

PROJECT BID MANUAL

SCHUYLKILL RIVER TRAIL EXTENSION

56th Street to 61st Street

Philadelphia, PA

SRDC PROJECT No. 56/61 - 001

SCHUYLKILL RIVER DEVELOPMENT CORPORATION



A **non-mandatory Pre-Bid Conference** will be held via conference call on **Tuesday April 7, 2020 at 2:00pm**. See Scope of Work section 000100, 2.2 for more information.

Proposals will be accepted until 4:00 PM on Thursday, April 30, 2020, at the Schuylkill River Development Corporation Offices, 2401 Walnut Street, Suite 603, Philadelphia, PA 19103.

SCHUYLKILL RIVER TRAIL EXTENSION – 56th Street to 61st Street
SRDC PROJECT NO. 56/61-001

March 25, 2020

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SECTION 000100

SCOPE OF WORK

PART 1: GENERAL INFORMATION & REQUIREMENTS

- 1.1** This project, which is being bid by the Schuylkill River Development Corporation (SRDC), involves the construction of an approximately 1,900-foot long trail segment along the west bank of the Schuylkill from the Bartram's Trail Head at 56th Street, to a point along the river roughly corresponding with 61st Street. The north end of this trail segment will tie into the southern end of the Bartram's Trail Head. The anticipated limit of construction is approximately 3.5 acres.

Specific work tasks and features are shown on the Contract Drawings outlined in Section 000015 and further defined by these specifications, which taken together are an important and integral part of this bid solicitation, award, and project success.

SRDC is eager to have this work completed in a timely manner and intends to make a decision and enter into a contract quickly. It is our expectation that prospective bidders are able and committed to begin quickly, with the desire being to have this work completed by the end of 2020. The Bid Submission date is **April 30, 2020**.

- 1.2 Insurance.** Contractor must maintain and show evidence that he has insurance covering the work, equal or greater to the limits listed below:

a.) Comprehensive/Commercial General Liability and Property Damage Insurance	\$2,000,000 per occurrence \$2,000,000 aggregate
b.) Automobile Liability Insurance	\$2,000,000 each occurrence
c.) Workman's Compensation Insurance	Statutory Limits

Insurance Notes

- Liability coverage must be on an "Occurrence Basis" and not a "Claims Made Basis"
- The project location must be indicated on the Certificate of Insurance.
- Cancellation period must state "30- days' prior written notice will be given to certificate holder prior to cancellation, non-renewal or reduction below the limits indicated."
- The issuing agent must sign the certificate.
- The Schuylkill River Development Corporation, the Commonwealth of Pennsylvania, the Commonwealth Financing Authority, the City of Philadelphia, the Philadelphia Industrial Development Corporation (PIDC), the Philadelphia Authority for Industrial Development (PAID), Delaware Valley Recycling, and the H&K Group must be named as additional insured.
- A copy of the certificate of insurance must be provided to the Schuylkill River Development Corporation, 2401 Walnut Street, Suite 603, Philadelphia, PA 19103, prior to starting work. It does not need to be provided with the bid.

