted shall be complete for all equipment and shall apply only to this specific project. All extraneous material shall be deleted.
   e. Provide revised battery and circuit calculations reflecting all new and existing devices. Circuit calculations shall demonstrate proper consideration of wire size, circuit loading and spare capacity allowances.
   f. Shop Drawings that are submitted for approval without all of this information will not be considered for approval.

C. Operation

1. The activation of any manual fire alarm station or the automatic actuation of any thermal detector, ceiling smoke detector, duct smoke detector, sprinkler system

water flow switch or any other approved alarm initiating device shall immediately result in the following:

a. The existing master box shall trip, causing the Fire Department to be notified.
b. The zone in alarm shall light its respective alarm lamp or display the appropriate alarm message on the system LCD at the fire alarm control panel and at all remote fire alarm annunciators.
c. All audible alarm signals (existing and new) shall sound, and all visual units shall flash in a synchronized fashion.
d. All smoke doors (existing and new) shall automatically close.
e. Upon activation of an elevator lobby smoke detector or other designated recall device, recall all elevators to the ground floor or an alternate level as required by the local authority having jurisdiction. Provide for shunt tripping of elevator power as shown and in accordance with applicable codes.

2. Certain duct smoke detectors shall activate damper control circuits as indicated in addition to their fire alarm system function.

3. Provide 24 volt DC power to the new LCN door closers from the fire alarm control panel.

D. Equipment

1. Fire Alarm Control Panel

a. Modify and expand the existing fire alarm control panel to provide for proper system operation from both new and existing devices. Provide new control panel modules incorporated into the existing cabinets, with 200 percent extra cabinet capacity for future system expansion capability. The operating controls and zone and supervisory indicators shall be located behind a locked door with a full size tempered glass viewing window. All control modules shall be labeled, all zone locations shall be identified and the panel shall be provided with a set of permanently mounted operating instructions. The panel shall contain the following modules.

b. A control module shall be provided to act as a central processing and indicating location for the fire alarm system. It shall include acknowledge, reset, LED test and trouble silence switches, annunciator trouble, system trouble and earth LED's and a trouble sonalert and an alphanumeric LCD. The control module shall also be provided with an alarm resound feature to permit subsequent alarms to resound the signals.

c. Provide Class "A" four (4) wire loop style alarm initiating circuit modules with two (2) electrically supervised, normally open circuits, monitoring for alarm (shorts), trouble (opens) and ground faults. The modules shall provide alarm and trouble LED's, LED test (from control), alarm annunciator outputs and alarm resound with flasher acknowledge (from control). They shall also be equipped with zone test and disconnect switches which match the existing configuration. They shall allow the mixing of smoke detectors, heat detectors, flow switches and other initiation devices on the same zone, without the use of limiting resistors at manual stations and detectors and without using a separate source of power for the detectors.

d. Provide Class "A" four (4) wire loop style notification appliance circuit modules for control and supervision of the audible and visual signals. Each signal circuit shall have a trouble LED and fuse. Supervision shall be provided for opens, shorts and earth grounds.

e. Provide adequate power supply module supplying 6 amperes each of continuous filtered power. The power supply shall be capable of furnishing the system power and power for devices such as duct smoke detectors, auxiliary relays, door holders, and notification appliances, etc. It shall contain a normal power LED, battery trouble LED and power supply trouble LED, all viewable on front of enclosure. Where power supplies are in separate or remote enclosures, they shall be supervised by the FACP for loss of AC power, battery fail, and ground fault, and each notification appliance circuit served shall be individually supervised.

f. Provide terminal connectors and harnesses for field connections of remote annunciators, or for the modules' auxiliary contacts. Each connector shall have provisions for at least sixteen (16) separate points and shall be fastened securely on the rack end.

g. Provide any and all modules and modifications including system programming to the fire alarm control panel necessary for proper system operation.

h. Remote Annunciators

1) Modify the existing annunciators to provide capacity for the new fire alarm zones.
2) Provide additional modules for zone annunciation to match existing.

i. Manual Fire Alarm Stations

1) Match existing double action, semi-flush, non-coded stations shall be furnished where shown on Plans. A downward pull of the lever shall actuate a positive snap action switch. Station shall remain actuated until the station is reset by means of a key furnished with each station.

j. Thermal Detectors

1) Furnish and install, where shown, the following low profile, matte white:

a) 135°F rate of rise fixed temperature type.
b) 190°F fixed temperature type.

k. Smoke Detectors

1) Furnish and install, where indicated on the Plans, microprocessor-based analog/addressable photoelectric smoke detectors which match existing devices.
2) Detectors shall be listed by Underwriters' Laboratories, Incorporated under the current standards for photoelectric type smoke detectors, UL 268.
3) Each detector shall be designed to latch into alarm following a predetermined alarm verification time allowance. An alarm

condition shall be indicated by a red LED indicator. Supervised remote LED alarm indicators shall be connected to detectors where shown on the Plans.

4) For ease of maintenance and installation, detectors shall utilize a separate base assembly having screw terminals for external wire connections. The base assembly shall mount on a standard 4 inches (10.16cm) square or 4 inches (10.16cm) octagonal outlet box.

5) Provide a base with each smoke detector, except for locations requiring auxiliary functions. Provide a base with integral auxiliary relay for those locations.

l. Duct Mounted Smoke Detectors

1) Furnish and install photoelectric air duct smoke detectors which match existing to operate directly from the fire alarm panel power supply. It shall have a detection chamber capable of being removed without breaking conduit connections or requiring an access panel in the duct. Each detector shall have a remote test and annunciating station. The detector shall have two associated programmable alarm relay contacts

m. Programmable Modules

a) Furnish and install addressable monitor modules to monitor waterflow, tamper or other related dry contact status inputs.

b) Furnish and install addressable control modules to provide programmable auxiliary contact outputs from the system. Each contact shall be rated for 2 amps @24VDC or .5 amps @ 120VAC.

n. Audio Visual Alarm Signals

1) Furnish and install combination audio/visual alarm assemblies, except where noted.

2) Audible signals shall match existing and produce a sound output of 85dba at 10 feet, or 15dba above ambient; whichever is greater.

3) Provide xenon strobe visual signals with a minimum effective intensity of 15 candela or otherwise shown or required in accordance with UL1971, ADA and NFPA72.

E. Installation

1. Furnish and install, in accordance with manufacturer's instructions, all wiring, conduit and outlet boxes required for the installation of the complete system as specified and described herein and as shown on the Drawings. Ensure that any new work or wiring performed within the new area shall in no way impair or adversely affect the performance of the existing building's fire alarm system in areas adjacent to the new area.

2. All wiring shall be of the same approved type as used for electric light and power wiring and shall meet the requirements of National Electric Codes. The sizes of the different wires shall be no smaller than #14 AWG. Color codes shall be used throughout. All wires shall be tagged at all junction points and shall test free from grounds or crosses between conductors. The wiring color code system shall be carried right through all equipment.

3. Final connections between the new equipment, the wiring system (and the existing equipment) shall be made under direct supervision of a Factory-Trained Manufacturer's Representative.

F. Manufacturer's Guarantee and Final Test

1. The Installing Contractor shall guarantee all equipment and wiring free from inherent mechanical and electric defects for a period of one (1) year from date of final test and acceptance form.

2. The manufacturing, supplying and servicing company of the previously specified system shall be a single responsibility. All equipment shall carry the original manufacturer's label, part number and UL/FM listing. Multiple suppliers will not meet the intent of a single responsibility for the total system concept.

3. The manufacturer of this equipment shall maintain local offices within fifty (50) miles of installation for prompt and efficient service when required. Manufacturers without local service facilities and equipped accordingly shall not be considered equal under these Specifications.

4. Provide a complete final test and recertification of the modified system if accordance with NFPA72 and UL procedures. The tests shall be witnessed and conducted under the direction of the local Authority Having Jurisdiction. A complete test report, riser diagram, address directory and as-built drawings and UL certificate shall be provided as part of the final as-built documentation.

PART 3 - EXECUTION

3.01 SPECIAL COORDINATION INSTRUCTIONS

A. Coordination with the work of other trades is referred to within various parts of this Section of the Specifications. The following special instructions shall also be carefully noted:

1. Locations and mounting height of all wall outlets and lighting fixtures shall be as specified on the electrical, architectural drawings, and as required by the latest edition of national and local codes.

2. All feeder, branch circuit or auxiliary system wiring passing through pull boxes and/or being made up in panel boards shall be properly grouped, bound and tied together in a neat and orderly manner in keeping with the highest standards of the trade, with plastic cable ties.

3. All duplex convenience and power receptacles shall be mounted vertically with the grounding post to the bottom as the outlet is viewed from the front.

4. All miscellaneous hardware and support accessories, including support rods, nuts, bolts, screws and other such items shall be of a galvanized or cadmium plated finish, or of other approved rust-inhibiting coatings. Care should be taken that fixtures shall not be installed on both sides of existing or new building expansion joints.

5. The Electrical Contractor shall provide all materials, equipment and workmanship to provide for adequate protection of all electrical equipment during the course of construction of the project.

6. The Electrical Contractor shall furnish and install approved details for all insulation at terminal connection points for all electrical conducting materials, such as transformer terminals, terminal studs, and at any other special locations as directed by the Engineer and confirmed by the Owner.

7. The Electrical Contractor shall provide GFI rated and weatherproof rated equipment in damp or wet locations. All GFCI receptacles shall be mounted in readily accessible location as required by NEC 210.8

8. Coordination with local utility companies with the local utility companies and the local Fire Department is required. Electrical Contractor shall obtain all necessary permits and file all required applications and meet all utility company requirements.

9. Any outlet box shall not be mounted back to back on any wall of any rotating. Maintain the code clearances when boxes are mounted back to back.

3.02 COOPERATION AND WORK PROGRESS

A. The electrical work shall be carried on under the usual construction conditions, in conjunction with all other work at the site. The Electrical Contractor shall cooperate with the Engineer and all contractors and equipment suppliers working on the site coordinate the work and proceed in a manner so as not to delay the progress of the project.

B. The Electrical Contractor shall be responsible to coordinate the exact mounting arrangement and location of equipment indicated on the drawings to allow for proper space requirements for equipment access, operation and maintenance.

C. It shall be the responsibility of the Electrical Contractor to coordinate the delivery of electrical equipment to the project prior to the time of installation or equipment.

3.03 INSTALLATION OF WIRING & CONDUIT

A. In general all conduits shall be run concealed behind new plywood wall unless otherwise indicated to be run exposed.

B. Exposed conduits shall be run parallel to or at right angles to the walls of the building and all bends shall be made with standard conduit ells or conduits bent to, not less than, the same radius. Horizontal runs of exposed conduits shall be close to ceiling beams, passing over water or other piping where possible and shall be supported by pipe straps or by other approved means, not more than 5' apart. Installation of exposed conduits in finished areas of the building shall be checked with the Engineers, Architect, and Owner for layout before installation to conform to the pattern of the structural members, and when completed, is to present the most obtrusive appearance possible. No exposed conduits will be permitted on walls or partitions in public areas.

C. In no place shall a conduit be run within 3" of hot water pipes or appliances, except where crossing is unavoidable and in that case, the conduit shall be kept at least 1" from covering or pipe crossed.

D. Conduits shall be supported on approved galvanized wall brackets, ceiling trapeze, strap hangers or pipe straps, secured by means of toggle bolts on hollow masonry units or expansion bolts in concrete or brick.

E. In general, no splices or joints will be permitted in either feeder or branches except at outlets or accessible junction boxes. No splices shall be made in security or fire alarm systems.

F. All splices in wire #8 AWG and smaller shall be standard pigtail, made mechanically tight and insulated with proper thickness of insulating tape. Wire splicing nuts as manufactured by; Minnesota Mining Company (Scotch Lock) or Ideal wire nuts shall be used, subject to the local wire inspector.

3.04 GROUNDING

A. For each feeder or run of lighting and appliance branch circuitry include equipment and raceway grounding conductors run within the raceways. The indicated quantities of conductors do not include the ground wires.

B. Conductors utilized for grounding and bonding shall have type of insulation, comparable to the phase conductors, color coded green.

3.05 SLEEVES, INSERTS, AND SUPPORTS

A. Furnish and install all inserts, conduit hangers, anchors and steel supports necessary for the support and installation of all electrical equipment.

B. Where openings are required in walls and floors for the passing of raceways the Electrical Contractor shall furnish the General Contractor with the necessary information

regarding dimensions and locations so that he may install suitable concrete stops to provide these openings. Such openings shall be by the General Contractor in such a manner so as to interfere with the fireproof integrity of the building.

C. The Electrical Contractor will be held responsible for the location of the maintaining in proper position, sleeves, inserts and anchor bolts supplied and/or set in place by him. In the event that failure to do so required cutting and patching of finished work, such work shall be done at the Electrical Contractor's expense by the General Contractor.

3.06 FINAL INSPECTION AND TEST

A. Prior to test, feeders and branches shall be continuous from service contact point to each outlet include: all panels, feeders and devices. Test system free from short circuits and grounds with insulation resistances not less than outlines in the National Electrical Code. Provide testing equipment necessary and conduct test in presence of the Owner's representative.

B. Furnish all labor, material, instruments, supplies and services and bear all costs for the accomplishment of tests herein specified. Correct all defects appearing under test, repeat the tests until no defects are disclosed. Leave the equipment clean and ready for use.

C. The Electrical Contractor shall perform any test other than herein specified which may be specified by legal authorities or by agencies to whose requirements this work is to conform.

D. All equipment and material furnished by the Electrical Contractor shall operate under all conditions of load without objectionable noises or vibrations, which in the opinion of the Owner's Engineer, is objectionable. Where sound or vibration conditions arise which are considered objectionable by the Owner's Engineer, the Electrical Contractor shall eliminate it in a manner approved by the Owner's Engineer.

E. Final inspection and test report shall be provided for the following:

1. Testing of the impedance of the grounding system.
2. Testing of each outlet.
3. Testing of branch and feeder conductors for continuity.
4. Testing, targeting and focusing of all adjustable lighting fixtures.

3.07 BRANCH CIRCUITRY

A. For all lighting and appliance branch circuitry, raceway sizes shall conform to industry standard maximum permissible occupancy requirements except where these are exceeded by other requirements specified elsewhere.

B. Circuits shall be balanced on phases at their supply as evenly as possible.

C. Feeder connections shall be in the phase rotation which establishes proper operation for all equipment supplied.

D. Reduced size conductors indicated for any feeders shall be taken as their grounding conductors.

3.08 REQUIREMENTS GOVERNING ELECTRICAL WORK IN DAMP OR WET LOCATIONS

A. Outlets and outlet size boxes shall be of galvanized cast ferrous metal only.

B. The finish of threaded steel conduit shall be galvanized only.

C. Wires for pulling into raceways for lighting and appliance branch circuitry shall be limited to "THWN".

D. Wires for pulling into raceways for feeders shall be limited to "THWN".

E. Final connections of flexible conduit shall be neoprene sheathed.

F. Apply one layer of half looped plastic electric insulating tape over wire nuts used for joining the conductors of wires.

G. Enclosures, junction boxes, pull boxes, cabinets, cabinet trims, wiring troughs and the like, shall be fabricated of galvanized sheet metal, shall conform to the following:

1. They shall be constructed with continuously welded joints and seams.

2. Their edges and weld spots shall be factory treated with cold galvanizing compound.

3. Their connection to circuitry shall be by means of watertight hub connectors with sealing rings.

H. Enclosures for individually mounted switching and overcurrent devices shall be NEMA Class IV weatherproof construction.

I. The covers, doors and plates and trims used in conjunction with all enclosures, pull boxes, outlet boxes, junction boxes, cabinets and the like shall be equipped with gaskets.

J. The following shall be interpreted as damp or wet locations within building confines:

1. Spaces where any designations indicating weatherproof (WP) or vapor-proof appear on the drawings.

2. Below waterproofing in slabs applied directly on grade.

3. Spaces defined as wet or damp locations by article 100 of the National Electric Code.

3.09 REQUIREMENTS GOVERNING ELECTRIC WORK IN AIR HANDLING SPACES

A. Within air handling ductwork or plenums (other than spaces within suspended ceilings used for air handling purposes): Area B and the media shall comply with requirements for return air plenums.

1. Abide by the requirements specified for electric work in damp locations within building confines.

2. Where circuitry passes through duct walls, include, in accordance with instructions issued in the field, airtight sealing provisions which allow for a relative movement between the circuitry and the duct walls.

3. Exclude the installation of type NM or NMC cable.

B. In spaces within suspended ceilings used for air handling purposes, abide by the requirements specified for normal electric work conditions except:

1. Lighting fixtures recessed into the ceilings shall be certified as being suitable for this purpose.

3.10 IDENTIFICATION AND TAGGING

A. Identify individually:

1. Each panelboard.
2. Each switch and circuit breaker.
3. Each feeder, wire or cable of all systems.
4. Each outlet.

B. Each wire or cable in a feeder shall be identified at its terminal points of connection and in each pullbox, junction box and panel gutter through which it passes.

C. The nomenclature used to identify panelboards or load center shall designate the numbers assigned to them.

D. The nomenclature used to identify switches or circuit breakers shall:

1. Where they disconnect mains or services designate this fact.

2. Where they control feeders, designate the feeder number and the name of the load supplied.

3. Where they control lighting and appliance branch circuitry, designate the name of the space and the load supplied.

E. The nomenclature used to identify feeder wires and cables shall designate the feeder number.

F. Identification for panelboards or load centers shall be by means of engraved lamacoid nameplates showing 1/4" high white lettering on a black background fastened to the outside face of the front.

G. Identification for switches or circuit breakers shall be by means of the following:

1. Where individually enclosed -- engraved lamacoid nameplates showing 1/8" high white lettering on a black background fastened on the outside front face of the enclosure.

2. Where in panelboards or load centers without doors -- same as for individually enclosed.

3. Where in panelboards or load centers with doors -- typewritten directories mounted behind transparent plastic covers, in metal frames fastened on the inside face of the doors.

H. Identification for wires and cables shall be by means of wrap around "brady" type labels.

I. Device plates for local toggle switches, toggle switch type motor starters, pilot lights and the like, whose function is not readily apparent shall be engraved with 1/8" high letters suitably describing the equipment controlled or indicated.

J. These identification letters shall be stamped into the metal of the bus bars of each phase of the main busses of each switchboard and each panelboard. The letters shall be visible from at least one "normal posture" location without having to demount any current carrying or supporting elements.

K. Identify each outlet box, junction box, and cabinet used in conjunction with empty raceway for wires of a future system by means of indelible markings on the inside denoting the system.

L. Prior to installing identifying tags and nameplates, submit their nomenclature for approval. Conform to all revisions issued by the Architect.

3.11 LIMITING NOISE PRODUCED BY ELECTRICAL INSTALLATION

A. Perform the following work, in accordance with field instructions issued by the Architect to assure that minimal noise is produced by electrical installations due to equipment furnished as part of the electrical work.

B. Check and tighten the fastenings of sheet metal plates, covers, doors and trims used in the enclosures of electrical equipment.

C. Remove and replace any individual device containing one or more magnetic flux path metallic cores (e.g., discharge lamp ballast, transformer, reactor, dimmer, solenoid) which is found to have a noise output exceeding that of other identical devices installed at the project.

3.12 SUPPORTS AND FASTENINGS

A. Support work in accordance with best industry standards and Mass. Electric Code.

B. Include supporting frames or racks for equipment, intended for vertical surface mounting, which is required in a free standing position.

C. Supporting frames or racks shall be of standard angle, standard channel or specialty support system steel members. They shall be rigidly bolted or welded together and adequately braced to form a substantial structure. Racks shall be of ample size to assure a workmanlike arrangement of all equipment mounted on them.

D. No work intended for exposed installation shall be mounted directly on any building surface. In such locations, flat bar members or spacers shall be used to create a minimum of 1/4" air space between the building surfaces and the work. Provide 3/4" thick exterior grade plywood painted with two coats of fire-retardant gray paint for mounting of panelboards.

E. Nothing (including outlet, pull and junction boxes and fittings) shall depend on electric conduits, raceways or cables for support.

F. Nothing shall rest on, or depend for support on, suspended ceiling media.

G. Support less than 2" trade size, vertically run, conduits at intervals no greater than 8 ft. Support such conduits, 2-1/2" trade size or larger, at intervals no greater than the story height, or 15 ft., whichever is smaller.

H. Where they are not embedded in concrete, support less than 1" trade size, horizontally run, conduits at intervals no greater than 7 ft. Support such conduits, 1" trade size or larger, at intervals no greater than 10 ft.

I. Support all lighting fixtures directly from structural slab, deck or framing member.

J. Where fixtures and ceilings are such as to require fixture support from ceiling openings frames, include in the electric work the members necessary to tie back the ceiling opening frames to ceiling suspension members or slabs so as to provide actual support for the fixtures noted above.

K. As a minimum procedure, in suspended ceilings support small runs of circuitry (e.g., conduit not in excess of 1 inch trade size) from ceiling suspension members as defined above. Support larger runs of circuitry directly from structural slabs, decks or framing members.

L. Fasten electric work to building structure in accordance with the best industry practice.

M. Floor mounted equipment shall not be held in place solely by its own dead weight. Include floor anchor fastenings in all cases.

N. For items which are shown as being ceiling mounted at locations where fastenings to the building construction element above is not possible, provide suitable auxiliary channel or angle iron bridging tying to building structural elements.

O. As a minimum procedure, where weight applied to the attachment points is 100 lbs. or less, fasten to concrete and solid masonry with bolts and expansion shields.

P. As a minimum procedure, where weight applied to building attachment points exceeds 100 lbs., but is 300 lbs. or less, conform to the following:

1. At field poured concrete slabs, utilize inserts with 20' minimum length slip-through steel rods, set transverse to reinforcing steel

3.13 SPLICING AND TERMINATING WIRES AND CABLES

A. Maintain all splices and joints in removable cover boxes or cabinets where they may be easily inspected.

B. Locate each completed conductor splice or joint in the outlet box, junction box, or pull box containing it, so that it is accessible from the removal cover side of the box.

C. Join solid conductors No. 8 AWG and smaller by securely twisting them together and soldering, or by using insulated coiled steel spring "wire nut" type connectors. Exclude "wire nuts" employing non-expandable springs. Terminate conductors No. 8 AWG and

smaller by means of a neat and fast holding application of the conductors directly to the binding screws or terminals of the equipment or devices to be connected.

D. Join, tap and terminate stranded conductors No. 6 AWG and larger by means of solder sleeves, taps; and lugs with applied solder or by means of bolted saddle type or pressure indent type connectors, taps and lugs. Exclude connectors and lugs of the types which apply set screws directly to conductors. Where equipment or devices are equipped with set screw type terminals which are impossible to change, replace the factory supplied set screws with a type having a ball bearing tip. Apply pressure indent type connectors, taps and lugs utilizing tools manufactured specifically for the purpose and having features preventing their release until the full pressure has been exerted on the lug or connector.

E. Except where wire nuts are used, build up insulation over conductor joints to a value, equal both in thickness and dielectric strength, to that of the factory applied conductor insulation. Insulation of conductor taps and joints shall be by means of half-lapped layers of rubber tape, with an outer layer of friction tape; by means of half-lapped layers of approved plastic electric insulating tape; or by means of split insulating casings manufactured specifically to insulate the particular connector and conductor, and fastened with stainless steel or non-metallic snaps or clips.

F. Exclude splicing procedures for neutral conductors in lighting and appliance branch circuitry which utilize device terminals as the splicing points.

G. Exclude joints or terminations utilizing solder in any conductors used for grounding or bonding purposes.

H. Exclude all but solder or pressure indent type joints in conductors used for signaling or communications purposes.

I. Lugs for conductors used to make phase leg connections on the line side of the main service overcurrent and switching device shall be of the limiter type.

3.14 PULLING WIRES INTO CONDUITS AND RACEWAYS

A. Delay pulling wires or cables in until the project has progressed to a point when general construction procedures are not liable to injure wires and cables, and when moisture is excluded from raceways.

B. Utilize nylon snakes or metallic fish tapes with ball type heads to set up for pulling. In raceways 2" trade size and larger, utilize a pulling assembly ahead of wires consisting of a suitable brush followed by an 3-1/2" diameter ball mandrel.

C. Leave sufficient slack on all runs of wire and cable to permit the secure connection of devices and equipment.

D. Include circular wedge-type cable supports for wires and cables at the top of any vertical raceway longer than 20 feet. Also include additional supports spaced at intervals which are no greater than 10'. Supports shall be located in accessible pull boxes. Supports shall be of a nondeteriorating insulating material manufactured specifically for the purpose.

E. Pulling lubricants shall be used. They shall be products manufactured specifically for the purpose.

F. Slack on wires and cables located in cabinets and pull boxes shall be formed and set in place in groupings corresponding to their occupancy of raceways. They shall also be arranged, with insulators and supports provided where necessary, such that cable shims or other such temporary expedients do not have to be left permanently in place to prevent the wires and cables from shifting when covers or trims are removed.

3.15 REQUIREMENTS FOR THE INSTALLATION OF JUNCTION BOXES, OUTLET BOXES AND PULL BOXES

A. Flush wall mounted outlet boxes shall not be set back to back but shall be offset at least 24" horizontally regardless of any indication on the drawings.

B. Locate all boxes so that their removable covers are accessible without necessitating the removal of parts of permanent building structure, including piping, ductwork, and other permanent mechanical elements.

C. In conjunction with concealed circuitry, abide by one of the following instructions (as may be applicable to the conditions) in order to assure the aforementioned accessibility. (Not required for circuitry concealed by removable suspended ceiling tiles.)

1. For a small (outlet size) box on circuitry concealed in a partition or wall, locate box or fitting so that its removable cover side (or the face of any applied raised cover) penetrates through to within 1/8" a of the exposed surface of the building materials concealing the circuitry and apply a blank or device plate to suit the functional requirements.

2. For a large box on circuitry concealed in a partition, suspended ceiling, or wall, locate box totally hidden but with its removable cover directly behind an architectural access door or panel (included for the purpose, separate from the electric work) in the building construction which conceals the circuitry.

3. For a small (outlet size) box on circuitry concealed above and intended as an outlet for a surface mounted lighting fixture or other such electrical item, locate box so that its removable cover side penetrates through to the exposed surface of the building materials concealing the circuitry. Arrange the mounting of the lighting fixture or other item so that it completely covers the opening in the building construction caused by the box.

4. For a small (outlet size) box on circuitry concealed in a suspended ceiling, and intended as an outlet for a non-demountable type of recessed lighting fixtures or other such electrical items, locate box totally hidden but with its removable cover not more than one foot away from the building construction opening occupied by the demountable items.

D. Apply junction and pull boxes in accordance with the following:

1. Include pull boxes in long straight runs of raceway to assure that cables are not damaged when they are pulled in.

2. Include junction and pull boxes to assure a neat and workmanlike installation of raceways.

3. Include junction and pull boxes to fulfill requirements pertaining to the limitations to the number of bends permitted in raceway between cable access points, the accessibility of cable joints and splices, and the application of cable supports.

4. Include all required junction and pull boxes regardless of indications on the drawings (which, due to symbolic methods of notation, may omit to show some of them).

E. Apply outlet boxes in accordance with the following:

1. Unless noted below or otherwise specifically indicated, include a separate outlet box for each individual wiring device, lighting fixture and signal or communication system outlet component. Outlet boxes supplied attached to lighting fixtures shall not be used as replacements for the boxes specified herein.

2. A continuous row of fixtures of the end-to-end channel type, designed for "through wiring," and wired in accordance with the specification hereinafter pertaining to circuitry through a series of lighting fixtures, may be supplied through a single outlet box.

3. A series of separate fixtures, designed for "through wiring," spaced not more than 4' apart, and inter- connected with conduit or raceway and circuitry which is in accordance with the specifications hereinafter pertaining to circuitry through a series of lighting fixtures, may be supplied through a single outlet box.

4. Connection to recessed ceiling fixtures supplied with pigtails may be arranged so that more than one, but not more than four, such fixtures are connected into a single outlet box. When adopting this procedure:

a. Utilize an outlet box no smaller than 5" square by 2-1/2" deep.

b. Allow no fixture to be supplied from an outlet box in another room.

5. Multiple local switches indicated at a single location shall be gang mounted in a single outlet box.

6. Include all required outlet boxes regardless of indications on the drawings (which due to symbolic methods of notation, may omit to show some of them).

F. Install junction boxes, pull boxes and outlet boxes in accordance with the following:

1. Exclude surface mounted outlet boxes in conjunction with concealed circuitry.

2. Exclude unused circuitry openings in junction and pull boxes. In larger boxes each such opening shall be closed with a galvanized sheet steel plate fastened with a continuous weld all around. In small outlet type boxes, utilize plugs as specified for such boxes.

3. Close up all unused circuitry openings in outlet boxes. Unused openings in cast boxes shall be closed with approved cast metal threaded plugs. Unused openings in sheet metal boxes shall be closed with sheet metal knock-out plugs.

4. Outlet boxes for switches shall be located at the strike side of doors. Indicated door swings are subject to field change. Outlet boxes shall be located on the basis of final door swing arrangements.

5. Boxes and plaster covers for duplex receptacles shall be arranged for vertical mounting of the receptacle.

6. Equip outlet boxes used for devices which are connected to wires of systems supplied by more than one set of voltage characteristics with barriers to separate the different systems.

G. Barriers in junction and pull boxes of outlet size shall be of the same metal as the box.

H. Barriers in junction and pull boxes which are larger than outlet size shall be of the polyester resin fiberglass of adequate thickness for mechanical strength, but in no case less than 1/4" thick. Each barrier shall be mounted, without fastenings, between angle iron guides so that they may be readily removed.

3.16 LOCATING AND ROUTING OF CIRCUITRY

A. In general, all circuitry shall be run concealed except that it shall be run exposed where the following conditions occur:

1. Horizontally at the ceiling of permanently unfinished spaces which are not assigned to mechanical or electrical equipment.

2. Horizontally and vertically in mechanical equipment spaces.

3. Horizontally and vertically in electric equipment rooms.

B. Concealed circuitry shall be so located that building construction materials can be applied over its thickest elements without being subject to spalling or cracking.

C. All circuitry and raceways shall not be run within slabs. If for field conditions requires raceways to be embedded in field poured structural building construction concrete fill or slab shall conform to the following:

1. All proposed embedded raceways shall be indicated on plan and elevation and submitted to the Architect and Structural Engineer for review and written approval prior to installation. Any costs associated with the review and approval shall be borned by the Electrical Subcontractor.

2. They shall be run "single layer" with their outside surface no closer than 1" to any surface of the structural concrete.

3. They shall not be located in any configuration which places the outside surface of one closer than 3" to the outside surface of another, except at tees, crosses or other single level wide angle junction points.

4. Where crossovers or close grouping are unavoidable, circuitry shall be carefully field coordinated so as not to cause structural weakness.

5. Where turned up or down into a wall or partition they shall, before entering same, be routed parallel for a long enough distance to assure that no relocation of the wall or partition will be necessary to conceal the required bend.

6. They shall be routed in such a manner as to coordinate with the structural requirements of the building.

7. They shall be routed in accordance with field instructions issued by the Architect where such instructions differ from specifications set forth herein.

D. Circuitry run exposed shall be routed parallel to building walls and column lines.

E. Exposed circuitry located overhead shall be run in a completely accessible manner on the underside of all piping and ductwork.

F. Circuitry run in suspended ceilings shall be routed parallel to building walls, column lines, etc.

G. Circuitry shall be routed so as to prevent electric conductors from being subject to high ambient temperature. Minimum clearances from heated lines or surfaces shall be maintained as follows:

1.	Crossing where uninsulated	3"
2.	Crossing where insulated	1"
3.	Running parallel where uninsulated	36"
4.	Running parallel where insulated	6"

H. Circuitry shall not be run in elevator shafts, hoistways, and the like. Where outlets for trail cables, pit lights, run be level lights, and the like, are involved, only the "final connection" outlet boxes themselves shall be located within or open into, the confines of the shaft.

I. Circuitry for miscellaneous systems indicated without notation as to location and routing shall be run as per the requirements and notations governing the adjacent light and power circuitry.

3.17 TEMPERATURE CONTROL WIRING

A. The temperature control system shall be installed by the Heating and Air Conditioning Contractor.

B. All electric wiring and wiring connections required for the installation of the temperature control system shall be provided by the Temperature Control Contractor.

C. Electrical Contractor shall provide 120-volt control power to all temperature control panels. Provide a 120V, 20A circuit from local 120V panel to a ceiling mounted junction box located in each mechanical space.

3.18 SLEEVES, INSERTS, AND SUPPORTS

A. Furnish and install all inserts, conduit hangers, anchors and steel supports necessary for the support and installation of all electrical equipment.

B. Where openings are required in walls and floors for the passing of raceways the Electrical Contractor shall furnish the General Contractor with the necessary information regarding dimensions and locations so that he may install suitable concrete stops to provide these openings. Such openings shall be by the General Contractor in such a manner so as to interfere with the fireproof integrity of the building.

C. The Electrical Contractor will be held responsible for the location of the maintaining in proper position, sleeves, inserts and anchor bolts supplied and/or set in place by him. In the event that failure to do so required cutting and patching of finished work, such work shall be done at the Electrical Contractor's expense by the General Contractor.

3.19 FIRE ALARM SYSTEM

A. The contractor is responsible for assuring that conduit and wire quantity, size and type are suitable for the equipment supplied. All final connections, testing, adjusting and calibration shall be made under the direct supervision of a trained specialist of the equipment manufacturer. System shall be tested to 100% performance before contacting the local Fire Department.

B. All system wiring shall be in type EMT conduit or an approval fire alarm control cable.

C. Upon completing and prior to all acceptance, an approved service company shall perform complete system tests in the presence of an authorized representative of the local Fire Department.

1. Actuate all manual and automatic indicating devices one at a time verify proper operation.

2. Verify operation of signaling systems, elevator capture, transmission or alarm to fire department, battery operation.

3. The contractor shall verify in writing that fire alarm system is operating properly.

END OF SECTION

SECTION 31 0000

EARTHWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 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. Survey plan entitled "Warwick, RI Existing Conditions Prepared for Brewster Thornton Group, Class III Survey of Community College of Rhode Island Knight Campus East Ave." prepared by Marsh & Long Surveying, Inc. of Smithfield, RI dated July 3, 2014.

C. Supplemental plan entitled "Warwick, RI Existing Conditions Prepared for Pare Corp., Survey of a Portion of Community College of Rhode Island Knight Campus East Ave." prepared by Marsh & Long Surveying, Inc. of Smithfield, RI dated January 19, 2017 and revised March 23, 2018.

1.03 SUMMARY

A. This Section includes all excavation including, but not limited to, the following:

1. Excavating and backfilling for demolition of structures.
2. Excavating and backfilling for utility trenches.
3. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.

B. Related Sections include:

1. SECTION 31 5000 EXCAVATION SUPPORT AND PROTECTION
2. SECTION 31 2319 DEWATERING

1.04 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: As part of the Base Bid, Contractor shall retain a qualified testing agency indicating and interpreting test results for compliance with the following requirements indicated:

1. Gradation Test Results for each on-site and imported soil material proposed for fill and backfill.
2. Laboratory compaction curve according to ASTM D 698 ASTM D 1557 for each on-site and imported soil material proposed for fill and backfill.

C. Copies of permits obtained for excavations that are required by state and local governing authorities and local utility companies shall be submitted to the owner's representative.

1.05 SITE INFORMATION

A. 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.

B. 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.

C. The Contractor may request to perform additional test borings and other explorations at no cost to the Owner.

D. 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 or hauled off the site necessary 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.

E. The Contractor shall use suitable on-site soils, 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. Imported materials are anticipated for this project.

F. 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.

1.06 UNIT PRICES

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

B. Unit prices for rock excavation include all labor, equipment, and materials required for removal of rock and hauling of rock off-site. 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 Engineer prior to removal. Specified excavation limits for rock are specified in Section 3.04.

1.07 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: Satisfactory soil for use as fill or backfill.

E. Boulder: A soil particle with a minimum dimension of 12 inches.

F. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

G. 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 Engineer. 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 Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.

H. Fill: Soil materials used to raise existing grades.

I. Imported Material: Material obtained by the Contractor from sources off the site.

J. 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 roadways or shoulder; or (c) 0.5 foot outside the exterior edge at the spring line of pipes and culverts.

K. Optimum Moisture Content: Determined by the ASTM standard specified to determine the maximum dry density for relative compaction.

L. Relative Compaction: The ratio, in percent, of the as-compacted field dry density to the laboratory maximum dry density as determined by ASTM D1557. Corrections for oversize material may be applied to either the as-compacted field dry density or the maximum dry density, as determined by the Engineer.

M. Relative Density: As defined by ASTM D4253 or D4254.

N. 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. Weathered Rock that can be removed by an excavator without hammering or other mechanical means shall not meet the definition of rock.

Rock also includes boulders of rock material that exceed 2 cu. yd. for bulk excavation or 1 cu. yd. diameter for footing, trench, and pit 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.

O. 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.

P. Subbase Course: Course placed between the subgrade and base course for asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or asphalt walk.

Q. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

R. 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.

S. 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.

1. Anticipated unsuitable soils: Unsuitable soils identified in the geotechnical report, drawings, specifications, test pit logs, or boring logs provided as part of the project manual.

2. Unanticipated unsuitable soils: Unsuitable soils not identified in either the geotechnical report, test pits, or boring logs provided as part of the project manual.

T. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

U. 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.

1.08 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. Gradation tests by the Contractor shall be made on samples taken at the place of production prior to shipment. Samples of the finished product for gradation testing shall be taken as specified in Section 3.16 Field Quality Control, or more often as directed by the Engineer if variation in gradation is occurring, or if the material appears to depart from the Specifications. Test results shall be forwarded to the Engineer within 48 hours of testing.
4. 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.

1.09 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548 shall be hired to provide required testing of earthwork materials at the Contractor’s Expense.

B. All temporary shoring and bracing shall be designed, detailed, and stamped by a Professional Engineer registered in the State of Rhode Island. Refer to SECTION 31 50 00 - EXCAVATION SUPPORT AND PROTECTION

C. Pre-excavation Conference: Conduct conference at Project site prior to the start of construction. Date and time to be specified by the Owner and Engineer.

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. Do not proceed with utility interruptions without Owner's written permission.

b. 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.

1.11 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.

1.12 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.

1.13 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.

1.14 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

2.01 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.

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. Gradations of satisfactory soils are as shown in the Table below:

TABLE 1: SOIL GRADATIONS

Sieve Size	Sand Gravel Fill	Granular Fill	3/4 inch Crushed Stone	1 ½" Crushed Stone	Coarse Sand
3-inch*	100	60-100	-	-	-
1 1/2- inch	-	-	100	100	-
¾-inch	70-100	-	90-100	10-40	-
½-inch	-	50-85	10-50	0-8	-
3/8-inch	-	45-80	-	-	100
No. 4	30-55	40-75	0-5	-	95-100
No. 10	-	-	-	-	50-85
No. 40	-	0-45	-	-	-
No. 50	8-25	-	-	-	2-10
No. 200	0-8	0-10	<1	-	-

* 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.

2. 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 Table 1.
   b. Onsite Common Borrow shall conform to the specified gradation of Granular Fill in Table 1, 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.

3. 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 Table 1 within this specification.
4. Base Course 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 Sand Gravel Fill in Table 1 within this specification.
5. Riprap shall conform to RI Standard M.10.03. Filter stone shall conform to RI Standard M.10.03.1.
6. Drainage Stone or Crushed Stone or 1 ½" Crushed Stone shall be imported material conforming to the gradation for 1 ½" Crushed Stone in Table 1 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.
7. 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.
8. Gravel Borrow shall conform to the Sand Gravel Fill Gradation in the Table above.

C. Unsatisfactory Soils are defined as soils not conforming to the satisfactory soils criteria unless otherwise approved by the Engineer.

2.02 GEOTEXTILES

A. Filter Fabric: Non-woven geotextile shall be needle punched pervious sheets of polyester, polyethylene, nylon, or polypropylene filaments formed into a uniform pattern conforming to TenCate 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-6241	310 min
Trapezoidal Tear Strength (lbs)	ASTM D-4533	50 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 –120

(1) All numerical values represent minimum/maximum average roll valves (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/ft^2 shall be determined by multiplying permittivity in sec^{-1} as determined by ASTM D-4491 by a conversion factor of 74.

PART 3 - EXECUTION

3.01 PREPARATION

A. Furnish, install, and maintain shoring, sheeting, bracing, and sloping necessary to support the sides of earth and rock excavations, and to keep and prevent any movement which may damage adjacent structures, pavements, and utilities, damage or delay the work, or endanger life and health. Furnish, install, and maintain shoring, sheeting, bracing, and sloping as required by OSHA and other applicable government regulations and agencies.

B. All temporary shoring and bracing shall be designed, detailed, and stamped by a Professional Engineer registered in the State of Rhode Island.

C. Provide excavation support and protection in accordance with Section 31 50 00 - Excavation Support and Protection.

D. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent building area and walkways.

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.

3.02 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. 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, specified in Section 31 23 19 - Dewatering, to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required at no additional expense to the Owner.

3.03 WORK IN FREEZING WEATHER

A. Protect excavation bottoms against freezing when atmospheric temperature is 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. Removal of these unsatisfactory materials will be required as directed by the Engineer.

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.

3.04 ROCK EXCAVATION

A. General

1. Rock excavation includes the removal of rock to the lines and grades shown on the plans and as specified within this Section and the disposal of the Rock off site by legal methods.
2. The Contractor shall obtain all necessary permit and licenses and pay all fees at no additional cost to the Owner.
3. All rock excavation shall be paid for in accordance with the Unit Prices provided in Part 4.
4. Unit prices for rock excavation include all labor, equipment, and materials required for removal of rock and hauling of rock off-site. 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 Engineer prior to removal.
5. 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.
6. 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.
7. 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.

B. 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.

C. 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.

D. 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.

3.05 EXCAVATION, GENERAL

A. Excavate to subgrade elevations. 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.

B. All topsoil and unsuitable or excess materials shall be stripped from areas of new construction or regrading. Materials suitable for reuse shall be stored in locations and approved by the Community College of Rhode Island will not interfere with construction operations.

C. Existing topsoil shall be stripped and stored on-site before any underlying excavating is begun. Existing topsoil is the property of the Community College of Rhode Island and shall not be removed from the site. Contractor shall haul material to a location on campus designated by the Owner's Representative.

D. All excess and unsuitable materials shall be legally disposed of off-site by the Contractor.

3.06 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. Based upon the characteristics of the on-site soils, 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

4. In fill areas within the building footprint, the soil subgrade shall be surface compacted with a minimum of six passes of a vibratory roller having a drum weight of at least 10,000 pounds and a dynamic force of at least 20,000 pounds. In the event that subgrade soils within the building area become disturbed during construction, they should be over-excavated and replaced with one foot of compacted Sand Gravel Fill or six inches of ¾-inch Crushed Stone placed on a layer of filter fabric to stabilize the subgrade.

5. If the subgrade is wet, the Contractor shall over-excavate all footing excavations by 6 inches and place a working mat of ¾-inch Crushed Stone compacted to 95% underlain by filter fabric (Mirafi 140N or approved equivalent). Stone shall extend 2 feet beyond the edge of the footing on all sides. This working mat shall be provided by the Contractor in wet conditions at no additional expense to the Owner.

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. In wet conditions, overexcavation shall be backfilled in 6-inch lifts with 3/4-inch Crushed Stone and a layer of filter fabric approved by the Engineer and 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.

3.07 SUBGRADE INSPECTION

A. Notify Owner's Representative when excavations have reached required subgrade.

B. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Continue this process until the area has been proof-rolled 4-6 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. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

3.08 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 disposal of Unanticipated Unsuitable Soils within the limit of excavation shall be included as part of the original Contract Sum.

C. Excavation and disposal of Unanticipated Unsuitable Soils outside the limit of excavation shall be paid for in accordance with the Unit Prices included in Part 4 of this specification.

1. Unit prices for unanticipated unsuitable soils excavation include all labor, equipment, and materials required for removal of unsuitable soils, hauling of unsuitable soils off-site, and disposal. Unit prices for unanticipated unsuitable soil also include all labor, equipment, and materials required for replacement of unsuitable soil excavation with approved materials. Any unanticipated unsuitable soil excavation must be approved by the Engineer and Owner's Representative prior to removal.
2. The dimensions and quantity of the Unanticipated 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.

3.09 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.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations in locations approved by the Owner's Representative. Do not store within drip line of remaining trees.

3.11 BACKFILL GENERAL

A. The contractor shall notify the Engineer 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 Owner's Representative and the respective Utility Company following inspection

C. Place backfill on subgrades free of mud, frost, snow, or ice.

D. 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. 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.
2. The Contractor agrees to use this material at his own risk and 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 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.

3.12 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.

3.13 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.

3.14 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Compaction shall be completed with a vibratory roller having a static weight of 10,000 lbs and a dynamic weight of 20,000 lbs.

C. 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.

D. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

E. 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.

F. The Contractor is made aware that the On-Site Common Borrow may be difficult to work with and may require significant efforts in order to achieve the specified compaction requirements. The Contractor agrees to use this material at his own risk and is responsible for any additional work required to install this material in accordance with the specifications. In the event that project delays 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 and provide imported fill meeting the specifications. This imported material shall be provided at no additional expense to the Owner. Any project delays resulting from additional time required to work this material are the responsibility of the Contractor and shall be made up elsewhere on the project.

G. Material that is too wet or too dry for compaction of the particular material in place as determined by the Owner’s Representative or the Geotechnical Engineer 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 Geotechnical Engineer at no additional cost to the Owner.