- 1.3 Indemnification.** The Contractor shall hold the Schuylkill River Development Corporation (SRDC), the Commonwealth of Pennsylvania, the Commonwealth Financing Authority, the City of Philadelphia, the Philadelphia Industrial Development Corporation (PIDC), the Philadelphia Authority for Industrial Development (PAID), Delaware Valley Recycling, the H&K Group, and Pennoni Associates harmless from and indemnify each of the parties named above against any and all claims, liabilities, demands, and actions based upon or arising out of any activities performed by the Contractor, its employees, agents, assigns, officers, or subcontractors under this Contract, including claims arising under the Eminent Domain Code, and shall defend any and all actions brought against any or all of the four above named entities based upon any such claims or demands.
- 1.4 Project Administration and Inspection.** The Contractor is required to have a superintendent/foreman on site during all work. SRDC will provide project inspection using its own forces and/or the services of a Construction Manager. It is anticipated that there will be at least one on-site job meeting every two weeks to review up-coming work. The contractor must have responsible representation at these meetings.
- 1.5 Project Site Security.** The contractor is responsible for securing the work area at the conclusion of each workday. This is to protect the public from an unsafe construction area and to secure and protect the contractor's work, equipment and materials.
- 1.6 Project Site Visits.** From time to time, SRDC may desire to have selected persons visit the job site. The contractor must accommodate these visitors, who will be accompanied by SRDC personnel.
- 1.7 Project Timeline.** Contract award is expected to occur no later than **May 15, 2020** and Notice to Proceed no later than **May 30, 2020**. All work on this project is to be completed by **November 5, 2021**. This includes the time for procurement of material, fixtures, and equipment.
- 1.8 Project Construction Sign:** Contractor must supply one (1) 18" x 24" project construction sign, mounted to temporary freestanding supports. Sign to be a vinyl graphic mounted to exterior-grade plywood, or other material acceptable to the owner. Graphic design to be provided by the owner. This item is incidental to the Mobilization bid item.
- 1.9 Environmental Permits/Approvals/Clearances.** The environmental permits and/or clearances listed below have already been obtained or have applications under review. We will update the bidders and selected contractor on approval status.
- PADEP Water Obstructions and Encroachment General Permit
 - PADEP NPDES Permit for Construction Activities
 - PWD Post Construction Stormwater Management Plan Approval
 - PFBC Species Impact Review Letter
 - PHMC Project Review Form
- Electronic copies of the permits/letters listed above will be provided to the contractor when they become available. If it is determined that any other permits or clearances are required for construction of this project, it shall be the Contractor's responsibility to obtain these permits or clearances.
- 1.10 Design/Build Retaining Wall.** This project includes an approximately 460-foot long retaining wall. The retaining wall component is to be included as a Design-Build item within the overall project contract. The contractor's design plans must be sealed by a Professional Engineer licensed in Pennsylvania and approved by SRDC or its designated representative. The cost of both design and construction of the retaining wall is to be included in the total bid amount.

- 1.11 Geotechnical Data.** Two Geotechnical Report that include soil boring data were prepared for this project by Pennoni. These are dated January 20, 2020, for the southern end of the project area, and July 19, 2017 for the northern end of the project area in the vicinity of the proposed fishing pier. Electronic copies of these reports are available for viewing and download on SRDC's website.

The Preliminary Geotechnical Summary Report, including its appendices, provides Owner's information for the Bidders' convenience and is intended to supplement rather than serve in lieu of Bidders' own investigations. This information is made available for Bidders' convenience and information but is not a warranty of existing conditions. The Preliminary Geotechnical Summary Report is not part of the Contract Documents.

- 1.12 Construction Photographs.** The Contractor, incidental to this contract and before any work is done on this project, shall photograph the project site and provide a CD with the files to SRDC and retain a copy for his/her records. The purpose of the photographs, among other things, is to document the condition of the site prior to construction so as to form a baseline for comparison to the site conditions post-construction.

The contractor is advised to especially document damages or irregularities to the site and facilities that exist before any work is started. The contractor is advised to take photographs of these damages/irregularities to further document pre-existing conditions. Existing bulkheads are to be photographed at low tide. Photographs or digital images should note the date, time and location of the photograph. Provide one digital set of photographs to SRDC before the start of work.

- 1.13 Access to Project Site and Parking Limitations.** The project site will be accessed from 56th Street. Access and construction staging will be via an existing gate and on property owned by the Philadelphia Industrial Development Corporation (PIDC). A License Agreement will need to be executed between the contractor and PIDC (PAID) prior to construction.

The License Agreement will provide for a project staging and access to the work site. This is the only way to access the work site. A portion of the site has discarded tires on it. The contractor will have to move some tires (within the site) to provide a sufficient pathway for access. Costs for this provision shall be included in the mobilization bid price. The license agreement will require a lease payment of \$1,000/month to PAID, which expense should be included in your mobilization bid price.

- 1.14 Access to the existing portions of the trail and trail head at 56th Street will remain open during construction.** Except when expressly authorized by SRDC, the Contractor must keep the existing trail open for trail users during the course of this work and exercise caution so as to not create unsafe conditions for users. To protect trail users and the worksite, the Contractor may install temporary fencing or barricades at his/her sole cost but the location and extent of such fencing must be kept to a minimum and be approved by SRDC or its representative prior to installation. Any damage to the work area must be repaired by the Contractor, incidental to this contract.

- 1.15 Repair of Damage.** Contractor, as incidental to this contract, is responsible for any damages to the existing trail and associated features resulting from this work. Damaged areas must be restored to pre-construction conditions.