H. 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 for foundation 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
Backfill behind retaining walls	95 [3]
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] During compaction of fill placed behind retaining walls, care shall be taken so as to maintain uniform elevation along both sides within the embedded areas, and to not overstress the wall by applying too much compactive energy at the top of the wall.

3.15 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.

3.16 FIELD QUALITY CONTROL

A. Testing Agency: The Contractor shall engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed every 100 feet to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by the Owner's Representative.

2. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than 3 tests.

3. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet or less of wall length, but no fewer than 2 tests.
4. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than 2 tests.

D. 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; recompact and retest until specified compaction is obtained.

3.17 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 Engineer; 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.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Topsoil is the property of the Community College of Rhode Island and shall not be removed from the site without the Owner's written permission. Contractor shall haul material to a location on campus designated by the Owner's Representative.

B. Disposal: Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by the Owner's Representative.

1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

3.19 GEOTEXTILES

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

PART 4 MEASUREMENT AND PAYMENT

4.01 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. Bulk Rock Excavation, Trench Rock Excavation, and Unanticipated Unsuitable Soils Removal and Replacement shall be paid for in accordance with the Unit Prices described herein. Payment for these items will be deducted from the Allowance included in the Base Bid. If the Allowances included in the Base Bid are exceeded, these Unit Prices will still apply.

C. Rock Excavation: Unit prices for rock excavation include all labor, equipment, and materials required for removal of rock and hauling of rock off-site. 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 Engineer prior to removal. Specified excavation limits for rock are specified in Section 3.4.

1. Payment of Bulk Rock Excavation
   a. The Owner shall pay the Contractor for Bulk Rock Excavation at the Unit Price of <u>$70.00 per cubic yard</u>.
   b. No other price will be paid for Bulk Rock Excavation.

2. Payment of Trench Rock Excavation.
   a. The Owner shall pay the Contractor for Trench Rock Excavation at the Unit Price of $170.00 per cubic yard.
   b. No other price will be paid for Trench Rock Excavation.

D. Unanticipated Unsuitable Soils Removal and Replacement: Unit prices for unanticipated unsuitable soils excavation include all labor, equipment, and materials required for removal of unsuitable soils, hauling of unsuitable soils off-site, and disposal. Unit prices for unanticipated unsuitable soil also include all labor, equipment, and materials required for replacement of unsuitable soil excavation with approved materials. Any unanticipated unsuitable soil excavation must be approved by the Engineer and Owner's Representative prior to removal.

1. Payment of Unanticipated Unsuitable Soils:
   a. If unanticipated unsuitable soils 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 unanticipated unsuitable soil conditions. Similarly, removal of these materials within paved areas as specified herein will not be considered unanticipated 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. The Owner shall pay the Contractor for Unanticipated Unsuitable Soils Removal and Replacement at the Unit Price of $50.00 per cubic yard.

   e. No other price will be paid for Unanticipated Unsuitable Soils Removal and Replacement.

E. 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.

F. 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 31 1000
SITE CLEARING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 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. Survey plan entitled "Warwick, RI Existing Conditions Prepared for Brewster Thornton Group, Class III Survey of Community College of Rhode Island Knight Campus East Ave." prepared by Marsh & Long Surveying, Inc. of Smithfield, RI dated July 3, 2014.

C. Supplemental plan entitled "Warwick, RI Existing Conditions Prepared for Pare Corp., Survey of a Portion of Community College of Rhode Island Knight Campus East Ave." prepared by Marsh & Long Surveying, Inc. of Smithfield, RI dated January 19, 2017 and revised March 23, 2018.

1.03 SUMMARY

A. The work of this Section includes the following:

1. Provisions for protection of all existing utilities from damage particularly at heavy construction vehicle crossings.
2. Removal, disposal, capping or plugging of drainage, sewer, gas, steam, and water piping at the locations specified on the drawings.
3. Removal and disposal of flexible pavement, curbing, concrete entrance ramps, and concrete walks at the locations specified on the drawings.
4. Removal and disposal of catch basins, manholes, cisterns, utility structures.
5. Removal and disposal of signs and fence.
6. Removal and disposal of remnants of concrete and stone foundations.
7. Cleaning and maintenance of the site and stormwater management system.

B. Related Sections include the following:

1. Section 31 0000 Earthwork

1.04 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.

. 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 subsoil and weeds, roots, toxic materials, or other non-soil 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.

1.05 MATERIAL OWNERSHIP

A. Except for stripped topsoil or other 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 removed from the site, including earthwork. The materials claimed by the Owner shall be stockpiled on the site as directed.

C. Stripped Topsoil is the property of the Community College of Rhode Island and shall not be removed from the site. Contractor shall haul topsoil to a location designated by the Community College of Rhode Island.

1.06 SUBMITALS

A. Shop Drawings:

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

1.07 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 in writing 72 hours in advance of proposed utility interruptions.

   a. Notification should be made to Mark Libutti, College Project Manager, at 401-825-2380.

2. Do not proceed with utility interruptions without Owner's written permission.

   a. All power shut downs shall be coordinated with the Owner.

3. Underground utilities were compiled from available record plans and aboveground locations and are approximate. The Contractor shall contact "Dig-Safe" at 1-888-DIG-SAFE and Mark Libutti at 401-825-2380 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 Contactor's base bid.

D. Contractor shall not operate existing water gate valves and hydrants. All operation of the water distribution system must be completed by Kent County Water Authority (KCWA).

E. All abandoned 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.

F. Do not commence site operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS

2.01 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

3.01 TEST PITS

A. Prior to commencing work, Contractor shall complete test pits depicted on Contract Documents and provide information to Engineer.

B. Work installed prior to excavating test pits and providing the required information to the Engineer shall be reconstructed as needed at no additional cost to the Owner.

3.02 REMOVE AND DISPOSE CONCRETE RAMPS AND CONCRETE WALKS

A. In accordance with Subsections 201.03.7 the Standard Specifications.

3.03 REMOVE AND DISPOSE CONCRETE RETAINING WALLS, STAIRS, AND RAILINGS

A. The Contractor shall excavate test pit to the base of the existing wall to verify the existing elevation, location and dimensions of the retaining wall. Remove and dispose in accordance with the State Standards and applicable State laws and regulations.

3.04 REMOVE AND DISPOSE CONCRETE OR STONE FOUNDATION REMANTS

A. The Contractor shall excavate concrete or stone foundation remnants uncovered during excavation for proposed improvements. Remove and dispose concrete and stone foundation remnants in accordance with local and State requirements.

3.05 DISPOSAL

A. Disposal: Remove surplus soil 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, as specified by the State of Rhode Island Department of Environmental Management rules and regulations shall be brought to the Rhode Island Resource Recovery Corporation or another appropriately licensed waste facility for legal disposal.

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.

3.06 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 and Landscape Architect 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. 07 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 31 2319
DEWATERING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 of the Rhode Island Department of Transportation Standard Specifications Sections, apply to this Section.

1.02 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. Survey plan entitled "Warwick, RI Existing Conditions Prepared for Brewster Thornton Group, Class III Survey of Community College of Rhode Island Knight Campus East Ave." prepared by Marsh & Long Surveying, Inc. of Smithfield, RI dated July 3, 2014.

C. Supplemental plan entitled "Warwick, RI Existing Conditions Prepared for Pare Corp., Survey of a Portion of Community College of Rhode Island Knight Campus East Ave." prepared by Marsh & Long Surveying, Inc. of Smithfield, RI dated January 19, 2017 and revised March 23, 2018.

1.03 SUMMARY

A. This Section includes construction dewatering for utility trenches and utility structure installation.

B. Related Sections include the following:

1. Section 31 0000 – Earthwork.
2. Section 31 5000 – Excavation Support and Protection.

1.04 PERFORMACE REQUIREMENTS

A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control ground-water flow into excavations and permit construction to proceed on dry, stable subgrades.

B. Maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.

C. Prevent surface water from entering excavations by grading, dikes, or other means.

D. Accomplish dewatering without damaging existing buildings adjacent to excavation.

E. Remove dewatering system if no longer needed.

1.05 SUBMITTALS

A. Shop Drawings for Information:

1. For dewatering system. Show arrangement, locations, and details of dewatering locations; locations of erosion controls and dewatering basins.
2. Include a written report outlining control procedures to be adopted if dewatering problems arise.

B. Record drawings at Project closeout identifying and locating capped utilities and other subsurface structural, electrical, or mechanical conditions performed during dewatering.

C. Field Test Reports: Before starting excavation, submit test results and computations demonstrating that dewatering system is capable of meeting performance requirements.

1.06 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with water disposal requirements of authorities having jurisdiction.

1. At no time is discharge to be allowed to an existing drainage structure without sedimentation controls. Any damage caused by dewatering will be repaired in full to match existing conditions at the Contractor's expense.
2. At no time is discharge allowed to existing sanitary sewer system.

1.07 PRODUCT CONDITONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by the Owner's Representative and then only after arranging to provide temporary utility services according to requirements indicated.

B. Make additional test borings and conduct other exploratory operations necessary for dewatering.

C. Soil test pits have been made by qualified Contractors prior to this Contract. This information shall be made available to bidders as specified under other Sections. The Contractor is responsible to employ qualified personnel capable of interpreting geotechnical information and test pit logs. The results of these subsurface explorations and recommendations for work were prepared by the Engineer and are hereby attached to this specification for information only. Procedures for dewatering, areas to receive special fill and other methods and procedures specified herein shall be supplemented by this information.

PART 2 - PRODUCTS

2.01 GENERAL

A. The Contractor shall provide any equipment and materials necessary for dewatering at his own expense.

PART 3 - EXECUTION

3.01 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.

B. Prevent surface water and subsurface or groundwater from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.

C. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

D. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

E. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

F. Provide erosion controls in accordance with the Rhode Island Soil Erosion and Sediment Control Handbook.

G. Dewatering basins capable of handling the flows directed to them shall be supplied whenever dewatering is completed.

3.02 INSTALLATION

A. Install dewatering system utilizing pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

B. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, utilities, and structures have been constructed and fill materials have been placed, or until dewatering is no longer required.

C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of drains, sewers, utilities and other excavations.

D. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water in a manner that avoids inconvenience to others.

E. Provide sumps, dewatering basins, sedimentation tanks, and other flow-control devices to avoid erosion and sedimentation.

F. Direct discharges to storm drains will be unacceptable unless proper sediment and siltation removal devices are installed prior to discharge to the storm water conveyance system.

G. Any discharge of water, generated from a dewatering operation, into wetlands or an open water body will not be permitted.

H. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.

I. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.

J. Damage including but not limited to erosion or sedimentation, resulting from untreated dewatering discharges shall be restored to meet or exceed the existing condition. All remedial work shall be completed in accordance with local and State Environmental Regulations and Requirements.

3.03 PROPERTY LOSSES FROM REMOVAL OR DISTURBANCE OF GROUNDWATER

A. Any structure, including but not limited to embankments, buildings, streets, and utilities that become unstable or vulnerable to settlement due to removal or disturbance of groundwater will be supported immediately by the Contractor. Support shall include but not be limited to bracing, underpinning, or compaction grouting.

B. All loss or damage arising from removal or disturbance of groundwater, including but not limited to claims for subsidence and the loss of structure support, that may occur in the prosecution of the work shall be sustained and borne by the Contractor. If the Contractor needs to correct the damage resulting from his operations, the Owner may, 30 days after notifying the Contractor in writing, proceed to repair, rebuild or otherwise restore such damaged property as may be deemed necessary, and the cost thereof shall be deducted from compensation which may be or become due the Contractor under this Contract.

END OF SECTION

SECTION 31 2500
EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 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. Survey plan entitled "Warwick, RI Existing Conditions Prepared for Brewster Thornton Group, Class III Survey of Community College of Rhode Island Knight Campus East Ave." prepared by Marsh & Long Surveying, Inc. of Smithfield, RI dated July 3, 2014.

C. Supplemental plan entitled "Warwick, RI Existing Conditions Prepared for Pare Corp., Survey of a Portion of Community College of Rhode Island Knight Campus East Ave." prepared by Marsh & Long Surveying, Inc. of Smithfield, RI dated January 19, 2017 and revised March 23, 2018.

1.03 SUMMARY

A. The work of this Section includes the following:

1. Provision of erosion controls, specifically compost filter socks, baled hay erosion checks, temporary diversions, sand bags, and catch basin inlet protection 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 31 00 00 Earthwork.

1.04 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.

1.05 SUBMITTALS

A. Shop Drawings:

1. Product information depicting that the products furnished meet the project specifications.

1.06 PROJECT CONDITIONS

A. Do not commence operations which disturb the ground surface until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS

2.01 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. Haybales as described in Subsection 206.02.1 and 206.02.2 of the State Standards.

1. Haybales shall conform to Subsection 206.02.1 of the State Standards.
2. Haybales shall have a minimum cross section measuring 18” x 18” with a minimum 36” length.
3. Wood stakes shall be oak and conform to the dimensions shown on the plans.

C. Turf Reinforcement Mat

1. Turf reinforcement mats shall be Tensar North American Green EroNet S150 or approved equivalent.
2. Turf reinforcement mat shall be degradable after 12 to 24 months
3. Provide a turf reinforcement mat designed to stabilize a 3:1 slope or greater.

D. Filter Fabric

1. See Geotextiles in Division 2 Section 31 00 00 “Earthwork” for specification.

E. Temporary Seed

1. Residential Seed Mix: Applied at rate of 150 pounds/acre. In accordance of M18 of the State Standards.

F. Temporary Sediment Traps, Swales, and Diversions

1. Refer to Section 31 0000 Earthwork for soil materials and excavation.
2. Provide temporary seeding.
3. Provide turf reinforcement mat as required to stabilize sideslopes.

PART 3 - EXECUTION

3.01 PROVISION OF COMPOST FILTER SOCKS

A. Trenching is not required; there 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.

3.02 PROVISION OF BALED HAY EROSION BARRIERS AND CHECK DAMS

A. In accordance with Subsection 206.03.1 of the State Standards.

3.03 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 has 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.

3.04 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.

3.05 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.

3.06 DISPOSAL

A. Disposal: Remove surplus soil 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, as specified by the State of Rhode Island Environmental Management rules and regulations shall be brought to the Rhode Island Resource Recovery Corporation or another appropriately licensed waste facility for legal disposal.

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.

3.07 PREPARATION

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

3.08 TEMPORARY SEEDING

A. Time of Seeding: Conduct seeding under favorable weather conditions between April 1st and October 15th.

B. Inoculating Seed: Inoculate shall be stored as recommended by manufacturer and shall not be used later than the date indicated on the container or as otherwise specified. Inoculation of legumes shall be done within 48 hours before seeding.

C. Mechanical Seeding: Plant grass seed only when temperature and moisture conditions are suitable for work of this nature. Sow grassed areas evenly with a mechanical spreader at the following rates: General Seed Mix, 3 lbs per 1,000 sf. Then roll with cultipacker to cover seed then water with fine spray. Method of seeding may be varied at discretion of Contractor on his own responsibility to establish a smooth, uniformly grassed area.

D. Hydroseeding:

1. Seeding shall be done within 10 days following soil preparation at the following rates: General Seed Mix, 3 lbs per 1,000 sf.
2. Proceed with seeding operation on moist soil, but only after free surface water has drained away.
3. Exercise due care to prevent drift and displacement of mixture into other areas.
4. Winter Protective Seeding: If seeding has not occurred by October 15, apply winter protective seed at a rate of 120 lbs per acre to all areas that are bare or incomplete. Remobilize to complete seeding in the spring.

END OF SECTION

SECTION 31 5000
EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 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. Survey plan entitled "Warwick, RI Existing Conditions Prepared for Brewster Thornton Group, Class III Survey of Community College of Rhode Island Knight Campus East Ave." prepared by Marsh & Long Surveying, Inc. of Smithfield, RI dated July 3, 2014.

C. Supplemental plan entitled "Warwick, RI Existing Conditions Prepared for Pare Corp., Survey of a Portion of Community College of Rhode Island Knight Campus East Ave." prepared by Marsh & Long Surveying, Inc. of Smithfield, RI dated January 19, 2017 and revised March 23, 2018.

1.03 SUMMARY

A. This Section includes temporary excavation support and protection systems.

B. Related Sections include the following:

1. Section 31 00 00 - Earthwork.
2. Section 31 23 19 - Dewatering.

1.04 PERFORMANCE REQUIREMENTS

A. Design, furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure and superimposed and construction loads.

1. Provide professional engineering services needed to assume engineering responsibility, including preparation of Shop Drawings and a comprehensive engineering analysis by a qualified professional engineer.
2. Prevent surface water from entering excavations by grading, dikes, or other means.
3. Install excavation support and protection systems without damaging existing buildings, pavements, and other improvements adjacent to excavation.

B. The Contractor assumes all responsibility for the excavation support systems used. In the event of a failure, all resulting damages are the responsibility of the Contractor.

1.05 SUBMITTALS

A. Shop Drawings for Information: Prepared by or under the supervision of a qualified professional engineer for excavation support and protection systems.

1. Include Shop Drawings signed and sealed by a qualified Registered Professional Engineer licensed in the State of Rhode Island.
2. Working drawings and details on the excavation support proposed by the Contractor shall be provided along with detailed calculations showing the design of the bracing and sheeting proposed also stamped by a Registered Professional Engineer licensed in the State of Rhode Island.
3. Working Drawings and design calculations, at a minimum, shall indicate the following:
    a. Design criteria.
    b. Details, arrangement and method of assembly and disassembly of proposed system and sequence of construction.

c. Connection details.

d. Method of preloading the bracing.

e. Full excavation depth.

f. Loads on support system for various stages of excavation and bracing removal.

g. Expected equipment loads.

h. Maximum design load carried by various members of support system, and preload values.

i. Depths below main excavation to which support system will be installed.

j. Methods of resolving difficulties arising from misalignment of soldier piles or steel sheetpiling exposed during excavation, and criteria for implementing procedures.

k. Design calculations, for various stages of excavation and bracing removal.

l. Existing utility facilities. After checking locations by field investigations, revise drawings to show actual locations of facilities and excavation supports interference with proposed Work, and measures proposed to overcome such interferences.

m. Manufacturer's product data.

4. Design Computations: The Contractor shall also submit complete computations for the design of the sheeting and bracing system(s) proposed to be installed.

   1. The design shall be in accordance with sound engineering practice and modern, accepted principles of soil mechanics.

   2. The design shall include the effects of all surcharges which may be reasonably anticipated.

   3. The minimum factor of safety for each of the design conditions required to be considered shall be 1.50.

B. Qualification Data for Installer and Professional Engineer.

C. Submittal Review:

   1. The design and layout will be reviewed by the Engineer as to type and suitability, providing that the arrangements presented by the Contractor are satisfactory, but such review will not relieve the Contractor of the sole responsibility for the adequacy of the system, nor shall it be construed as a guarantee that the Contractor's proposed equipment, materials and methods for sheeting and bracing will be adequate for the work required at the locations of and for the work required by this contract.

1.06 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.

B. The Contractor may make test borings and conduct other exploratory operations necessary for excavation support and protection.

C. Survey adjacent structures and improvements adjacent to the excavation support system to monitor settlement. Employ a qualified professional engineer or land surveyor to establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations during construction.

D. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Owner's Representative if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

1.07 QUALITY CONTROL

A. Provide in accordance with the requirement as specified in Division 1 Specification Sections.

B. Support of Excavation shall be of sufficient strength to safely sustain all loads from the sides of the excavations, together with all water pressure and reasonable surcharge.

C. The Contractor shall, at all times, be entirely responsible for the adequacy of sheeting and bracing used:

1. to permit the satisfactory and safe installation and construction of the work;
2. to provide adequate protection against damage to all existing utilities, structures, and completed portions of the work; and
3. to prevent injury to persons.

D. The Contractor shall control, and pitch, the grading to prevent water from running into the excavated areas of the structures, or to prevent damage to other structures or work already accomplished.

1. Welding Operations – in accordance with AWS D1.1

1.08 DESIGN CRITERIA

A. This design criteria applies where the Contractor is responsible for design of the excavation support:

1. Design the excavation support system in accordance with the earth pressures and other detailed criteria indicated.
2. Design the excavation support system to support the earth pressures, decking system and AASHTO HS20 traffic loads if any, utility loads, equipment and construction loads, and other surcharge loads to allow the safe and expeditious construction of the permanent structures without movement or settlement of the ground, and to prevent damage to, movement or settlement of, adjacent buildings, structures, or utilities.
3. Design sheet pile and soldier pile and lagging excavation support systems to penetrate to a depth below the bottom of excavation adequate to prevent lateral and vertical earth movement, and permit lowering of the indicated bottom of excavation at least two feet without any change in the support system as installed except for additional lagging and bracing for soldier pile and lagging systems.
4. Design the bracing system to furnish sufficient reaction against the side banks to maintain stability in such banks. Obtain such reaction by timely stressing to predetermined locations until the necessary reaction is produced against the banks, or by such other methods that may be necessary to prevent displacement of ground and movement of structures.

PART 2 – PRODUCTS

2.01 MATERIALS

A. General: Provide materials that are either new or in serviceable condition.

B. Structural Steel: ASTM A 36/A 36M, ASTM A 690/A690M, or ASTM A 992/A 992M.

C. Steel Sheet Piling: ASTM A 328/A 328M, ASTM A 572/A 572M, or ASTM A 690/A 690M; with continuous interlocks.

D. Lagging:

1. Timber Lagging: use sound, well-seasoned Douglas Fir of rectangular cross section, Grade 2 or better. Timber shall be stamped and certified ALOPB LP-22 by the American Preserves Bureau.
2. Moisture Content shall not exceed 20%.
3. Minimum fiber stress in bending perpendicular to the grain shall be 1200 psi.

E. Timber Sheeting:

1. Any species of wood sheets that will satisfactorily withstand all driving and construction stresses and the loads, to which the members will be subjected, may be used for sheeting and bracing.
2. Wood sheeting shall not be less than three (3) inches nominal thickness.
3. All timber sheeting and bracing shall be free from worm holes, windshakes, loose knots, decayed or unsound portions of other defects which might impair its strength or tightness.

F. Cast-in-Place Concrete: ACI 301, of compressive strength required for application.

G. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

H. Other Materials:

1. The Contractor shall provide all hardware and fastenings necessary to accomplish satisfactory installation of all sheeting and bracing.

PART 3 - EXECUTION

3.01 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.

1. Shore, support, and protect utilities encountered.

B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner. Provide alternate routes around closed or obstructed traffic ways if required.

C. Locate excavation support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces is not impeded.

D. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.

E. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

3.02 INSTALLATION

A. General: Sheeting and bracing shall be of sufficient strength to sustain all loads from the sides of the excavations, together with all water pressure and surcharge.

B. The Contractor shall be entirely responsible for adequacy of sheeting and bracing used, and shall take all precautions necessary to prevent movement of material along the sides of excavations, and to prevent the intrusion of water beyond that which his pumping or well point system can control.

C. Sheeting shall be permanently left in place where indicated or directed.

D. It is expressly understood and agreed that whenever sheeting and bracing is used, it shall not relieve the Contractor of the sole responsibility for any damages, delays, or injury due to installation or failure of the sheeting or bracing, or the settling of the backfill, the pipeline, or the adjacent ground.

3.03 TIMBER SHEETING

A. Sheeting shall be driven to sufficient depth below the deepest excavation level to maintain sufficient restraint of the adjacent soil and to prevent movement of the sheeting or excessive intrusion of groundwater.

B. If voids occur behind the sheeting, they shall be filled immediately with proper material from earth excavation or other sources to the satisfaction of the Engineer.

C. Withdrawal of sheeting shall be carefully performed to prevent movement of material along the sides of the backfilled excavations, to prevent damage to utilities, structures, or the work, and to avoid injury to persons.

D. Unless otherwise permitted, sheeting shall be withdrawn in lifts of not more than four (4) feet, and all voids shall be filled immediately with selected materials and thoroughly compacted.

3.04 STEEL SHEET PILING

A. nstall in plumb position with each pile interlocked with adjoining piles for its entire length so as to form a continuous diaphragm throughout the length of each run of wall, being tightly against original ground. Use vibratory pile driver to install sheeting to depth required for design. The equipment and methods of installation, cutting, and splicing shall conform to the approved Working Drawings.

B. Steel sheet piling located within a one to one slope from the bottom of the foundation element shall not be removed.

3.05 SOLDIER PILES AND LAGGING

A. Provide bored holes for soldier piles adequate to accommodate pile sections shown on approved Working Drawings. Extend holes to necessary depth below level of subgrade. When pre-boring is to occur within two feet of a utility, uncover utility and install a steel drill casing to a level at least six inches below bottom of utility prior to pre-boring.

B. Carry bottom of sheeting system to a depth below main excavation adequate to prevent lateral movement and to obtain adequate vertical support. In areas where additional excavation is required below main excavation subgrade, prevent movement of main excavation supports.

C. Encase soldier piles with 2500 psi concrete up to lowest point of excavation adjacent to pile location. Fill remainder of hole with lean concrete, completely encasing pile.

D. Use timber lagging secured in place to soldier piles.

E. Follow excavation closely with placement of lagging. Do not allow height of unlagged face of excavation to exceed five feet in rock and predominately clayey soils, or three feet in sandy soils. Extend lagging to final subgrade. Decrease height as required to prevent ground movement.

F. Do not permit height of unlagged face to exceed 15 inches if water flows from face of excavation, or if soil (of any type) in face moves towards excavation area. Decrease unlagged face height as required to prevent ground movement.

G. Carefully perform excavation for installation of lagging to minimize formation of voids. Separate lagging members only as necessary to permit packing behind them.

H. Pack behind lagging as installation progresses; establish tight contact between excavation face and lagging. Pack openings between lagging members with straw or other suitable material to allow free drainage of water without loss of soil or sand packing.

I. If unstable material is encountered during excavation, take suitable measures to contain unstable material in place and prevent ground displacement, which may cause damage.

J. Maintain sufficient quantity of material on hand for lagging, bracing and other operation for protection of Work and for use in case of accident or emergency.

3.06 SUPPORT SYSTEMS WITH INTERNAL BRACING

A. Use walers, struts, and rakers as necessary to provide internal support of excavation faces retained by soldier piles. Internal columns are unacceptable.

B. When walers are used, obtain tight bearing between wales and wall, and ample bearing area with starpack for load transfer.

C. Provide struts as indicated and intermediate bracing as needed to enable struts to carry maximum design load without distortion or buckling.

D. Provide diagonal bracing as needed for stability of system.

E. Include web stiffeners, plates or angles as needed to prevent rotation, crippling or buckling of connections and points of bearing between structural steel members. Allow for eccentricities caused by field fabrication and assembly.

F. Install and maintain internal bracing support members in tight contact with each other and with surface being supported. Attach struts to wales using direct end bearing vertical plate (shimmed) connections at all levels.

G. Design internal bracing support members for maximum forces occurring during excavation or removal stages.

H. Preloading:

1. Preload internal bracing members, including struts, (except deck beams), shores and similar members, to 50 percent of design compression load occurring during excavation phase.
2. Use procedures that produce uniform loading on bracing members without inducing appreciable eccentricities or overstressing and distortion.
3. Make provisions for permanently fixing each member with steel shims or wedges welded into place.
4. Accomplish preloading by jacking supports in place against soldier piles or wales.
5. Do not use wooden wedges to preload bracing member.
6. Include in preloading system means to determine, within five percent, amount of preload induced into bracing members.

I. If decking beams are not required, or if decking beams are not designed to support excavation loads, install uppermost tier of bracing at vertical distances not more than eight feet below top of excavation.

J. Install tiers of internal bracing with a vertical distance between them and level of excavation below of not greater than 15 feet. Reduce maximum vertical distance to nine feet where ground movement and settlement shall be minimized to prevent damage, where indicated or as directed.

K. Excavate below point of support as indicated. Install bracing, and preload immediately after installation and before continuing excavation.

L. When removing struts, increase vertical spacing provided invert slab has been place for at least ten days and support system is adequate to support, safely, adjacent structures and works.

M. Vertical spacing of bracing may be increased when removing struts, provided support system is adequate to support adjacent structures and works.

3.07 REMOVAL AND REPAIR OF SUPPORTING SYSTEM

A. When removing excavation support system, do not disturb or damage adjacent buildings structures, construction, or utility facilities. Fill voids immediately with lean concrete or with approved backfill compacted to the density as specified in Section 31 0000, “Earthwork”.

B. Except as specified herein and below, remove sheeting system to a depth of at least six feet below the ground surface.

C. Remove material of supporting system from the Worksite immediately.

END OF SECTION

SECTION 32 1216
BITUMINOUS CONCRETE PAVEMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 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. Survey plan entitled “Warwick, RI Existing Conditions Prepared for Brewster Thornton Group, Class III Survey of Community College of Rhode Island Knight Campus East Ave.” prepared by Marsh & Long Surveying, Inc. of Smithfield, RI dated July 3, 2014.

C. Supplemental plan entitled “Warwick, RI Existing Conditions Prepared for Pare Corp., Survey of a Portion of Community College of Rhode Island Knight Campus East Ave.” prepared by Marsh & Long Surveying, Inc. of Smithfield, RI dated January 19, 2017 and revised March 23, 2018.

1.03 SUMMARY

A. This Section includes the following:

1. Bituminous concrete paving
2. Bituminous concrete patching
3. Bituminous concrete paving overlay
4. Asphalt surface treatments
5. Cold milling of existing hot-mix asphalt pavement
6. Curbing

B. Related Sections include the following:

1. Section 31 0000 "Earthwork" for aggregate subbase and base courses and for aggregate pavement shoulders.

1.04 DEFINITIONS

A. DOT: Rhode Island Department of Transportation

1.05 DESIGN REQUIREMENTS

A. Use all means necessary to protect bituminous concrete pavement materials before, ongoing, and after installation, and to protect the installed work and materials of all other trades.

B. In the event of damage, immediately make all repairs and replacements necessary as directed by the Engineer at no additional expense to the Owner.

1.06 SUBMITTALS

A. Product Data: For each type of product indicated include technical data, gradation, and composition of materials proposed.

B. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.

C. Qualification Data: For manufacturer.

D. Material Test Reports: For each paving material.

E. Conformance Certificates: For each paving material, signed by manufacturers.

F. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international graphics symbol, spaces dedicated to people with disabilities.

1.07 QUALITY ASSURANCE

A. Manufacturer shall be a paving-mix manufacturer registered with and approved by the Rhode Island Department of Transportation.

B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated, as documented according to ASTM E 548.

C. Regulatory Requirements: Comply with the State Standards.

1.08 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:

1. Prime and Tack Coats: Minimum surface temperature of 60 deg F.
2. Slurry Coat: Comply with weather limitations of ASTM D 3910.
3. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
4. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

PART 2 - PRODUCTS

2.01 AGGREGATES

A. Conform to State Standards.

2.02 BITUMINOUS CONCRETE SURFACE COURCE

A. Type I-1; conform to Subsection 401.02 and Item M.03 of the State Standards.

B. Surface course shall not include reclaimed asphalt pavement materials.

2.03 BITUMINOUS CONCRETE BASE COURSE

A. A. Conform to Subsection 401.02 and Item M.03 of the State Standards.

2.04 TACK COAT

A. Conform to Asphalt Emulsion Tack Coat as specified in Section 403 of the State Standards

2.05 SUBGRADE

A. Reuse on-site material, or Common Borrow, as specified in Section 31 0000 - Earthwork.

2.06 CURBING

A. Precast concrete curbing shall conform to Subsection 906.02.2, and Section 601 of the State Standards.

B. Concrete curb lock shall be 3,000 psi concrete conforming to Section 03 0000 Concrete.

C. Granite curb shall conform to Subsection 906.02.1 and Item M.09.01 of the State Standards.

2.07 COARSE AGGREGATE

A. ASTM D 692, sound; angular crushed stone, crushed gravel, or properly cured, crushed blast-furnace slag.

2.08 FINE AGGREGATE

A. ASTM D 1073, sharp-edged natural sand or sand prepared from stone, gravel, properly cured blast-furnace slag, or combinations thereof.

1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.

2.09 TEMPORARY TRENCH PATCHING

A. Conform to Section M.03.04 of the State Standards.

PART 3 - EXECUTION

3.01 CONTRACTOR REQUIREMENTS

A. The Contractor shall perform and complete the construction work within the limits indicated in a continuous manner so that the pavement placement work may proceed without delay.

B. The Contractor shall, at all times, prior to acceptance of the work by the Engineer, maintain the completed work in a safe and satisfactory condition. All maintenance and repairs to the completed work shall be subject to the approval of the Engineer and the controlling municipal and State authorities. All maintenance and repairs of the completed work shall be provided by the Contractor at no additional cost to the Owner.

C. Equipment used in the work will be subject to approval by the Engineer and shall be maintained in a satisfactory condition at all times. Unless otherwise permitted, compaction shall be performed by use of suitable power rollers. Finished surfaces of new asphaltic surface courses shall finish even with adjacent existing pavement surfaces and be free from surface irregularities.

D. It shall be the responsibility of the Contractor to obtain from the controlling municipal authorities all required permits for cutting roadway pavements and to perform the work in accordance with all customs and requirements of the controlling authorities, in addition to those specified herein, and at no additional expense to the Owner.

E. Existing pavements outside of the indicated work limits which are damaged as a result of the Contractor's operations, including base courses, bituminous tack coats and surface courses, shall be replaced by the Contractor in accordance with the requirements specified herein for the respective type of pavement; in a satisfactory manner and at no additional cost to the Owner.

F. In case of settlement or other defects in new or replaced pavements, the Contractor shall cut out, replace, restore or repair the damaged pavements at no additional expense to the Owner. This requirement shall remain in effect for 2 years after the acceptance of the work by the Owner. The pavement area to be replaced, repaired or restored, shall extend from edge of pavement to edge of pavement, a minimum of 20 feet on either side of the defect; final pavement course shall be feathered to provide a smooth finish detail.

G. The Contractor shall furnish a bond for the 2-year duration to the Owner insuring that the corrective repairs will be performed if necessary.

H. This contract shall not be considered complete until the replacement, restoration and repair of pavements has been provided in a manner satisfactory to the Engineer, and in accordance with the requirements specified herein.

3.02 CURBING

A. Precast concrete curbing shall be installed in accordance with Subsection 906.03.2 of the State Standards.

B. Granite curbing shall be installed in accordance with Subsection 906.03.1 of the State Standards.

C. All curbing in all locations shall be installed with concrete curb lock prior to backfill to lock curb in place at all locations on-site.

3.03 SUBGRADE PREPARATION

A. Prepare subgrade by shaping and compacting to proper grade. Remove all soft and yielding material from the subgrade and replace with suitable material. Compact thoroughly using approved types of rollers or tampers. Insure that all areas are stable and dry.

B. Saw cut edges of existing pavement along even lines to obtain undisturbed, clean and sound vertical edges of original pavement.

C. Do not store or stockpile materials on the subgrade.

3.04 GRAVEL BASE COURSE AND SUBBASE COURSE PLACEMENT

A. Place materials in the proper lift depths and perform compaction as specified in the earthwork section. Make proper allowance for bituminous courses.

B. All compaction shall be performed with approved equipment well suited to location and material being compacted. Use heavy vibratory rollers where heavy equipment is authorized.

C. Do not operate heavy equipment closer to a foundation than a horizontal distance equal to height of backfill above bottom of foundation. Compact remaining area with hand tampers suitable for material being compacted. Place and compact backfill around pipes with care to avoid damage.

3.05 BITUMINOUS CONCRETE BASE COURSE

A. Provide a Bituminous Concrete Base Course in the compacted thickness as shown on the drawings.

B. The Bituminous Concrete Base Course shall be provided in accordance with the applicable requirements of the State Standards, Section 401, Subsection 401.02 and Item M.03 for materials; and Item 401.03 for construction methods.

3.06 BITUMINOUS CONCRETE SURFACE COURSE

A. Place Bituminous Concrete Surface Course in compacted thickness as shown on drawings. The finished pavement surface shall conform to the proposed grades of the roadway or as directed, and shall be flush with all existing pavements unless otherwise indicated.

B. The Bituminous Concrete Surface Course shall be provided in accordance with the applicable requirements of the State Standards, Section 401, Subsection 401.02, and Item M.03 for materials, and Subsection 401.03 for construction methods.

C. A tack coat conforming to the Rhode Island State Standards shall be applied to the base course prior to the placement of the surface course.

3.07 COMPACTION

A. The Contractor shall conform to the State Standards for pavement operations, including compaction (401.03.10).

B. Immediately after the bituminous mixture has been spread, struck off, and surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling. The surface shall be rolled when the mixture is in the proper condition and when rolling does not cause undue displacement, cracking and shoving.

C. The number, weight and type of rollers furnished shall be sufficient to obtain the required compaction while the mixture is in a workable condition. Rolling shall be continued until all roller marks are eliminated and the minimum densities have been obtained based upon 95 percent of laboratory Marshall Densities made in the proportions of the job-mix formula, AASHTO T-245.

D. Steel-Tired, Static Weight Rollers: The maximum roller speeds for steel-tired static-weight rollers for various operations shall not exceed three miles per hour. The wheels of steel-wheel rollers shall be kept moist and clean to prevent adhesion of the fresh material, but an excess of water will not be permitted.

E. Vibratory Rollers: The maximum roller speed for vibratory rollers shall be that which provides impact spacing less than the compacted lift thickness. When vibratory rollers are used in the static mode, roller speed shall not exceed three miles per hour.

F. When an approved vibratory roller is used for breakdown rolling in a vibratory mode, intermediate rolling will not be required. When the vibratory roller is used for finish rolling it shall be used in the static mode. Rolling shall progress continuously until the specified density of the corresponding daily plant Marshall Density, AASHTO T-245 has been attained. Finish rolling shall continue until all roller marks are eliminated.

G. Unless otherwise directed, rolling shall start longitudinally at the sides and gradually progress toward the center of the pavement except on super-elevated curves where the rolling shall

begin on the low side and progress to the high side, overlapping on successive trips by at least one-half the width of tandem rollers and uniformly lapping each preceding track.

H. The motion of the rollers shall be slow enough at all times to avoid displacement of the hot mixture. Any displacement resulting from reversing the direction of the rollers or from any other cause shall be satisfactorily corrected.

I. When the base course fails to comply with the density requirements herein specified additional compaction might be applied when permitted and as directed, to attain the required density. If satisfactory density cannot be attained the Contractor shall be required to remove and replace, at his own expense, any affected area that is proven to be structurally inadequate and/or incapable of maintaining material integrity.

J. Any mixture that becomes loose and broken, mixed with dirt, or is in any way defective, shall be removed and replaced with fresh hot mixture, which shall be compacted to conform to the surrounding area. Any area showing an excess or deficiency of bituminous material shall be removed and replaced.

K. In the event of dispute as to the creditability of the results, density shall be determined from cores taken from the pavement.

3.08 TACK COAT

A. Tack coat shall be installed in accordance with Section 403 of the State Standards.

3.09 TEMPORARY TRENCH PATCHING

A. Conform to Section 410.03.2 of the State Standards.

END OF SECTION

SECTION 32 1313
CEMENT CONCRETE PAVEMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 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. Survey plan entitled "Warwick, RI Existing Conditions Prepared for Brewster Thornton Group, Class III Survey of Community College of Rhode Island Knight Campus East Ave." prepared by Marsh & Long Surveying, Inc. of Smithfield, RI dated July 3, 2014.

C. Supplemental plan entitled "Warwick, RI Existing Conditions Prepared for Pare Corp., Survey of a Portion of Community College of Rhode Island Knight Campus East Ave." prepared by Marsh & Long Surveying, Inc. of Smithfield, RI dated January 19, 2017 and revised March 23, 2018.

1.03 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:

1. Vehicular Concrete Pavement
2. Concrete pads

B. Related Sections include the following:

1. Section 31 0000 – Earthwork

1.04 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.05 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated. Indicate name, source, and description of each material and product.

B. Design Mixtures:

1. 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.
2. For each concrete pavement mixture, include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Qualification Data: For testing agency.

D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the aggregates and concrete mix with requirements indicated.

E. 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.

F. Field quality-control test reports.

G. Sample of Detectable Warning Paver for review by Owner

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.

B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.

C. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.

D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

E. Mockups: Cast mockups of full-size sections of concrete pavement to demonstrate typical joints, surface finish, texture, color, and standard of workmanship.

1. Build mockups of approximately 100 square foot size in the location as directed by the Architect.

2. Notify Owner's Representative a minimum of seven days in advance of dates and times when mockups will be constructed.

3. Obtain Owner's Representative's approval of mockups before starting construction.

4. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed pavement.

5. Demolish and remove approved mockups from the site when directed by Owner's Representative.

6. Approved mockups may become part of the completed Work if approved by the Owner's Representative.

1.07 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

1.08 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

B. 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.

C. Deliver concrete to discharge locations in watertight agitator or mixer trucks without altering the water-cement ratio, slump, air entrainment, temperature and homogeneity.

D. 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.

1.09 PROJECT CONDITIONS

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

B. Weather: Protect concrete from damage and reduced strength or performance due to weather extremes during mixing, placing and curing.

C. 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.

D. 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.

PART 2 - PRODUCTS

2.01 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

1. Use flexible or curved forms for curves with a radius 100 feet or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, nor adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

C. 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 Owner's Representative, 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.

D. 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.

E. 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". Tycone 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.

F. Chamfer Strips: Provide ¾-inch triangular fillets to form all exposed concrete corners. Material shall be rubber or polyvinyl chloride type, or smooth clear, sealed softwood.

G. Seals: Sleeve/pipe seals shall be Link-Seal modular mechanical seals as manufactured by Thunderline Corporation or approved equivalent. The seal shall be modular, mechanical; type, consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and the wall opening. The elastomeric element shall be sized and selected per manufacturer's recommendations and have the following properties as designated by ASTM:

1. For standard service applications: (-40°F to 250°F) EPDM – ASTM D2000 M3 BA 510.
2. For hydrocarbon service applications: (-40°F to 210°F) Nitrile – ASTM D2000 M1BF510.
3. For high temperature or fire seal applications: (-60°F to 400°F) Silicone – ASTM D2000 M1GE505.

2.02 STEEL REINFORCEMENT

A. Steel reinforcement required for the construction of sidewalks and walkways shall conform to the requirements of the State Standards.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.

D. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M or ASTM A 934/A 934M; with ASTM A 615/A 615M, Grade 60 deformed bars.

E. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.

F. Epoxy-Coated Joint Dowel Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60, plain steel bars.

2.03 CONCRETE MATERIALS

A. The Contractor shall insure that the final appearance of the sidewalks is consistent throughout the whole project. Any difference in color, texture, or finish will not be accepted by the Engineer.

1. Any portion of sidewalk or walkway that does not match the color, texture, or finish of previously constructed sidewalks will be removed and replaced with a sidewalk that matches the recently poured sidewalks at the expense of the Contractor.

B. Cementitious Materials conforming to the State Standards shall be provided for the construction of the proposed sidewalks.

1. The cement factor shall be between 658 lbs/cy and 799 lbs/cy.
2. The maximum water/cementitious ratio is 0.42.
3. The slump shall be between 1 and 3 inches.
4. The minimum compressive strength after 7 days shall be 2,400 lbs with a 28-day compressive strength of 4,000 lbs.

C. Aggregate shall conform to the requirements and gradations specified in the State Standards.

D. Water: ASTM C 94/C 94M.

E. Air-Entraining Admixture: ASTM C 260.

F. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain no more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.04 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

2.05 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to the State Standards, for each type and strength of normal-weight concrete required.

2.06 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For concrete mixes of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.

2. For concrete mixes larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

2.07 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.

2.08 JOINT COMPOUNDS

A. Provide joint compound for expansion joints in horizontal surfaces and surfaces inclined less than 30 degrees from the horizontal conforming to ASTM C920, Type S or M, Grade P, Class 25. Use type T in pedestrian and vehicular traffic areas and use type NT in non-vehicular areas.

B. Provide joint compound 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. Provide compatible joint compounds as recommended by manufacturer when they abut each other.

D. Provide compound intended for continuous submergence in liquid containing structures.

2.09 BOND BREAKER FOR JOINT COMPOUNDS

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

2.10 BACK-UP MATERIAL FOR JOINT COMPOUNDS

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 compound manufacturer that is compatible with the joint compound and has the same expansion/contraction capability as joint compound.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase in one direction. Limit vehicle speed to 3 mph.
2. Subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch require correction according to requirements in Section 31 00 00.

C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

D. Remove loose material from compacted subbase surface immediately before placing concrete.

3.02 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

C. 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.

D. 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.

E. 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.

F. 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.

G. Corner Treatment:

1. Unless shown otherwise, form chamfers with ¾-inch by ¾-inch strips, accurately formed and surfaced to produce uniformly straight lines and tight edge joints on exposed concrete. Extend terminal edges to required limit and miter chamfer strips at changes in direction.

H. Control Joints: Locate as indicated on the Drawings.

I. 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.

J. 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.

3.03 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 in accordance with State Standards.

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.

3.04 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.

3.05 STEEL AND WELDED WIRE FABRIC REINFORCEMENT

A. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

B. Place steel or welded wire fabric in conformance with the construction methods specified within the State Standards.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.06 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. The Contractor shall score the concrete sidewalks in conformance with the scoring pattern shown on the Drawings where specified.

C. Where the scoring pattern is not specified, the Contractor shall score the concrete sidewalk in conformance with the State Standards.

D. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints.

E. Key groove all construction joints unless otherwise indicated. Wall horizontal joints need not be keyed except where specifically indicated.

F. Key grooves shall be one-third the thickness of the thinner member and 1-1/2-in. deep unless otherwise indicated.

G. Use tapered key groove forms to permit form removal without damage to the groove. Taper not to exceed 2 inches per foot.

H. Center waterstops in construction joints unless otherwise indicated. Secure waterstops in position by tie wire to adjacent reinforcing every 12 inches.

I. Consolidate concrete during placement in the vicinity of key groove without damaging or dislodging waterstop.

J. Remove all key groove forms.

K. Clean key groove of laitance, curing compound, 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.

L. Protect exposed key groove and waterstop from damage.

3.07 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.

3.08 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 compound.

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 compound 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 compound 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 compound, foreign materials and protrusions of hardened concrete. Blow out debris and dust with oil-free compressed air.

3.09 JOINT COMPOUND

A. Seal the dry clean concrete in expansion joints in conformance with manufacturer's printed instruction.

B. Install back-up and bond breaker materials.

C. Prime concrete, fill flush with joint compound or required thickness, tool to concave shape and seal in conformance with manufacturer's printed instructions and ASTM C1193.

D. Prevent spilling joint compound 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 compound when compound, air or concrete temperature is less than 40 deg F or as required by manufacturer.

3.10 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site.

F. Do not add water to fresh concrete after testing.

G. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

H. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

I. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

1. Remove and replace concrete that has been placed for more than 15 minutes without being covered by top layer, or use bonding agent if approved by Architect.

J. Screed pavement surfaces with a straightedge and strike off.

K. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

L. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.

1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.

M. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

N. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.

O. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.11 FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

C. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

D. Coordinate special finishes with Landscape Drawings.

3.12 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
2. Water.
3. Continuous water-fog spray.
4. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

5. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
6. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.13 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:
1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.14 FIELD QUALITY CONTROL

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

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain at least 1 composite sample for each 5000 sq. ft. or fraction thereof of each concrete mix placed each day.
2. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
5. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
6. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
7. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.
   a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.

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

D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.15 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section at no expense to the Owner.

B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 32 3120
ORNAMENTAL STEEL FENCES AND GATES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Ornamental welded steel fencing panels fabricated with galvanized flat bars and round rods welded into modular, open grille fencing panels, including steel fence posts and gates.

B. Related sections:
   1. Section 03 30 00 - Cast-in-Place Concrete: Concrete equipment pad in which fence posts are embedded.

1.02 REFERENCES

A. ASTM A36 - Carbon Structural Steel.

B. ASTM A121 - Metallic-Coated Carbon Steel Barbed Wire.

C. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

D. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

E. ASTM B117 - Operating Salt Spray (Fog) Apparatus.

F. ASTM D822 - Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

G. ASTM D2794 - Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

H. ASTM D3363 - Test Method for Film Hardness by Pencil Test.

1.03 SUBMITTALS

A. Provide in accordance with Section 01 33 00 - Submittal Procedures:
   1. Product data for components and accessories.
   2. Shop drawings showing layout, dimensions, spacing of components, and anchorage and installation details.
   3. Sample: [8 by 10 inches] [203 by 254 mm] minimum size sample of fence panel illustrating design, fabrication workmanship, and selected color coating.
   4. Copy of warranty specified in Paragraph 1.4 for review by Architect.

1.04 WARRANTY

A. Provide in accordance with Section 01 77 00 - Closeout Procedures:
   1. Factory finish: 20-year warranty against cracking, peeling, and blistering under normal use.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS – Basis of Design

A. Ametco Manufacturing Corporation, 4326 Hamann Parkway, P.O. Box 1210, Willoughby, Ohio 44096; 800-362-1360.

B. Manufacturers of equivalent products submitted and approved in accordance with Section 01 6000 - Product Substitution Procedures.

2.02 MATERIALS

A. Steel bar stock: ASTM A36.

B. Steel tubing: ASTM A500, Grade B.

C. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, and water-reducing and plasticizing additives.

2.03 FENCE SYSTEM

A. Type: Ornamental aluminum perforated fencing system supported by steel posts and gates and gate hardware; Ametco Fence System as manufactured by Ametco Manufacturing Corporation.

B. Fence panels: Fabricated from perforated aluminum sheets with aluminum louvers; Delta Design as manufactured by Ametco Manufacturing Corporation.

Perforations:

1. Round: ½" diameter holes spaced at 11/16" centers in straight line

2.04 GATES

A. Provide gates of type and size indicated on Drawings. Equip gates with manufacturer's standard hardware as required for complete functional operation.

B. Type: Hinged swinging double gate.

2.05 FACTORY FINISH

A. Steel fence panels and posts shall be hot-dip galvanized to 1.25 ounces per square foot minimum zinc coating in accordance with ASTM A123. Standard size components shall receive polyester powder coating. Large gate panels shall be coated with 2-part polyurethane coating.

B. Polyester powder coating: Electrostatically applied colored polyester powder coating heat cured to chemically bond finish to metal substrate.
   1. Minimum hardness measured in accordance with ASTM D3363: 2H.
   2. Direct impact resistance tested in accordance with ASTM D2794: Withstand 160 inch-pounds.
   3. Salt spray resistance tested in accordance with ASTM B117: No undercutting, rusting, or blistering after 500 hours in 5 percent salt spray at 95 degrees F and 95 percent relative humidity and after 1000 hours less than [3/16 inch] [5 mm] undercutting.
   4. Weatherability tested in accordance with ASTM D822: No film failure and 88 percent gloss retention after 1 year exposure in South Florida with test panels tilted at 45 degrees.
   5. Polyurethane coating: 1.0 mil dry film thickness of coating of steel test panel cured 30 minutes at 180 degrees F and aged 14 days shall resist the following test conditions without failure:
      a. 5 percent salt spray for 500 hours.
      b. 100 percent relative humidity for 1000 hours.
      c. Water immersion for 100 hours.
      d. 20 double rubs with cloth saturated with either lacquer thinner, acetone, MEK, gasoline, or xylene.
      e. Exposure to lubricating oils, hydraulic fluids, and cutting oils.
      f. 16 cycles of 24 hours at 100 percent humidity, 24 hours at 10 degrees F, and 24 hours at 77 degrees F.
      g. Hardness: H to 2H.
      h. Flexibility: [1/8 inch] [3 mm] conical mandrel.
   6. Color: Selected by Architect from manufacturer's standard range.

PART 3 - EXECUTION

3.01 PREPARATION

A. Prior to fabrication, field verify required dimensions.

3.02 INSTALLATION

A. Install fencing in accordance with manufacturer's installation instructions and approved shop drawings.

B. Install fence posts plumb and level by embedding post directly in concrete equipment pad. Temporarily brace fence posts with 2 by 4 wood supports until concrete is set.

C. Do not install bent, bowed, or otherwise damaged panels. Remove damaged components from site and replace.

D. Secure fence panels with stainless steel anti-intruder bolts to fence posts after posts have been set in footings.

E. Gates:
   1. Install gates and adjust hardware for smooth operation.
   2. [Provide concrete center foundation depth and drop rod retainers at center of double swinging gate openings.]
   3. [Provide concrete surface for length of operation of V-wheeled rolling gate. Anchor track to concrete with countersunk fasteners.]
   4. After installation, test gate [and operator]. Open and close a minimum of five times. Correct deficiencies and adjust.
   5. Touch-up damaged finish with paint supplied by manufacturer and matching original coating.

END OF SECTION

Section 32 92 00
SOIL PREPARATION FOR LAWN ESTABLISHMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

A. Related Sections: The following Sections contain requirements that relate to this Section:
1. Section 31 00 00 – Earthwork
2. Section 31 11 00 – Site Preparation
3. Section 32 92 20 – Seeding for Lawn Establishment

1.2 DESCRIPTION OF WORK

A. Provide all materials, equipment and labor necessary to complete the work as indicated on the drawings or as specified herein.

B. The principal work of this section includes, but may not be limited to, the following:
1. Loam from off-site, if on-site is insufficient
2. Loam Testing
3. Grading and Spreading Loam
4. Preparations of Seed Beds
5. Application of Soil Additives
6. Application of Turf Starter Fertilizer

1.3 QUALITY ASSURANCE

A. Contractor shall specialize in work outlined with a minimum of five (5) years experience on similar projects.

B. Contractor shall not make substitutions without written approval. If specified materials are not available, obtain approval for substitution from the Owner's Representative.

C. All fertilizer applications shall be performed by a licensed applicator in strict conformance with all local, state and federal regulations. Contractor shall notify the Owner’s Project Representative at least two weeks prior to scheduled application. A copy of the applicator’s license shall be given to the Owner’s Representative.

D. Pre-Construction Meeting – Contractor shall request in writing an on-site meeting with the Owner’s Representative, the General Contractor and Site Contractor and the Landscape Architect and the Civil Engineer to review the scope of work prior to any work taking place to review the subgrade conditions. Any deficiencies in

the subgrade conditions shall be remedied by the contractor and approved by the Owner prior to any loam being spread.

E. Any loam stockpiles sitting beyond one growing season shall be covered. Contractor shall be responsible for complete removal and disposal of any weed seed established on loam stockpiles prior to placement and spreading of loam.

F. The materials shall not be handled or moved when in wet or frozen conditions.

1.4 SUBMITTALS

A. Samples shall be as follows:

1. The Contractor shall provide a one cubic foot representative sample per each 1,000 cubic yard on-site stockpile of existing loam for testing. All stockpile sampling shall be per ASTM D 75 and Appendices.

2. Preparation of Samples: Contractor shall place these soil slices into a large, clean plastic container and mix thoroughly. Contractor shall take one cup of soil mixture and dry it room temperature (do not dry samples in an oven or on a stove or radiator). Once soil is dry, place soil in sandwich size type plastic bag and close. Label each sample on outside of bag, identifying sample by soil type and stockpile location and phase of construction.

3. Loam from off-site, if on-site loam is insufficient: The Contractor shall provide a one cubic foot representative sample per each 1,000 cubic yard proposed stockpile of loam borrow for testing. All stockpile sampling shall be per ASTM D 75 and Appendixes.

B. Contractor shall submit to the Owner's Representative samples, manufacturer's product data, source of off-site loam and certified testing of off-site loam at least 60 days prior to delivering material on site.

C. Contractor shall submit to the Owner's Representative samples and certified test results for on-site loam 60 days prior to using material to allow for reformulation and retesting if test results are rejected.

D. Contractor shall submit to the Owner's Representative certified test results for loam with added amendments 60 days prior to using material to allow for reformulation and retesting if test results are rejected.

E. Testing: Testing shall be as follows:

1. General
   a. On-site stockpiled loam shall be tested at the beginning of each phase of construction prior to its use in its respective phase.
   b. Contractor shall provide current certified test results for off-site, imported loam to be used on the project prior to use. Testing date shall be within the current year the loam is to be used on the project.

c. Contractor shall provide current certified test results of all soil amendments including organic compost and soil additives prior to use.
d. All testing and re-testing shall be at the expense of the Contractor. Contractor shall deliver samples to an independent testing facility such as the University of Mass Experiment Station and have the results forwarded to the Owner's Representative for review and approval prior to using the material.
e. Samples for tests shall be taken from on-site stockpiles in the presence of the Owner's Representative.

2. Testing reports shall include the following tests and recommendations:

a. Percent organic matter by weight as determined by the loss on ignition of samples that have been oven dried to a constant weight at temperature of 105 degrees C.
b. Mechanical gradation (sieve analysis) shall be performed and compared to the USDA Soil Classification System.
c. Chemical Analysis shall be undertaken for Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, Lead, Zinc, Soluble Salts, extractable Aluminum, Cadmium, Copper, pH and buffer pH, carbon:nitrogen ratio and toxic elements. Except where otherwise noted, nutrient tests shall be for available nutrients.
d. Soil analysis tests shall show recommendations for soil additives to correct soils to meet the specifications and for additives necessary to accomplish lawn and planting work as specified.
e. Certified analysis, manufacturer, labels and source of organic compost and soil additives to be provided.

1.5 DEFINITIONS

A. The following definitions shall apply to the work of this section.

The following size distributions of mineral particles by diameter and sieve size shall apply to the following conventional names of soil types:

Conventional Name	Retained on US Sieve No.	Diameter (mm)
Very Coarse Sand	#18	1-2
Coarse Sand	#35	0.5-1
Medium Sand	#60	0.25-0.5
Fine Sand	#140	0.10-0.25
Very Fine Sand	#270	0.05-0.10
Silt	by hydrometer	0.002-0.05
Clay	by hydrometer	Less than 0.002

1.6 PRODUCT DELIVER, STORAGE AND HANDLING

A. Protect all products from weather vandalism or other damaging or deteriorating conditions.

PART 2 - PRODUCTS

2.1 CLEAN SCREENED LOAM

A. Loam shall consist of screened fertile, loose, friable sandy loam with no admixture of refuse or any natural or introduced materials toxic to plant growth and free of subsoil, refuse, stumps, roots, rocks, cobbles, stones, brush, clay lumps, noxious weeds, litter and other deleterious materials. Loam shall not come from USDA-classified prime farmland.

B. Loam shall be one of the following sandy loams: “coarse sandy loam”, “sandy loam”, “fine sandy loam” based on the USDA Classification System determined by mechanical analysis ASTM D-422. It shall be uniform in composition, without admixture of subsoil. The loam shall possess good filtration and permeability rates, and shall possess a mechanical analysis where:

		Percent Passing By Weight	
Millimeter	US Sieve Size	Max.	Min.
4	#5	100	95
2	#10	95	90
0.42	#40	90	60
0.149	#100	60	30
0.074	#200	30	20
0.037	#400	20	0

1. One hundred percent shall pass a half inch sieve opening, and the maximum retained on the quarter inch sieve shall be 20 percent by weight of the total sample.

2. On-site and off-site loam shall be screened to achieve the above specified sieve analysis.

3. Organic matter in approved planting soil shall be between 5% minimum and 8% maximum by weight as determined by the loss on ignition of samples that have been oven dried to a constant weight at temperature of 105 degrees C.

4. Acidity range of planting soil shall be 5.5 to 6.5 pH when tested according to methods of testing or A.O.A.C.

   a. When pH of loam borrow is equal to or greater than the maximum use aluminum sulfate to adjust pH to required levels.

   b. When pH of loam borrow is less than the minimum required use either sulfur or ferrous sulfate to adjust pH to required levels.

C. Soluble salt content shall be less than 100 PPM.

D. Loam shall be uncontaminated by salt water, foreign matter and substances harmful to plant growth. Topsoil shall not have extractable aluminum greater than 200 parts per million unless otherwise noted. Cation Exchange Capacity (CEC) shall be between 10 and 15.

2.2 ORGANIC COMPOST

A. Organic Compost shall be natural or manufactured mature, composted organic material produced from a DEP-approved composting vendor. Only Federal EPA Class A or Massachusetts Type I compost products shall be used. The following shall be requirements shall be met:

1. Compost shall originate from mature leaf compost, mature composted animal manure, other aged, composted vegetable materials such as brewer's waste, or chemically tested toxin-free processed sludge products (biosolids).
2. Test results shall indicate maturity and age of organic compost. Raw uncomposted or unprocessed or incompletely composted organic matter shall be rejected.
3. Organic matter manufactured from sludge and other biowaste materials or manure, shall be aged for at least one (1) year without exception and shall have no biowaste odor.
4. Compost shall contain no uncomposted bulking agents such as uncomposted wood chips and shall be free from hard lumps and free from seeping water when handled.
5. Compost shall be free from sticks, stones, plastic, debris or other substances which would be injurious to healthy plant growth. 100% of compost material shall pass a ½" sieve.
6. Acidity range shall be pH 6 minimum and 8 maximum when tested according to methods of testing or A.O.A.C.
7. Organic matter shall not be less than 30% as determined by ASTM D2974.
8. Moisture content of 35% to 70%, as determined by ASTM D2974
9. Carbon:Nitrogen ratio of 15:1 to 30:1
10. Solvita intex of 6 to 8
11. Non-phytotoxic
12. There shall be no unpleasant or detectable odor of ammonia or hydrogen sulfide, which would indicate immature compost. Color of compost shall be dark brown.

2.3 SOIL ADDITIVES

A. Limestone for adjustment of soil pH shall be agricultural grade ground dolomitic limestone containing up to 50% magnesium carbonate in a dry, granular form. Limestone shall be ground to such a fineness that at least 50% will pass through a 100-mesh sieve and 90% to 100% will pass through a 20-mesh sieve.

B. Aluminum Sulfate for adjustment of soil pH shall be commercial sulfur, unadulterated, 57% and delivered in containers with the name of the manufacturer, material analysis and net weight appearing on each container.

C. Lawn Starter and Maintenance Fertilizer:

1. Fertilizer shall be a complete commercial product complying with the State and Federal fertilizer laws. Fertilizer shall be pelletized. Deliver to the site in the original unopened containers that shall bear the

manufacturer's certificate of compliance covering analysis. At least 50% by weight of the nitrogen content shall be derived from organic materials. Fertilizer shall contain not less than the percentages of weight of ingredients as follows or as recommended by the soil analysis:

Nitrogen	10%
Phosphorus	6%
Potash	4%

2. Adjust nitrogen type and analysis for spring growth and slow release in fall.

3. Application Rate: Per manufacturer's instructions and as recommended by soil test results.

D. Sand: Shall be clean, course, angular, ungraded material meeting ASTM C33 with the following addendums:
1. Sand shall not be gravelly
2. Sand shall not be beach sand
3. Sand shall have a fineness modulus of 2.5 to 3.2
4. A coefficient of uniformity (D60/D10) of less than 4

E. Bone Meal: shall be fine ground, steam cooked, packing house bone with a minimum analysis of 23% phosphoric acid and 4% nitrogen.

F. Gypsum: shall be agricultural grade, granular form. Gradation shall conform to the following:

Sieve Designation	Percent Passing By Weight
No. 8 (2.36mm)	100
No. 16 (1.18mm)	97
No. 30 (0.60mm)	82
No. 50 (0.30mm)	46
No. 100(0.15mm)	21

2.4 WATER

E. Clean, fresh potable water free of salt and other impurities injurious to vegetation.

PART 3 - EXECUTION

3.0 MIXING, GRADING AND SPREADING AMENDED LOAM

A. Contractor shall amend loam with organic compost and soil additives to meet requirements in these specifications and only after approval of test results shall amended loam be spread.

B. Prior to any spreading of loam, it is the responsibility of the Contractor to request a meeting with the Owner's Representative and the Landscape

Architect to review and approve the subgrade condition. Subgrade shall meet the requirements outlined in Section 31 00 00 – Earthwork.

C. Remove all debris and other inorganic materials on any prepared subgrades, and reshape and dress any damaged or eroded slopes, swales, and other areas. Scarify and loosen subgrade to a friable condition in any areas where compaction may have occurred. Fill all depressions in existing grades with suitable fill material as specified in Section 31 00 00-Earthwork prior to spreading loam, then shape and finish grade to depth of loam required. Loam shall not be placed until subgrade is in suitable condition and free of excessive moisture or frozen materials.

D. **Loam shall be spread as required on all disturbed and bare areas to produce a total depth of six (6) inches for seeded and sodded areas at the locations shown on the Plans.**

E. Area shall be progressively fine graded and machine and hand raked, with loam added as required to correct depressions and other irregularities, to produce smooth and unbroken finish grades and the depth of loam required.

F. Finish grades shall conform to lines, grades, sections, and shapes of lawn areas as required to meet design intent on Plans. Provide positive drainage. Provide smooth, uniform, rounded transitions at all changes and break in grade.

1. Loam for seeded areas shall be a consistent depth of 1/2" below adjacent pavements surfaces.

2. Loam for sodded areas shall be placed so that top of sod is a consistent depth of ½” below adjacent pavement surfaces.

G. Starter fertilizers: All required materials shall be spread and distributed into the soil at rates and amounts specified herein.

3.1 PREPARATION OF AREAS FOR SEEDING

A. GENERAL DESCRIPTION: This work shall consist of the preparation of the soil bed. Work shall be done as described herein:

1. Areas shall be finely raked to a finished grade. Material ½” or greater in any dimension shall be removed and disposed of per the contract specifications.
2. Where the soil has become compacted, prior to fine raking, areas shall be scarified by discing, york raking, or other approved method to a minimum depth of two (2) inches.
3. Where the soil is loose and soft, prior to fine raking, areas shall be lightly rolled and soil added as required to meet finished grades.
4. No seeding or sodding will be permitted on areas where the soil bed has not been prepared per the specification.
5. Any debris that falls on paved or other hardscape areas shall be removed by the Contractor.

3.2 APPLICATION OF LIMESTONE

A. When applied dry, limestone shall be spread evenly and incorporated thoroughly into the soil by discing or other approved means.

B. When applied hydraulically, no discing will be necessary.

C. Granular treatment to be applied at the rate required by soil pH test to produce a pH required per this specification.

3.3 APPLICATION OF STARTER FERTILIZER

A. Application Rate: Refer to Section 2 in this specification.

B. Contractor shall notify the Owner's Project Representative at least two weeks prior to scheduled application. Contractor shall obtain approval in writing by the Owner's representative.

END OF SECTION

Section 32 92 20
SEEDING FOR LAWN AREAS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Section 32 92 00 - Soil Preparation for Lawn Establishment
2. Section 32 92 10 – Soil Preparation for Athletic Fields

1.2 DESCRIPTION OF WORK

A. Provide all materials, equipment, and labor necessary to complete the work as indicated on the drawings or as specified herein.

B. The principal work of this section includes, but may not be limited to, the following:
1. Application of seed
2. Application of weed control
3. Maintenance of seeded areas
4. Acceptance of seeding

C. In general, seeded areas shall, at a minimum, include all areas of site within project limit lines that have been disturbed or are barren unless otherwise noted on the plans. Overseeding of established lawn areas, if required on plans, shall also extend to the limit of disturbance (LOD), unless otherwise noted.

1.3 QUALITY ASSURANCE

A. Subcontract seeding work to a firm specializing in such work unless Contractor is fully experienced and qualified.

B. Each seed bag or container shall display a label which identifies the contents as a true representation of the seed mix and percentages required by specification. No seed shall be applied to a site until display labels are submitted to the Owner's representative and has determined the mixture meets all requirements.

C. Do not make substitutions without written approval. If specified seed mixes are not available, obtain approval for substitution from the Owner's representative.

1.4 SUBMITTALS

A. Certifications and/or labels of proposed seed mixtures stating common and scientific names of grasses, percentages by weight, and percentages of purity and germination.

B. Product information for all proposed weed control chemicals.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect all products from weather or other damaging or deteriorating conditions.

B. Seed mixes which have been damaged or have deteriorated in transit or storage are not acceptable.

C. Seeding Schedule: Prepare a proposed seeding schedule. Schedule dates for each type of landscape work during normal seasons for such work.

Seeding: March 15 - June 30
August 15 - October 15

D. Correlate with specified maintenance periods to provide maintenance to date of acceptance. Once the schedule is accepted, dates shall be revised and submitted in writing for reasons of delay.

1.6 WARRANTY

A. Warranty seeding until final acceptance of grass stand. Final acceptance is defined in Part 3 of this specification.

1.7 MAINTENANCE

A. Maintenance of seeding to be performed by the installer to ensure plant survival and to eliminate undesirable species includes:
1. Watering
2. Mowing
3. Regrading and replanting eroded areas
4. Seeding or patching sparse or bare areas
5. Debris removal
6. Replacement of damaged or dead material
7. Additional fertilizations
8. Additional weed control

B. Maintain seeded areas immediately after placement until seed areas are accepted as outlined in Part 3 of this specification.

PART 2 - PRODUCTS

2.1 MULCH

A. Hydro mulch: Shall be a Bonded Fiber Matrix Hydraulically applied erosion system, consisting of long strand, virgin wood fibers (90% by weight), bound together by a pre-blended, high-strength polysaccharide polymer adhesive (10% by weight). The virgin wood fibers shall be thermo-mechanically defibrated from clean whole wood chips, containing a minimum of 25% of the fibers averaging 10 mm long, with a minimum of 50% or more retained on a #24 mesh screen. The organic binders shall be a high viscosity. Fiber shall not be produced from recycled material such as sawdust, paper or cardboard.

The bonded fiber matric shall be of such character that it will disperse uniformly into a slurry when mixed with water. The slurry, when hydraulically applied to the ground, shall form an absorptive mat of mulch. No materials which inhibit growth or germination shall be present in the mixture.

2.2 SEED

A. General: Pure, live, fresh seed from commercial sources meeting and labeled in accordance with State and Federal laws, rules and regulations. All seed to have minimum germination rate of 90%.

1. Seed mix for all **general lawn areas** shall conform to the following grass types and percentages:

Improved Perennial Rye	25%
Improved Annual	25%
Creeping Red Fescue	25%
Turf Type Tall Fescue	18.5%
Kentucky Bluegrass 98/85	5%
Red Top	1%
Colonial Bentgrass	0.5%

Sowing Rate: 5 to 7 pounds per 1,000 sq. ft.
Overseed Sowing Rate: 2 to 3 pounds for 1,000 sq. ft.

2.3 WEED CONTROL

A. Pre-emergent weed control for Loam and Seed Areas shall be Treflan 5-G or approved equal. Deliver in manufacturer's fully identified containers and apply according to manufacturer's directions.

2.4 WATER

A. Clean, fresh potable water free of salt and other impurities injurious to vegetation.

2.5 JUTE MESH

A. Jute mesh shall be uniform, open, plain weave of undyed and unbleached single jute yarn, a minimum of four (4) feet in width plus or minus one (1) inch. There shall be 78 warp ends per width and 41 weft ends per yard. Weight shall average 1.22 pounds per linear yard, plus or minus 5%. Staples for Erosion Control Materials: 9 gauge staples shall be used with jute mesh: 11 gauge with woven paper.

PART 3 - EXECUTION

3.1 GENERAL

A. Seeded areas shall, at a minimum, include all areas of site within project limit lines that have been disturbed or are barren unless otherwise noted on the plans.

B. Any seeded areas that are rutted or eroded due to construction, weather or otherwise damaged shall be the responsibility of the contractor to correct.

C. Multi-phased projects may have different seeding times based on each phase. It is the contractor's responsibility to follow the specifications herein for each phase of construction.

3.2 APPLICATION OF SEED

A. Seeding operations shall not occur until the seed bed has been approved per Specification 32 92 00, Section 3.1.

B. The approved seed mixture shall be applied at a rate indicated in Section 2.2 of this specification by means of a seeder device capable of penetrating ground to depth of 1". Seeder machine shall be equipped with disc-type penetrating action and seeder tubes which plant seeds. Seeder shall be similar to Jacobson Model 524-100, 548100 or equal.

C. Distribute seed over area in two separate passes, each one perpendicular to the other (north-south, east-west orientation). Each pass shall be in a linear progression, and shall conform to the field direction that permits the longest straight line application procedure.

D. Hydro mulch shall be applied to seeded areas after seeding has occurred on athletic fields.

E. Hydroseeding will be permitted only with permission of Owner's Representative. All requests shall be in writing with detailed and itemized procedure to be followed. **Hydroseeding of athletic fields shall not be permitted.**

F. Broadcast seeding will be permitted only with permission of Owner's Representative. All requests shall be in writing with detailed and itemized procedure to be followed.

3.3 APPLICATION OF FERTILIZER

A. Complete fertilizer in granular form shall be applied per Specification 32 92 00 – Soil Preparation for Lawn Establishment and Specification 32 92 10 – Soil Preparation for Athletic Fields.

3.4 APPLYING JUTE MESH

A. Jute mesh shall be applied to any slopes 4:1 or steeper.

B. Apply jute mesh loosely but smoothly to fit the contour of the finished grade, parallel to and in same direction as the flow of water. The up-slope end of each separate strip or piece of jute mesh shall be buried in a six (6) inch minimum vertical anchor slot or junction slot with the soil tamped firmly against the mesh. Where more than one width of material is required, edges shall overlap a minimum of twelve (12) inches, and the up-slope section of mesh will be on top. Down-hill ends of the jute mesh shall be folded under approximately four (4) inches and stapled in place. Staples will be inserted through the mesh along edges, overlaps, and in the center of all jute mesh strips at intervals not greater than three (3) feet. All anchor slots, junction slots, check slots, and terminal folds shall have five (5) staples spaced not more than nine (9) inches on center across widths.

C. On seeded banks, jute shall be applied immediately after seeding.

3.5 ACCEPTANCE OF SEEDING FOR GENERAL LAWN AREAS

A. PROVISIONAL ACCEPTANCE
Provisional acceptance shall be considered after a minimum of **ONE** full growing

season as indicated in Section 1.5 Paragraph C. In order for provisional acceptance to be granted, the Contractor shall request in writing to the Owner's Representative that he/she is ready to have the seeded areas reviewed. The following requirements shall be met.

1. Provisional acceptance will not occur until after one full growing season. The seeded areas must be well established, exhibiting a vigorous growing condition and devoid of bare spots greater than 1 square foot.
2. It will be the contractor's responsibility to maintain seeded areas from the time of seed installation until the date of Final Acceptance. See Section 3.4, C. herein for maintenance requirements.
3. Provisional acceptance will not be granted until contractor has obtained, in writing, a statement from the landscape architect indicating that grass is satisfactory under the terms of the provisional acceptance.
4. Following are some examples of delays in provisional acceptance of seeded areas:
   a. Improper grading:
      -Low or high spots on flat or fairly level areas
      -Improper drainage
      -Washed out or rilled areas
      -Exposed debris
   b. Turf Grass Conditions
      -Poor or thin stands of lawn
      -Improper fertilization application
      -Persistent weeds established in turf areas
      -Significant stands of clover are not considered persistent weeds in general lawn areas

B. FINAL ACCEPTANCE FOR GENERAL LAWN AREAS

In order for final acceptance to be granted, the Contractor shall request in writing to the Owner's Representative that he/she is ready to have the seeded areas reviewed and the following requirements shall be met.

1. All seeded areas have been maintained by the Contractor for not less than one growing season from the time provisional acceptance is granted. Growing season shall be defined as follows:
   a) If provisional acceptance is received during April, May, June or July, next growing season shall end on October 15.
   b) If provisional acceptance is received during September, October, November or December, next growing season shall end on June 1.
2. Inspection will be made by the Owner's Representative and the Landscape Architect. Grass areas not demonstrating satisfactory stands as outlined above, (except if damaged by vandalism) as determined, by the L.A. shall be renovated, re-seeded, and maintained meeting all requirements as specified herein. Maintenance period shall extend to the end of the next growing season, see Section 3.4, B,1 herein.
3. After all necessary corrective work has been completed, the Landscape Architect will submit in writing recommending to the Owner's Representative that Final Acceptance shall be granted.
4. One application of turf maintenance fertilizer shall be applied before final acceptance of seeded areas can be granted.
5. Decision of Owner's Representative as to the necessity to replace grass areas or repair any defects in workmanship, or cause of any destruction or loss, impairment or failure to flourish, shall be conclusive and binding upon Contractor. Replacements shall be the same as specified. All

replacements shall be planted as specified herein at Contractor's expense.

6. "Vandalism", as noted above, is intended to mean any acts, whether intentional or accidental, by other persons, which clearly result in damage, and which may reasonably be considered to be beyond the Contractor's reasonable control, as determined by the Owner's representative.

C. MAINTENANCE FOR GENERAL LAWN AREAS

1. Maintain grassed areas up to provisional acceptance and a minimum of one full growing season after provisional acceptance to establish an acceptable lawn. For areas seeded in fall, continue maintenance through the following spring until acceptable lawn is established.
2. Maintain grassed areas by watering, mowing, fertilizing, weeding, debris removal and trimming.
3. The Contractor shall mow all established seeded areas. No mowing shall remove more than one-third of the grass blade length. Heavy mowing, resulting in grass on the surface shall be “doubled mowed” or the contractor shall remove grass on surface. The grass shall be mown to a height of two and one half to three inches (2-1/2”-3”).
4. The Contractor shall keep all seeded areas watered and in good condition, reseeding if and when necessary to meet the requirements specified herein.
5. Watering of seeded areas.
   a. During this period, water grass as necessary to maintain an adequate supply of moisture within the root zone. An adequate supply of moisture is the equivalent of two (2) inches of absorbed water per week that is delivered at weekly intervals in the form of natural rain or is augmented by watering by the contractor.

6. Repair areas damaged by erosion or construction activities by regrading, rolling and replanting.
7. Reseed small, sparse grass areas. When sparse areas exceed 20 percent of planted area, reseed and hydro mulch.

END OF SECTION

Section 32 93 00
SOIL PREPARATION FOR TREES AND PLANTING BEDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Section 01 56 39 – Tree Protection and Trimming
2. Section 31 00 00 – Earthwork
3. Section 31 11 00 – Site Preparation
4. Section 32 93 10 – Trees, Shrubs and Groundcovers

1.2 DESCRIPTION OF WORK

A. Provide all materials, equipment and labor necessary to complete the work as indicated on the drawings, or as specified herein.

B. The principal work of this section includes, but may not be limited to, the following:
1. Loam from off-site, if on-site is insufficient
2. Testing
3. Mixing of Loam and Compost
4. Grading and Spreading of Loam/Compost Mix
5. Application of Limestone
6. Application of Fertilizer
7. Application of Jute Mesh

1.3 QUALITY ASSURANCE

A. Contractor shall specialize in work outlined with a minimum of five (5) years' experience on similar projects.

B. Contractor shall not make substitutions without written approval. If specified materials are not available, obtain approval for substitution from the Owner's Representative.

C. All fertilizer applications shall be performed by a licensed applicator in strict conformance with all local, state and federal regulations. Notify the Owner's Project Representative at least two weeks prior to scheduled application. A copy of the applicator's license shall be given to the Owner's Representative.

D. Pre-Construction Meeting – Contractor shall request in writing an on-site meeting with the Owner's Representative, the General Contractor and Site Contractor and the Landscape Architect and the Civil Engineer to review the scope of work prior to any work taking place to review the subgrade conditions. Any deficiencies in

the subgrade conditions shall be remedied by the contractor and approved by the Owner prior to any loam being spread.

E. Any loam stockpiles sitting beyond one growing season shall be covered. Contractor shall be responsible for complete removal and disposal of any weed seed established on loam stockpiles prior to placement and spreading of loam.

F. The materials shall not be handled or moved when in wet or frozen conditions.

1.4 SUBMITTALS

A. Samples shall be as follows:

1. The Contractor shall provide a one cubic foot representative sample per each 1,000 cubic yard on-site stockpile of existing loam for testing. All stockpile sampling shall be per ASTM D 75 and Appendices.

2. Preparation of Samples: Contractor shall place these soil slices into a large, clean plastic container and mix thoroughly. Contractor shall take one cup of soil mixture and dry it room temperature (do not dry samples in an oven or on a stove or radiator). Once soil is dry, place soil in sandwich size type plastic bag and close. Label each sample on outside of bag, identifying sample by soil type and stockpile location and phase of construction.

3. Loam from off-site, if on-site loam is insufficient: The Contractor shall provide a one cubic foot representative sample per each 1,000 cubic yard proposed stockpile of loam borrow for testing. All stockpile sampling shall be per ASTM D 75 and Appendixes.

B. Contractor shall submit to the Owner's Representative samples, manufacturer's product data, source of off-site loam and certified testing of off-site loam at least 60 days prior to delivering material on site.

C. Contractor shall submit to the Owner's Representative samples and certified test results for on-site loam 60 days prior to using material to allow for reformulation and retesting if test results are rejected.

D. Contractor shall submit to the Owner's Representative certified test results for loam with added amendments 60 days prior to using material to allow for reformulation and retesting if test results are rejected.

E. Testing: Testing shall be as follows:

1. General
   a. On-site stockpiled loam shall be tested at the beginning of each phase of construction prior to its use in its respective phase.
   b. Contractor shall provide current certified test results for off-site, imported loam to be used on the project prior to use. Testing date shall be within the current year the loam is to be used on the project.

c. Contractor shall provide current certified test results of all soil amendments including organic compost and soil additives prior to use.
d. All testing and re-testing shall be at the expense of the Contractor. Contractor shall deliver samples to an independent testing facility such as the University of Mass Experiment Station and have the results forwarded to the Owner's Representative for review and approval prior to using the material.
e. Samples for tests shall be taken from on-site stockpiles in the presence of the Owner's Representative.

2. Testing reports shall include the following tests and recommendations:

a. Percent organic matter by weight as determined by the loss on ignition of samples that have been oven dried to a constant weight at temperature of 105 degrees C.
b. Mechanical gradation (sieve analysis) shall be performed and compared to the USDA Soil Classification System.
c. Chemical Analysis shall be undertaken for Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, Lead, Zinc, Soluble Salts, extractable Aluminum, Cadmium, Copper, pH and buffer pH, carbon:nitrogen ratio and toxic elements. Except where otherwise noted, nutrient tests shall be for available nutrients.
d. Soil analysis tests shall show recommendations for soil additives to correct soils to meet the specifications and for additives necessary to accomplish lawn and planting work as specified.
e. Certified analysis, manufacturer, labels and source of organic compost and soil additives to be provided.

1.5 DEFINITIONS

A. The following definitions shall apply to the work of this section:

The following size distributions of mineral particles by diameter and sieve size shall apply to the following conventional names of soil types:

Conventional Name	Retained on US Sieve No.	Diameter (mm)
Very Coarse Sand	#18	1-2
Coarse Sand	#35	0.5-1
Medium Sand	#60	0.25-0.5
Fine Sand	#140	0.10-0.25
Very Fine Sand	#270	0.05-0.10
Silt	by hydrometer	0.002-0.05
Clay	by hydrometer	Less than 0.002

1.6 PRODUCT DELIVER, STORAGE AND HANDLING

A. Protect all products from weather vandalism or other damaging or deteriorating

conditions.

PART 2 - PRODUCTS

2.1 CLEAN SCREENED LOAM

A. Loam shall consist of screened fertile, loose, friable sandy loam with no admixture of refuse or any natural or introduced materials toxic to plant growth and free of subsoil, refuse, stumps, roots, rocks, cobbles, stones, brush, clay lumps, noxious weeds, litter and other deleterious materials. Loam shall not come from USDA-classified prime farmland.

B. Loam shall be one of the following sandy loams: “coarse sandy loam”, “sandy loam”, “fine sandy loam” based on the USDA Classification System determined by mechanical analysis ASTM D-422. It shall be uniform in composition, without admixture of subsoil. The loam shall possess good filtration and permeability rates, and shall possess a mechanical analysis where:

		Percent Passing By Weight	
Millimeter	US Sieve Size	Max.	Min.
4	#5	100	95
2	#10	95	90
0.42	#40	90	60
0.149	#100	60	30
0.074	#200	30	20
0.037	#400	20	0

1. One hundred percent shall pass a half inch sieve opening, and the maximum retained on the quarter inch sieve shall be 20 percent by weight of the total sample.

2. On-site and off-site loam shall be screened to achieve the above specified sieve analysis.

3. Organic matter in approved planting soil shall be between 5% minimum and 8% maximum by weight as determined by the loss on ignition of samples that have been oven dried to a constant weight at temperature of 105 degrees C.

4. Acidity range of planting soil shall be 5.5 to 6.5 pH when tested according to methods of testing or A.O.A.C.

   a. When pH of loam borrow is equal to or greater than the maximum use aluminum sulfate to adjust pH to required levels.

   b. When pH of loam borrow is less than the minimum required use either sulfur or ferrous sulfate to adjust pH to required levels.

C. Soluble salt content shall be less than 100 PPM.

D. Loam shall be uncontaminated by salt water, foreign matter and substances

harmful to plant growth. Topsoil shall not have extractable aluminum greater than 200 parts per million unless otherwise noted. Cation Exchange Capacity (CEC) shall be between 10 and 15.

2.2 ORGANIC COMPOST

A. Organic Compost shall be natural or manufactured mature, composted organic material produced from a DEP-approved composting vendor. Only Federal EPA Class A or Massachusetts Type I compost products shall be used. The following shall be requirements shall be met:

1. Compost shall originate from mature leaf compost, mature composted animal manure, other aged, composted vegetable materials such as brewer's waste, or chemically tested toxin-free processed sludge products (biosolids).
2. Test results shall indicate maturity and age of organic compost. Raw uncomposted or unprocessed or incompletely composted organic matter shall be rejected.
3. Organic matter manufactured from sludge and other biowaste materials or manure, shall be aged for at least one (1) year without exception and shall have no biowaste odor.
4. Compost shall contain no uncomposted bulking agents such as uncomposted wood chips and shall be free from hard lumps and free from seeping water when handled.
5. Compost shall be free from sticks, stones, plastic, debris or other substances which would be injurious to healthy plant growth. 100% of compost material shall pass a ½" sieve.
6. Acidity range shall be pH 6 minimum and 8 maximum when tested according to methods of testing or A.O.A.C.
7. Organic matter shall not be less than 30% as determined by ASTM D2974.
8. Moisture content of 35% to 70%, as determined by ASTM D2974
9. Carbon:Nitrogen ratio of 15:1 to 30:1
10. Solvita intex of 6 to 8
11. Non-phytotoxic
12. There shall be no unpleasant or detectable odor of ammonia or hydrogen sulfide, which would indicate immature compost. Color of compost shall be dark brown.

2.3 SOIL ADDITIVES

B. Limestone for adjustment of soil pH shall be agricultural grade ground dolomitic limestone containing up to 50% magnesium carbonate in a dry, granular form. Limestone shall be ground to such a fineness that at least 50% will pass through a 100-mesh sieve and 90% to 100% will pass through a 20-mesh sieve.

C. Aluminum Sulfate for adjustment of soil pH shall be commercial sulfur, unadulterated, 57% and delivered in containers with the name of the manufacturer, material analysis and net weight appearing on each container.

D. Tree and Shrub Fertilizer:

1. Fertilizer shall be a complete commercial product complying with the State and Federal fertilizer laws. Fertilizer shall be slow release fertilizer packets, which are designed and certified by the manufacturer to provide controlled release of nutrients over a minimum three-year period. Packets shall remain sealed at delivery to site and until installation. Each packet shall consist of four (4) ounces of water-soluble fertilizer with a minimum guaranteed analysis of available elements by weight as follows.

   Nitrogen 16%
   Phosphorus 8%
   Potash 16%

2. Application Rate: Per manufacturer's instructions and as recommended by soil test results.

E. Sand: Shall be clean, course, angular, ungraded material meeting ASTM C33 with the following addendums:
1. Sand shall not be gravelly
2. Sand shall not be beach sand
3. Sand shall have a fineness modulus of 2.5 to 3.2
4. A coefficient of uniformity (D60/D10) of less than 4

F. Bone Meal: shall be fine ground, steam cooked, packing house bone with a minimum analysis of 23% phosphoric acid and 4% nitrogen.

G. Gypsum: shall be agricultural grade, granular form. Gradation shall conform to the following:

Sieve Designation	Percent Passing By Weight
No. 8 (2.36mm)	100
No. 16 (1.18mm)	97
No. 30 (0.60mm)	82
No. 50 (0.30mm)	46
No. 100(0.15mm)	21

H. Jute Mesh: Jute mesh shall be uniform, open, plain weave of undyed and unbleached single jute yarn, a minimum of four (4) feet in width plus or minus one (1) inch. There shall be 78 warp ends per width and 41 weft ends per yard. Weight shall average 1.22 pounds per linear yard, plus or minus 5%. Staples for Erosion Control Materials: 9 gauge staples shall be used with jute mesh: 11 gauge with woven paper.

2.3 WATER

A. Clean, fresh potable water free of salt and other impurities injurious to vegetation.

PART 3 - EXECUTION

3.1 MIXING OF LOAM AND COMPOST

A. Thoroughly mix the Loam and Compost at a rate yielding an organic content and pH specified in Section 2.1, B. herein.

B. The Loam/Compost mix shall be fully and thoroughly blended.

C. Starter fertilizers and soil additives: All required materials shall be spread and distributed into the soil at rates and amounts specified herein.

D. Contractor shall amend loam with organic compost and soil additives to meet requirements in these specifications and only after approval of test results shall amended loam be spread.

3.2 GRADING AND SPREADING OF LOAM/COMPOST MIX

A. Prior to any spreading of loam, it is the responsibility of the Contractor to request a meeting with the Owner's Representative and the Landscape Architect to review and approve the subgrade condition. Subgrade shall meet the requirements outlined in Section 31 00 00 – Earthwork.

B. Remove all debris and other inorganic materials on any prepared subgrades, and reshape and dress any damaged or eroded slopes, swales, and other areas. Scarify and loosen subgrade to a friable condition in any areas where compaction may have occurred. Loam shall not be placed until subgrade is in suitable condition and free of excessive moisture or frozen materials.

C. Scarify and loosen subgrade to a friable condition in any areas where compaction may have occurred.

D. Loam/Compost shall not be placed until subgrade is in suitable condition and free of excessive moisture or frozen materials.

E. **Loam/Compost mix shall be spread as required to produce a total depth of twelve (12) inches for planting beds as indicated on the plan**. Fill all depressions in existing grades with suitable fill material as specified in Section 31 00 00 prior to spreading of loam/compost mix, then shape and finish grade to depth required.

F. Any debris that falls on paved or other hardscape areas shall be removed by the Contractor.

3.3 APPLICATION OF LIMESTONE

A. When applied dry, limestone shall be spread evenly and incorporated thoroughly into the soil by discing or other approved means.

B. When applied hydraulically, no discing will be necessary.

C. Granular treatment to be applied at the rate required by soil pH test to produce a pH required per this specification.

END OF SECTION

Section 32 93 10
TREES, SHRUBS AND GROUNDCOVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Provide all materials, equipment and labor necessary to complete the work as indicated on the drawings or as specified herein.

B. The principal work of this section includes, but may not be limited to, the following:
1. Layout and Excavation of Plant Holes
2. Planting and Backfilling
3. Watering.
4. Mulching.
5. Fertilizing.
6. Staking and Guying.
7. Antidessicant Application.
8. Tags and Labels.
9. Maintenance.
10. Plant Replacement Guarantee.

1.3 REFERENCES

A. ANSI Z260.1 - Nursery Stock, latest edition (American Association of Nurserymen, Inc.).

1.4 QUALITY ASSURANCE

A. Contractor shall specialize in work outlined with a minimum of five (5) years experience on similar projects.

B. An arborist, licensed by the state in which the work is to be performed, is required for all pruning work.

C. At least three (3) shrubs of each variety and all trees shall be tagged with a waterproof tag bearing legible designation of botanical and common names, and all other standard products shall be delivered sealed and unbroken.

D. Do not make substitutions without written approval. If specified landscape material is not available, obtain approval for substitution from the Owner or Owner's Representative.

E. Where formal planting arrangements are shown, select stock with uniform height and spread, and label with numbers to assure symmetry in planting.

F. The Owner and/or the Owner's Representative reserve the right to inspect all plant materials for compliance with specifications, and to reject unsatisfactory or defective work at any time during progress of work.

1.5 SUBMITTALS

A. Certified analysis and source of off-site loam, used to backfill to be provided. Certification shall list soil additives to topsoil, rates and type.

B. Certifications and/or labels of proposed plant materials or substitutions, listing common and scientific names of each.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect all products from weather or other damaging or deteriorating conditions.

B. Plants which have been damaged or have deteriorated in transit or storage are not acceptable.

C. Keep all plant material moist, fresh, and protected against exposure to sun, wind, and freezing temperatures whether in the receiving yard, in transit, while being handled, or at the job site awaiting planting.

D. Delivery:

1. Trees, shrubs, and groundcover after soil preparations for planting have been completed and plant immediately. Plant material shall not be dropped or rolled for long distances. Damaged plants arriving to the site shall be rejected.

2. Plugs shall be delivered to the site within 24 hours prior to planting. All plant materials shall be handled in a manner so as to avoid damages to the plants and root systems. Damaged plants arriving to the site shall be rejected.

E. Planting Dates: Prepare a proposed planting schedule. Schedule dates for each type of landscape work during normal seasons for such work. Once the schedule is accepted, dates shall be revised and submitted in writing for reasons of delay.

Deciduous material:	Spring	March 1 to June 15
	Fall	September to December 1
Evergreen material:	Spring	March 15 to May 30
	Fall	August 15 to November 15
Landscape Plugs:	Fall	September 1throughOctober 15

F. Those species known to be fall digging hazards shall be dug during the spring season only. Fall planting of these species shall be permitted only with certification, from the nursery, of the time of digging and at the discretion of the Owner or Owner's representative.

G. Correlate planting schedule with specified maintenance periods to provide maintenance to date of acceptance.

H. Coordination with Lawns: Plant trees, shrubs, and groundcover after final grades are established and prior to seeding of lawns and non-lawn areas, unless otherwise acceptable to Owner's Representative. If planting of trees and shrubs occurs after seeding work, protect seeded areas and promptly repair damage to lawns resulting from planting operations.

1.7 SPECIAL CONDITIONS

A. Should discrepancies exist between plant quantities or plant sizes as shown in the Planting Schedule and on the Planting Plan, quantities and sizes shown on the Planting Plan shall govern. Contractor shall then install all plants as shown on the plan at no additional cost to the owner.

1.8 GUARANTEE

A. Guarantee that, upon completion and written Final Acceptance tree, shrub and groundcover planting conforms to requirements of contract documents and that all plants except transplant materials are healthy and will remain so for a period of one (1) year. Such period shall commence with date of final acceptance.

1. It shall be the Contractor's responsibility to obtain necessary written documentation to show that final acceptance has been granted after Landscape Architect has inspected and accepted the planting work.

B. At any time within period of guarantee, Contractor shall replace any plantings which for any reason, other than vandalism, has died or is in a dying condition, or which has failed to flourish in such a manner or to such a degree that its usefulness or appearance has been impaired.

C. The Owner will maintain the plants after Final Acceptance. Contractor shall not have any claim that materials have failed to flourish as a result of Owner's maintenance operations, or lack of maintenance, and shall abide by terms stated herein for guarantee and replacement of plant materials.

D. Decision of Owner as to necessity to replace any plant materials or repair any defects on workmanship, or cause of any destruction or loss, impairment or failure to flourish, shall be conclusive and binding upon Contractor. Replacements shall be of same species and size as specified on Plant List. All plant replacements shall be inspected, sealed, furnished, planted and mulched as specified herein at Contractor's expense.

E. "Vandalism", is intended to mean any acts, whether intentional or accidental, by other persons occurring following final acceptance, which clearly result in breakage or other damage to individual plants or plant beds, and which may reasonable be considered to be beyond Contractor's reasonable control.

F. Landscape plugs and ground covers: The Contractor shall replace in accordance with the contract plans and specifications any area within the planting zone that has not achieved 85% cover of the planting medium when inspected from above. Percent cover shall be determined by inspection at the end of the first growing season, and shall be performed by the Owner's Representative. Where the minimum cover is not met, Contractor shall replace and replant unhealthy or dead plants with new plugs of the same species. Contractor shall provide a guarantee for groundcovers and plugs for a minimum of one year including one continuous growing season. Commence guarantee on date identified as Final Acceptance.

1.9 MAINTENANCE

A. Maintenance of tree, shrub, groundcovers and plugs shall occur up to the Final Acceptance. Maintenance of tree, shrub, groundcover and plugs planting to be performed by Installer Include:
1. Watering, weeding, cultivating and mulching.

2. Tightening, guy webbing and repairing of stakes.
3. Pruning & Replacing of dead material.
4. Resetting plants to proper grades, or to upright position.
5. Removal of debris.

PART 2 - PRODUCTS

2.1 LOAM COMPOST MIX

B. For Loam Compost Mix, refer to Section 32 93 00, “Part 2 – Products”.

2.2 ANTIDESSICANT FOR TREES

A. Emulsion which permits transpiration while retarding excessive loss of moisture from plants. Deliver in manufacturer's fully identified containers and mix according to manufacturer's direction. Use "Wiltproof" or equal approved.

2.3 TREE AND SHRUB FERTILIZER

A. Fertilizer shall be Organic-based and be OMRI (Organic Materials Review Institute) Certified

B. Complete fertilizer in granular form, from commercial sources bearing manufacturer’s analysis; 2-3-3 ratio of N-P-K.
1. Total Nitrogen (N) – 2.0%
   a. 0.8% - Water Soluble Nitrogen
   b. 1.2% - Water Insoluble Nitrogen
2. Available Phosphate (P_2O_5) – 3.0%
3. Soluble Phosphate (K_2O) – 3.0%

C. Application Rate: Apply 2-3 pounds per 100 square feet

2.4 STAKE AND GUYING MATERIALS FOR TREES

A. Guy web: Shall be a low abrasion woven fiber webbing with a break strength of 900 pounds or better. The width of the webbing shall be no less than 5/8 inch nor greater than ¾ inch. The length shall be sufficient enough to be attached to the tree trunk and stake.

B. Stakes: Shall be on a hardwood source, free of knots, insects and fungi. Stakes shall be of uniform size and shape and shall be a minimum of two inches (2”) square. Stakes shall be pointed with a taper of no less than four inches (4”).

C. The above ground stake height shall be eight inches (8”) above the point of attachment. The type of stakes shall be uniform throughout the job.

2.5 MULCH

A. Pine Bark Mulch shall be derived from evergreen tree bark aged to a minimum of six months and no more than eighteen months. The bark shall be shredded so that the resulting pieces are no more than ¼ inch thick and no longer than three inches (3”). The mulch shall be free of stringy material and shall not contain an excess of fine particles. The mulch shall be brown in color, free of leaves, twigs, sod, weeds, shavings and other foreign materials which are injurious to health plant growth.

2.6 WATER

A. Clean, fresh potable water free from injurious chemicals and other toxic substances harmful to plant life. No brackish water will be permitted.

2.7 PLANT MATERIALS

A. Plant materials shall conform in size, grade and quality to the "American Association of Nurserymen Standards for Nursery Stock" as amended by the United States of America standards institute, in effect at the time of bidding.

B. Plants of other kinds than those named in the Plant Schedule on the Drawings shall not be accepted without written approval of Owner or Owner's Representative.

C. Unless otherwise approved by Owner or Owner's Representative, all plants shall be nursery-grown in accordance with good horticultural practices and shall have been grown under climatic conditions similar to those in the locality of the project for at least two (2) years. They shall have been transplanted or root pruned at least nine (9) months previous to moving to the site.

D. All plant material shall comply with the state and federal law with respect to inspection for plant disease and insect infestation.

E. Replacement plants larger in size than existing may be used if approved by Owner or Owner's Representative, provided use of larger plants does not increase Contract price.

F. If use of larger plants is approved, increase ball of earth of spread of roots in proportion to size of plant.

G. Landscape plugs and ground covers: All plug material shall come in the form of five inch deep x two inch square tapered plug which shall show healthy signs of rooting at the fringe of the plug. Plants shall appear healthy with no foliar spots, discolorations, wilting, or other evidence of the presence of disease or insects. No plants shall be dug from the wild. No fertilizers shall be used in the planting or maintenance process.

PART 3 - EXECUTION

3.1 PLANTING

A. Layout: **Determine location of underground utilities and layout plants so as to avoid possible damage to such structures.** Plant pits and bed locations as shown graphically and/or verbally on plans, shall be staked on ground by contractor and approved by the Owner's Representative prior to excavation. Should discrepancies exist between plant quantities in Planting Schedule and Planting Plan, quantities shown on the Planting Plan shall govern. Adjustments in locations and outline shall be made in the field. Labor, equipment, and new smooth stakes are to be furnished by the Contractor for this purpose.

B. Excavation: Planting beds and pits shall conform to the approved staked locations and outlines. Holes dug for plantings shall in all cases be large enough to include the complete root system of the plant (tree, shrub, and groundcover) to be received and also sufficient amounts of approved backfill mix around the periphery of the rootball. All sod, weeds, roots, cobbles, and stones and other objectionable materials excavated from the plant holes which are unsuitable for backfill shall be removed from the site immediately and legally disposed of.

C. Plant Hole Size: The minimum plant hole size, unless otherwise specified, shown on the plans or directed by the Owner's Representative shall be as follows:

Trees and Shrubs - The planting hole shall be three (3) times the diameter of the rootball in width and no deeper than two inches (2") less than the distance from the bottom of the rootball to the root collar (i.e. a 12" distance between the bottom of the rootball and the root caller will require a 10" deep hole). Any excavation in excess of that required shall be replaced and compacted to eighty-five percent (85%) of maximum density.

Groundcover - The planting hole shall be twice the diameter of the rootball in width and equal to the depth from the bottom of the rootball to the level at which it was grown in the nursery. Any excavation in excess of that required shall be replaced and compacted to eighty-five percent (85%) of maximum density.

Any rocks or underground obstructions shall be removed to a depth necessary for planting as specified, unless alternate locations for the planting are approved by the Owner's Representative. If removal of obstructions result in a deeper hole than specified for planting, backfill material shall be added and compacted to eighty-five percent (85%) of maximum density to the correct depth.

D. Backfill Mix: Add loam to suitable soil excavated from the planting hole to create mix for planting pits. Backfill Mix shall be at least fifty percent (50%) loam.

3.2 SETTING PLANTS

A. Plants shall be handled in such a manner that the soil of the rootball will not be loosened from the roots. Carefully place plant into the prepared hole. Set plants plumb and fill in around the rootball to one half (1/2) the depth of the hole with backfill mix. Thoroughly tamp the backfill mix to eighty-five percent (85%) of maximum density.

B. Fill remaining area of planting hole with water. Once the water has completely drained loosen burlap and peel down at least the top one-third (1/3). If wire baskets are used, cut and bend down top one third (1/3) of basket. Roots that have been wrapped around the ball within the burlap shall be made to lay in as natural a manner as possible. Cut broken or frayed roots cleanly.

B. Fill remaining area of hole with backfill mix and thoroughly tamp to eighty-five percent (85%) of maximum density. Form a saucer around the edge of through backfill hole by constructing a berm. The finish height of the compacted berm shall be three inches (3"). No excess soil shall be allowed to remain within the plant saucer. Fill saucer with water.

3.3 PRUNING OF NEW PLANT MATERIAL

A. After planting prune only dead, broken or deformed branches and in such manner as to preserve natural character of plant.

B. Perform all pruning with sharp tools, with cuts flush and clean. Do not apply paint or asphalt emulsion tree wound compound on cut area.

C. Trees which have had their leaders cut, or so damaged that cutting is necessary, will not be accepted. There shall be no abrasion of bark, or fresh cuts of limbs over 1/2".

3.4 WATERING

A. The plants shall be watered immediately following planting.

B. Soak the plants thoroughly again within a twenty-four (24) hour period after the initial planting.

C. Additional watering shall be made at least once every three weeks, unless otherwise directed, until final acceptance of the plant material.

3.5 FERTILIZING

A. During backfill operations, place fertilizer in upper foot of back fill around perimeters as recommended by manufacturer.

3.6 MULCHING PLANTS

A. Application of mulch should only occur after planting operations have been completed and initial watering has taken place. Mulch shall be applied no latter than forty-eight (48) hours after planting.

B. Prior to the placement of mulch, the contractor shall apply a pre-emergent weed control within the entire area to be mulched. Pre-emergent weed control shall be applied by a licensed commercial applicator at a rate in accordance with the manufacturer's installation.

C. Mulch shall be applied a minimum of three (3) inches in depth for all individual trees and planting beds, as indicated graphically or verbally on the drawings. **Mulch rings around individual plants as indicated on the drawings shall be five feet in diameter and creating a well as detailed on the plans.**

D. Where mulch abuts seeded lawn areas or other finish grade materials, edge of planting bed shall be cut smooth and cleanly. Mulch shall be placed carefully so as not to spill into adjacent areas. Any excess or spilled mulch shall be promptly removed from the project area.

3.7 GUYING AND STAKING

A. Immediately after planting, stake trees as indicated on detail drawing.

B. Place stakes outside of the planting pit exercising care not to damage the soil berm.

C. Guy all trees with a caliper of two inch (2") or greater and all evergreen trees greater than four feet (4'). Guy webbing shall be attached at a point no higher than one half (1/2) the height of the tree or lower than one-third (1/3) the height of the tree.

C. Guy trees to each stake near top of stake and intertwine webbing at tree trunk. The guy webbing shall lay flat against the trunk. Draw guy webbing tight enough to remove slack but shall not cause deflation or strain to the plant.

D. Contractor shall remove all stakes and guys after one year of final acceptance.

3.8 TRUNK WRAPPING

A. Remove all trunk wrap and trunk protection devices prior to staking and guying operations unless otherwise directed by the Owner's Representative.

3.9 ANTIDESSICANT SPRAYING

A. Spray antidessicant as directed by the manufacturer's recommendation.

3.10 TAGS AND LABELS

A. Leave all tree tag and label seals unbroken and visible on plant material until final inspection. Remove all seals immediately after final inspection.

3.11 MAINTENANCE

A. Contractor is responsible for protection and maintenance of all work prior to final acceptance. No plants will be accepted unless they show a healthy growth and satisfactory condition.

B. Maintenance work for all plantings shall be as listed in section 1.9.

3.12 PLANTING ON BANKS

A. Apply jute mesh loosely but smoothly to fit the contour of the finished grade, parallel to and in same direction as the flow of water. The up-slope end of each separate strip or piece of jute mesh shall be buried in a six (6) inch minimum vertical anchor slot or junction slot with the soil tamped firmly against the mesh. Where more than one width of material is required, edges shall overlap a minimum of twelve (12) inches, and the up-slope section of mesh will be on top. Down-hill ends of the jute mesh shall be folded under approximately four (4) inches and stapled in place. Staples will be inserted through the mesh along edges, overlaps, and in the center of all jute mesh strips at intervals not greater than three (3) feet. All anchor slots, junction slots, check slots, and terminal folds shall have five (5) staples spaced not more than nine (9) inches on center across widths.

B. On seeded banks, jute shall be applied immediately after seeding. On shrub banks, apply jute after finish grading. Cut openings in mesh for each plant and mulch as specified.

END OF SECTION

SECTION 33 1100
WATER DISTRIBUTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 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. Survey plan entitled "Warwick, RI Existing Conditions Prepared for Brewster Thornton Group, Class III Survey of Community College of Rhode Island Knight Campus East Ave." prepared by Marsh & Long Surveying, Inc. of Smithfield, RI dated July 3, 2014.

C. Supplemental plan entitled "Warwick, RI Existing Conditions Prepared for Pare Corp., Survey of a Portion of Community College of Rhode Island Knight Campus East Ave." prepared by Marsh & Long Surveying, Inc. of Smithfield, RI dated January 19, 2017 and revised March 23, 2018.

D. American Water Works Association (AWWA):

1. AWWA C104: Standard for Cement Mortar Lining.
2. AWWA C111: Standard for Rubber Gasket Joints.
3. AWWA C150: Standard for the Thickness design of Ductile Iron Pipe.
4. AWWA C151: Standard for Ductile Iron Pipe, Centrifugally Cast.
5. AWWA C153: Standard for Ductile Iron Compact Fittings.
6. AWWA C600: Standard for Installation of Ductile Iron Water Mains and their Appurtenances.
7. AWWA C651: Standard for Disinfecting Water Mains.

E. Rules and Regulations of the Kent County Water Authority, latest revision, herein referred to as "KCWA Standards".

1.03 SUMMARY

A. This Section includes water distribution piping and related components outside the building for water service and fire service mains.

1.04 SUBMITTALS

A. Product Data and Shop Drawings: For each type of product indicated.

B. Field quality-control test reports and disinfection notification: The Contractor shall initially notify and subsequently provide the test reports to the Kent County Water Authority (KCWA) upon completion of the disinfection and pressure testing. A copy of the test reports shall be provided to the Owner.

1. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

C. A copy of any permits required by the utility company or local authorities having jurisdiction shall be submitted to the Engineer prior to commencing work on the water system.

D. Certificate of Compliance:

1. Each shipment of valves, tapping sleeves and appurtenances shall be accompanied with the manufacturer's notarized certificate certifying conformance with the requirements of the Specifications.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of the Kent County Water Authority including requirements pertaining to the tapping of water mains and backflow prevention.
2. Comply with KCWA standards for potable-water-service piping, including materials, installation, testing, and disinfection.
3. Comply with KCWA standards for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

1. Marking of all pipe shall conform to the requirements of AWWA C151, latest revision, and marking of all fittings shall conform to the requirements of AWWA C153, latest revision.

C. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.

D. All water pipe and appurtenances shall be "American Made".

1.06 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves, according to the following:

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

1. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

D. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

E. Protect flanges, fittings, and specialties from moisture and dirt. Piping or materials damaged during delivery storage or handling shall be replaced at the expense of the Contractor.

1.07 PROJECT CONDITIONS

A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:

1. Notify KCWA, Engineer, and Owner in writing no fewer than 2 weeks in advance of proposed interruption of service.

2. Do not proceed with interruption of water-distribution service without KCWA and Owner's written permission.

B. Contractor shall not commence work for installation of water main or appurtenances without the written consent and coordination with Kent County Water Authority.

1.08 COORDINATION

A. Coordinate connection to water main with KCWA.

B. The Contractor shall 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.

C. The Contractor shall meet with KCWA prior to commencing work on the water distribution system. Coordinate all work on the water system with the KCWA prior to commencing work.

D. All materials shall be approved by Kent County Water Authority.

1.09 PERMITS

A. The Contractor shall complete all applications, obtain and pay fees for any permits required by Kent County Water Authority and other local authorities having jurisdiction at no additional expense to the Owner.

B. Permits shall be obtained prior to commencing work on the water system. Provide copies of the permits to the Owner and Engineer prior to commencing work on the water distribution system.

C. Inspection Fees required by Kent County Water Authority shall be included in the Contractor's Bid.

PART 2 - PRODUCTS

2.01 GENERAL

A. All water appurtenances are to be American made.

2.02 PIPING SPECIALTIES

A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

B. Split-Sleeve Pipe Couplings:

1. Description: Metal, bolted, split-sleeve-type, reducing or transition coupling with sealing pad and closure plates, O-ring gaskets, and bolt fasteners.
    a. Standard: AWWA C219.
    b. Sleeve Material: Stainless steel.
    c. Sleeve Dimensions: Of thickness and width required to provide pressure rating.
    d. Gasket Material: O-rings made of EPDM rubber, unless otherwise indicated.
    e. Pressure Rating: 200 psig minimum.
    f. Metal Component Finish: Corrosion-resistant coating or material.

C. Tapping Sleeves and Tapping Valves
1. All tapping sleeves shall comply in all respects to AWWA Standard C-110 and the following design standards:
    a. Tapping sleeve shall be installed at the location of the existing water main as shown on the plans and details.
    b. The tapping sleeve shall be full port ductile iron or grade 18-8 type 304 stainless steel with mechanical type joints to provide pressure - tight installation and be suitable for use with the existing pressurized pipe material.
    c. Ductile iron tapping sleeve shall be bituminous or epoxy coated and shall use mechanical joint with rubber seals.
    d. Stainless steel tapping sleeve shall use a grid pattern virgin rubber ASTM 2000, full 360-degree pipe coverage
    e. Mechanical joint tapping sleeves shall have totally confined end gaskets and be designed to withstand a minimum of 200 psi working pressure.
2. Nuts and bolts shall be Type 304 stainless steel.
3. Tapping valves shall be full body and full port tapping type complying with Section 2.04 Buried Gate Valves except one end shall be flanged and the other mechanical. Valve shall be designed specifically for tapping.
4. Tapping valves shall be provided with an oversized opening to allow the use of full size cutters.
5. Fasteners on tapping sleeve and valve shall be stainless steel grade 18-8 type 304.

2.03 DUCTILE-IRON PIPE AND FITTINGS

A. All ductile iron pipe and appurtenances shall be from a single manufacturer source.

B. Mechanical-Joint, Ductile-Iron Pipe: Class 52 cement mortar lined, manufactured in accordance with AWWA C150 and C151, with mechanical-joint bell and plain spigot end used only where connections to fittings are made.
1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C111, Rubber Gasket Joints or AWWA C153, Ductile-Iron Compact fittings. Pipe fittings shall have a working pressure rating of 350 psi minimum.

2. Glands, Gaskets, and Bolts: AWWA C111, ductile iron glands, rubber gaskets, and steel bolts.
3. Lubrication material is to be food grade quality, kept in original container and stored according to Manufacturer's recommendations.
4. Interior coating shall meet requirements of EPA for potable water.

C. Push-on-Joint, Ductile-Iron Pipe: Class 52 cement mortar lined, manufactured in accordance with AWWA C150 and C151, with push-on-joint bell and plain spigot end used where no connection to fittings is required.

D. Push-on-Joint, Ductile-Iron Fittings: Joints for pipe shall be Tyton style only. AWWA C111, Rubber Gasket Joints or AWWA C153, Ductile-Iron Compact Fittings. Pipe fittings shall have a working pressure rating of 350 psi minimum.

E. Gaskets: AWWA C111, Rubber-Gasket Joints for Ductile-Iron Pressure and Fittings.

F. Ductile Iron Pipe shall be Class 52 and shall conform to AWWA C150 and C151, latest revision.

G. All pipes and fittings shall have a bituminous seal coating on all exterior surfaces in accordance with AWWA C151 and AWWA C153.

H. Interior pipe surfaces and fittings shall be covered with a double cement-mortar continuous lining not less than 1/16" thick, of materials, and applied in accordance with, ANSI/AWWA C104/A21.4 standards.

I. Restrained joints shall be suitable for 150 psi working pressure and fabricated of heavy section ductile iron casting.

2.04 BURIED GATE VALVES

A. Resilient seated gate valves shall meet AWWA C-509 and be UL listed and FM approved. The valve shall be iron-body, bronze mounted, nonrising stem, 4 inch through 12 inch in diameter as shown on the plans. All valves to OPEN LEFT. Direction shall be confirmed with the KCWA prior to purchase and installation of the valve. All valves to be mechanical joint.

B. Sizes 4 inch through 12 inch shall be suitable for a test pressure of 250-psi.

C. Valve shall have a minimum of two O-ring stem seals.

D. Bonnet, gland bolts, and nuts shall be stainless steel for corrosion resistance.

E. Stem shall be constructed of 420 stainless steel or equivalent with a minimum of 60,000 PSI yield strength.

F. Fasteners on entire valve shall be stainless steel type 304.

G. The interior and exterior of valves shall be fully coated with fuse bonded holiday free epoxy coating minimum 8 mils nominal thickness meeting or exceeding AWWA C550.

H. Operating nut shall be 2 inches square with hexagon stainless steel bolt fastener.

I. Wedges shall be fully rubber encapsulated cast iron, ductile iron, or bronze meeting AWWA C509.

J. Valve shall have mechanical joint connections.

2.05 GATE VALVE ACCESSORIES AND SPECIAL TIES

A. Cast iron valve boxes shall be two-piece adjustable, “Buffalo” style, sliding type. Barrel inside diameter shall be a minimum of 2-1/2 inches with 26 inch top section and 48 inch bottom section. Lengths shall be adjusted to finish grade.

B. Covers shall be cast iron, 5¼ inch, with the word "WATER" and a direction to open arrow imprinted thereon. The boxes and covers shall be compatible with the valves to which they attach. Covers shall be the heavy, non-tilting 2” drop style recessed in the top to prevent plow breakage.

C. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

D. An approved operating wrench shall be provided to the Owner.

2.06 THRUST RESTRAINTS

A. Restraining devices shall be utilized on all mains under the following conditions:

1. Pipeline direction changes (tees, bends)
2. Dead end lines (caps or plugs)
3. Transition pieces (reducers)
4. Couplings
5. All mechanical joints

B. Thrust Blocks are to be designed appropriately for the soils, pipe sizes, and pressures encountered at the job site and are to be installed square and plumb against undisturbed soil so that the joint itself, including and bolts, are accessible. Concrete shall be placed only against the fitting and not the joints, fasteners, or piping. Concrete is to be a minimum compressive strength of 3,000 psi at 28 days and installed to industry standards.

C. Thrust restraint may be provided via restrained joint, ductile iron pipe meeting AWWA C151/A21.512 and AWWA C111/A21.11. Restrained joint pipe lengths (restrained length) shall be sufficient to restrain thrust imparted by 1½ times the anticipated working pressure but not less than 150 psi with a 1.5 factor of safety. Gaskets for mechanical joints shall meet AWWA C111. Restrained joints shall have multiple wedge style mechanism with powder coated heat-treated ductile iron wedges. Proper actuation shall be ensured by torque limiting twist off nuts. Bolts and nuts shall be low carbon steel conforming to ASTM A307, Grade B.

D. Gland and restraint components made from Ductile Iron shall have a bituminous outside coating in accordance with AWWA C151.

PART 3 - PRODUCTS

3.01 EARTHWORK

A. Refer to Section 310000 - Earthwork for excavating, trenching, and backfilling.

3.02 INSTALLATION

A. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated. Contractor shall coordinate with Kent County Water Authority prior to commencing work on the existing water system.

B. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.

C. Pipe, valves, sleeves, accessories, and appurtenances shall be new and unused, and shall be of the types and materials specified, as indicated or as directed.

D. The interior of pipe and fittings shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations.

E. Piping, valves, sleeves and other appurtenances shall be constructed in dry trenches and shall not be laid when the conditions of the trench or the weather is unsuitable for such work.

F. The trench bottom and gravel bedding shall be shaped and compacted to give substantially uniform unyielding circumferential support to the lower fourth of the full length of each pipe.

G. Holes for the bells shall be excavated so that after placement the pipe and coupling receives uniform bearing pressure from the trench bottom.

H. Each pipe shall be laid to the line and grade and in such a manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets of the flow line. Joint deflections are limited to 80% of the values specified in AWWA C600-99 Table 3 and 4.

I. As the work progresses, the interior and exterior of the pipes and couplings shall be cleaned of all dirt and superfluous material of every description. Any damage to bituminous coating shall be repaired prior to backfill.

J. When required to keep interior of pipe clean, a suitable drag shall be kept in the pipe and pulled forward past each joint immediately after the jointing has been completed.

K. At times when work is not in progress, open ends of pipe and fittings shall be securely closed with a watertight plug so that no trench water, earth, or other substance will enter the pipe or fitting.

L. Any pipe, valve, sleeve, or appurtenance that has been disturbed after lying shall be taken up and re-laid.

M. All materials found to be defective during the progress of the work will be rejected by the Engineer and the Contractor shall promptly remove such defective material from the site of the work and replace with new material at no additional expense to the Owner.

N. The Contractor shall be responsible for the safe storage and proper handling of all materials.

O. No shims or mounds of earth shall be used to raise the pipe to grade.

P. All pipes, valves, sleeves, and appurtenances shall be maintained accurately to the required line and grade.

Q. No pipe, valves, sleeves, and appurtenances shall be covered until the Engineer has inspected the joints.

R. The pipeline shall not be used to convey trench drainage during construction.

S. Pipes shall be protected at all times during construction against flotation. They shall be thoroughly secured, properly supported and bedded to prevent settlement or disturbance. Compaction of bedding and backfill material shall be in strict accordance with Section 310000 - Earthwork.

T. Bends, crosses, tees, caps, plugs, valves, and other appurtenances, shall be strapped and clamped where indicated and/or as directed. Steel bars, rods and plates shall be of structural steel. Straps, bridle rods, clamps, anchors and such other parts shall be provided to the details as directed and as approved. After installation, all parts of the strapping and clamping devices shall be given two (2) heavy coats of an approved coal-tar base protective coating.

U. All lumps, burrs, excessive coatings, and irregularities on the plain and socket ends of the pipe, valves, sleeves, and appurtenances shall be removed.

V. Field cutting of the pipe is to be square and free of any burrs and defects.

W. Water shall be laid with a minimum horizontal separation of 5' from all utilities and 10' from sewer lines and wastewater systems including leaching areas. Sewer lines crossing over water lines shall be constructed of ductile iron or sleeved in ductile iron for 10 feet on either side of crossing regardless of vertical separation distance. Sewer lines crossing under water lines shall be constructed with a minimum vertical separation of 18" or the sewer shall be constructed of ductile iron or encased in concrete for 10 feet on either side of crossing.

X. Bury piping with depth of cover over top at least 60 inches.

Y. Connect to water-supply source and construct water-service piping to a point 5 feet from the outside face of the building wall in locations and pipe sizes indicated on Drawings. It is the responsibility of the plumber to construct the required piping from this point through the building wall.

Z. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

AA. Valves shall be set in the pipeline as directed. Blocking or supports of a permanent nature shall be placed under each valve to ensure against settlement.

BB. Each valve shall be tightly closed before being placed in the line and shall remain so until the joints on each side are completely tightened.

3.03 THRUST RESTRAINT INSTALLATION

A. Install mechanical restraining devices on all bends, mechanical joints, valves, tees, plugs and caps, bends, crosses, valves, and hydrant branches. Anchorages and restrained-joint types may be used include the following:

1. Concrete thrust blocks.
2. Megalug Restraining System or approved equivalent.
3. Locking mechanical joints.

B. The Contractor shall provide the type of anchorage or restrained joint as specified by the Engineer and KCWA.

C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.04 VALVE AND VALVE BOX INSTALLATION

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

B. Valves: Install each underground valve with head pointed up and with valve box

C. Valves shall be set in the pipeline as directed. Blocking or supports of a permanent nature shall be placed under each valve to ensure against settlement.

D. Each valve shall be tightly closed before being placed in the line and shall remain so until the joints on each side are completely tightened.

E. Valve boxes shall be set for all valves and shall be locking type. They shall be carefully fitted together, to the valve, and securely held during backfilling. They shall be centered over the valve-operating nut. The bedding material around them shall be thoroughly tamped in place and the box cover set to finished grade.

3.05 FIELD QUAILITY CONTROL

A. A general procedure for hydrostatic testing is included below. The Contractor shall obtain and adhere to Kent County Water Authority's quality control and testing specifications. Coordinate required inspections with Kent County Water Authority.

B. Hydrostatic Tests: After the pipe has been laid and the trench has been backfilled, all newly laid pipe or any valve section thereof, shall be subjected to a pressure and leakage test in accordance with AWWA C600-latest edition and as approved by the Owner. The Contractor shall provide all pumps, pipe, connections, gages, measuring devices, and all other apparatus necessary for the test and shall conduct the test in the presence of and to the satisfaction of the Owner. The Owner will supply water to the Contractor for testing purposes at no expense to the Contractor. All water lines shall be chlorinated, pressure tested, and sampled per Kent County Water Authority specifications and supervised by a Kent County Water Authority Inspector.

1. Test Pressure - The required minimum test pressure shall be 1-1/2 times the working pressure, or 150 PSI, whichever is greater, and maintained for a continuous two-hour period. An authorized representative of the KCWA shall witness the test. Any loss of pressure indicates a leak, and pipe installation will not be accepted with any leakage.

2. Air Removal - Prior to performance of the test the pipeline shall be completely filled with water at a rate no greater than one foot of pipe per second for a period of 24 hours. Expel air by means of air relief valves, hydrants or other means as required. If permanent air vents or taps are not located at all high points, the Contractor shall install corporation stops at such points so air can be expelled. After the tests are completed, plug all temporary taps.

3.06 DISINFECTION OF POTABLE WATER LINES

A. Chlorination/Disinfection:

1. All new or repair potable water system distribution mains, service pipe and the necessary connecting pipes, fittings, control valves, and all appurtenances in or adjacent to any residence, building or premises shall be purged of deleterious matter and shall be disinfected prior to utilization or permanent connection to the Kent County Water Authority system. That portion of the customer's service pipe after the curb stop shall be disinfected under the supervision of the local plumbing official. The owner must provide written laboratory certified documentation of the disinfection test results to the Kent County Water Authority before making any permanent connection to the Kent County Water Authority system or before reactivation of any existing water service can be authorized.

Please refer to appendices for program requirements of the Customer Water Service Disinfection Policy.

2. The proposer or the contractor for the proposer, in accordance with Chapter 5, Distribution System Chlorination, American Water Works Association manual #20, shall perform chlorination. Tablet chlorination shall not be allowed.
3. The owner or customer is responsible for all costs associated with the disinfection process or procedure.
4. The disinfection must result in eliminating from the various parts of the new pipe line any evidence of the existence, therein, of bacteria indicative of any contamination, as determined by tests of the bacterial content of samples of water taken from the new water main. The disinfection may be accomplished by introducing into all the various parts of the new water mains, a liquid solution containing 1% available chlorine in such volume that the rate of dosage to the water mains shall be at least 50 parts per million of available chlorine. Tablet chlorination is not allowed. The contact period for this disinfection shall be at least 24 hours, and a longer period will be required if tests of residual chlorine show it to be necessary for proper disinfection.
5. The new water system shall be flushed out after disinfection and refilled with fresh water. All chlorinated water used in the disinfection process shall be de-chlorinated prior to discharge to the surrounding area.
6. Water must sit in the main for at least 24 hours prior to taking a test sample. Water utilized for this purpose, flushing or pressure testing, which is obtained directly from the Kent County Water Authority system must flow through an isolated connection to the Kent County Water Authority system via an approved meter, testable backflow prevention device and jumper line. The contractor shall make all necessary arrangements for securing the water for test purposes and shall bear the expense of these arrangements. The installer shall furnish and install suitable temporary testing plugs, caps, pumps, pipe connections and other appurtenances, as necessary, to obtain samples at points no further than 1,000 feet apart.
7. After final flushing and before the new water main is connected to the distribution system, two consecutive sets of acceptable samples for coliform bacteria and heterotrophic plate count (HPC), taken 24 hours apart, shall be collected from the termination of the new main. At least one sample shall be collected every 1000 ft. of new main, plus one set of two samples from the end of the line. At least one site of two samples shall be taken from each branch. Samples shall be collected by Kent County Water Authority employees, given a two-day notice, and tested by a laboratory approved by Kent County Water Authority. A fee shall be imposed for the sampling testing for each test. The fee shall be at the current rate schedule in effect at the time of testing. Payment shall be prior to sample collection by the Kent County Water Authority. The water sample test results must indicate that the water quality in the new main is consistent in quality with the Kent County Water Authority system water.

3.07 IDENTIFICATION

A. Install continuous underground detectable warning tape below finished grade, directly over piping during backfilling of trench for underground water-distribution piping.

3.08 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. Top of pipe elevations shall be provided on the as-built at every bend and every 50 linear feet along a straight run of piping.

END OF SECTION

SECTION 33 4000
STORM DRAINAGE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 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. Survey plan entitled "Warwick, RI Existing Conditions Prepared for Brewster Thornton Group, Class III Survey of Community College of Rhode Island Knight Campus East Ave." prepared by Marsh & Long Surveying, Inc. of Smithfield, RI dated July 3, 2014.

C. Supplemental plan entitled "Warwick, RI Existing Conditions Prepared for Pare Corp., Survey of a Portion of Community College of Rhode Island Knight Campus East Ave." prepared by Marsh & Long Surveying, Inc. of Smithfield, RI dated January 19, 2017 and revised March 23, 2018.

1.03 SUMMARY

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

1. Pipe
2. Drywells

1.04 DEFINITIONS

A. PVC: Polyvinyl chloride plastic.

B. HDPE: High Density Polyethylene.

C. RCP: Reinforced Concrete Pipe

1.05 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. Drywell: Include plans, elevations, sections, details, and frames, covers, and grates.
2. Pipe of all materials.

C. Conformance Certificate: Each shipment of castings shall be accompanied with the manufacturer's notarized certification and cylinder testing results that materials meet specified requirements.

D. Record Drawings: 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.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect pipe, pipe fittings, and seals from dirt and damage.

B. Handle concrete structures 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 Engineer 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.

1.07 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.

1.09 QUALITY CONTROL

A. All precast concrete shall be the product of a manufacturer who has demonstrated capability to produce precast concrete products of the quality specified. A manufacturer must be able to show that he has experienced personnel, physical facilities, established quality control procedures, and a management capability sufficient to execute the work of this contract. When requested by the Engineer, the Contractor shall submit written evidence of the above requirements.

B. Experienced plant personnel shall closely supervise the manufacturing process, and daily records of concrete strength shall be kept and submitted to the Engineer for control.

C. Provide at least one person who shall be present at all times during execution of this portion of the work and who shall be thoroughly trained and experienced in the installation of the precast concrete structures and shall direct all work performed under this Section.

PART 2 - PRODUCTS

2.01 REINFORCED CONCRETE PIPE

A. Reinforced-Concrete Pipe and Fittings: ASTM C 76 (ASTM C 76M), with bell-and-spigot ends and sealant joints with ASTM C 990 (ASTM C 990M), bitumen or butyl-rubber sealant.

B. Pipe shall conform to AASHTO M170 for the specified diameters and strength classes. The minimum cement content shall be 564 pounds per cubic yard.

C. Strength class of reinforced concrete pipe shall be Class III unless specified otherwise on the drawings.

D. Joint of reinforced concrete pipe shall be made with flexible watertight rubber gaskets and the remaining exterior void of the joint shall be sealed with Portland cement mortar.

2.02 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.

2.03 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.

2.04 HIGH-DENSITY POLYETHYLENE PIPE AND FITTINGS

A. High-Density Polyethylene Pipe and fittings shall be ADS N-12 IB ST Corrugated Interior Pipe or approved equivalent. Joints shall be soil tight and include a rubber gasket on the spigot end of the pipe. When installed to 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.

2.05 DRYWELL

D. Drywell shall be constructed with precast concrete sections equal to that shown on the drawings and shall conform to ASTM Specifications C-478 and C-76 Class IV Wall "B".

E. Drywell shall conform to the dimensions depicted on the Drawings and shall have an open bottom.

F. Openings for pipe insertions shall be round and shall be precast or cored only. The diameter of the opening shall be adequate to install the pipe specified on the Drawings. The cored or precast opening shall maintain a minimum undisturbed distance of 6" from manhole section joints. Flexible rubber boot or mortar shall be placed to fix the pipe within the opening. Flexible rubber boot shall be neoprene with stainless steel clamps and bands.

G. Brick shall conform to ASTM Specification C-32 for sewer brick, except that the table therein is amended to provide that the required minimum compressive strength in pounds per square inch shall be for any individual brick 3,000 or 5,000 for the average of five bricks selected at random. The maximum absorption of water by five-hour boiling test shall not exceed 16% for any individual brick or 12% for the average of any five bricks selected at random.

2.06 GEOTEXTILES

A. Refer to Section 310000 – Earthwork for requirements regarding geotextile filter fabrics.

2.07 IDENTIFICATION

A. Underground-type line markers for non-metallic pipelines: manufacturer's standard permanent detection tape, bright-colored, continuous printed polyethylene tape with a metallic core for each detection of non-metallic underground installations, intended for direct-burial service; not less than 6" wide x 4 mils thick. Provide green detection tape with black printing reading "Caution Sewer Line Buried Below" as manufactured by Seton or approved equivalent.

2.08 MANHOLE FRAMES AND COVERS

A. Manhole Frames and Covers shall be cast iron and conform to the details on the drawings. Cast iron shall conform to ASTM A-48, Class 25. The underside of the cover and upper side of lip frame must present parallel plane surfaces, and at these points of contact, the frames and covers shall be machined to prevent covers from rocking in the frames under traffic.

B. Covers shall bear evenly in the frame and both frame seats and covers shall be accurately fabricated so that covers are interchangeable for use with any and all frames. Where indicated, frames and covers shall be watertight, and locked. The sizes and weights (medium duty, heavy duty, etc.) are shown on the detail sheets for special manholes.

C. Mortar shall consist of one part cement and two parts clean sand. No lime shall be used.

D. Covers shall have a non-slip surface and shall have the word “DRAIN”, inscribed.

E. Frames and covers shall be installed on the manholes as indicated on the drawings. They shall be well bedded and encased in cement mortar and accurately set to the grades indicated or as directed. Red clay brick with cement mortar shall be used to adjust grade of frame and cover. One half inch of cement mortar plaster cast shall be applied to exterior of red clay bricks.

2.09 CATCH BASIN FRAMES AND GRATES

A. Catch Basin Frames and Grates shall be cast iron and conform to the details on the drawings. Cast iron shall conform to ASTM A-48, Class 25. The underside of the grate and upper side of lip frame must present parallel plane surfaces, and at these points of contact, the frames and grates shall be machined to prevent grates from rocking in the frames under traffic.

B. Grate shall bear evenly in the frame and both frame seats and grates shall be accurately fabricated so that grate is interchangeable for use with any and all catch basin frames.

C. Mortar shall consist of one part cement and two parts clean sand. No lime shall be used.

D. Gratings shall have a non-slip surface.

E. Gratings shall be installed on the catch basins as indicated on the drawings. They shall be well bedded and encased in cement mortar and accurately set to the grades indicated or as directed. Red clay brick with cement mortar shall be used to adjust frame and grate. One half inch of cement mortar plaster cast shall be applied to exterior of red clay bricks.

2.10 CLEANOUT

A. Cast-iron cleanouts: frame and cover shall be able to withstand H-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 H-20 loading criteria.

PART 3 - EXECUTION

3.01 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Section 31 00 00 - Earthwork.

3.02 PIPE INSTALLATION

A. Reinforced Concrete Pipe: The method of joining reinforced concrete pipe sections shall be such that the ends are fully entered and the inner surfaces are reasonably flush and even. Joints shall be made with rubber gaskets and Portland Cement grout. The completed joints shall be protected against rapid drying by suitable covering material.

B. Use only nylon-protected slings to handle pipe. The use of hooks or bare cables will not be permitted.

C. Pipe shall be inspected before any backfill is placed. Any pipe determined by the Engineer 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 36-inch minimum cover unless otherwise specified on the Drawings.

H. Install piping with a minimum slope as specified on Drawings.

I. Install reinforced-concrete piping according to ASTM C 1479 and manufacturer's recommendations.

3.03 DRYWELL INSTALLATION

A. Excavation and backfilling requirements for installation of Drywell structures shall be in accordance with the requirements as specified in Section 310000 - Earthwork.

B. Drywell sections shall be set so as to be vertical and in true alignment.

C. Inverts: Where pipe alignment permits, and where directed by the Engineer, the pipe shall be continued through the manhole and the top half carefully and evenly cut away. Where changes in alignment occur, unless otherwise authorized by the Engineer, inverts shall be constructed of brick and mortar with a smooth flow line and an even curve in accordance with the plans.

D. All areas around pipes passing through walls shall be completely filled with cement mortar to tightly fill opening.

E. Bricks shall be laid in a workmanlike manner, true to line, and the joints shall be carefully struck and pointed on the inside. Bricks shall be thoroughly wet when laid and each brick shall be laid in mortar so as to form full bed, end and side joints in one operation. The outside of the brickwork shall be neatly plastered with ½" layer of cement mortar as the work progresses. The brickwork shall be satisfactorily bonded to the concrete and cast iron frame. No brick masonry shall be laid in water, or any water allowed to rise on the brickwork until the masonry has set for at least 24 hours.

3.04 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" 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 base course where laid in pavement surface.

3.05 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use procedure below:

1. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.

B. Abandoned Manholes and Structures: Excavate around manholes and structures as required and use one procedure below:

1. Remove manhole or structure and close open ends of remaining piping.
2. Remove top of manhole or structure down to at least 48 inches below final grade. Fill manhole below this point with gravel borrow and compact to 92%
3. Backfill to grade according to Section 31 00 00 - Earthwork.

3.06 IDENTIFICATION

A. Materials and their installation are specified in Section 31 00 00 - 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.

3.07 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.
   d. Infiltration: Water leakage into piping.
   e. Exfiltration: Water leakage from or around 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 Engineer.

3.08 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.

3.09 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