- 1.16 Performance of Work.** The prime contractor is required to perform at least 30% of the work with his/her own forces.

- 1.17 Disadvantaged Business Enterprise Participation.** SRDC has established a DBE goal of 10% of the total construction cost for this project. The contractor is encouraged to exceed this goal. DBE participation will be a factor in the contractor selection process.

1.18 Payment. The construction contract will be with SRDC. Invoices based upon work completed by pay item – as specified on the bid proposal sheets (Section 000300) – may be submitted on a monthly basis. Invoices should use the same format as the bid proposal sheets, listing the quantities that have been completed by pay item up to the date of the invoice. Use of the Application and Certification for Payment Form (AIA Document G702 or similar) is preferred. Assuming that the work is proceeding satisfactorily, and the invoice is accurate, invoices will be paid within 45 days.

Contractor shall be aware that 10% of each invoice amount will be held by SRDC as retainage, up until 50% of the work under the Contract is completed. At that point, no further retainage will be held. The retained amount (5% of the Contract total) will be released upon completion and final acceptance of the Contract work.

1.19 Payment to Sub-Contractors. In an effort to provide equity and fairness, and to address issues that have arisen on prior projects, the prime contractors shall be required to pay subcontractors for work done within 2 weeks of the prime contractor's receipt of payment of such work.

1.20 Contract Provisions. As this work is covered, in part, by grant funding, there are provisions/requirements that must be adhered to during the course of work. These provisions will become part of the contract. Copies of these requirements are attached and include:

- Attachment A – Provisions for Commonwealth Contracts
- Attachment B – Nondiscrimination/Sexual Harassment Clause
- Attachment C – Department of Environmental Protection General Conditions
- Attachment D – Pennsylvania Prevailing Wage Act
- Attachment E – Pennsylvania Steel Procurement Act
- Attachment F – Trade Practices Act

For purposes of these provisions the term GRANTEE shall be understood to mean CONTACTOR; the terms DEPARTMENT or COMMONWEALTH shall be understood to mean SRDC.

The Contractor shall also comply with the Federal Occupational Safety & Health Act of 1970 (O.S.H.A) and Pennsylvania Act 287, as amended by Act 181 of 2006.

1.21 Bonding Requirements. Contractor must provide the following bond amounts:

- A. **Bid Bond:** a bid bond in the amount of 100% of the base bid amount is to be provided with the bid submission
- B. **Performance Bond and Labor & Material Payment Bonds:** Each bond must be in the amount of 100% of the contract award price
- C. **Maintenance Bond** must cover a period of one year following completion of the project and should be in an amount of at least 10% of contract price

1.22 Codes, Regulations and Standards. Contractor is responsible for adhering to all applicable Codes, Regulations and Standards relating to the work under this contract. The following codes and regulations are applicable to this project. The list does not represent all codes, regulations and standards:

- The Philadelphia Municipal Code
- The Philadelphia Electrical Code
- The Philadelphia Fire Prevention Code
- The Philadelphia Mechanical Code

It is not the intent of the Contract Documents to conflict with any Code, or Regulation. Report any conflicts to the Design Engineer for clarification.

Standards: The following standards and policies cover this contract:

- For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes or intended use.
- The referenced standards shall have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- Should specified reference standards conflict with Contract Documents, request clarification from Design professional before proceeding but generally the more stringent requirement shall apply.
- In the absence of specific instructions in the specifications, materials, products, equipment, and their installation shall conform to the applicable codes, regulations and standards specified herein.
- The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any referenced document.
- Dates of codes, regulations and standards specified shall be the latest date prior to the date of issue of this Project Manual, except where, prior to the date of issue of this Project Manual, modified or otherwise directed by the applicable codes and their supplements and amendments adopted by the code authorities having jurisdiction.
- Each entity engaged in construction of the Project shall be familiar with industry standards applicable to its construction activity. If unfamiliar, obtain copies and review with all workers. Obtain copies of standards when required by individual specification sections. Maintain copy at job site until Substantial Completion.

1.23 Project Submittals. The Contractor must provide one (1) hardcopy and (1) electronic copy of each submittal to SRDC or its designated representative. Submissions should meet industry standards and include, but are not limited to, shop drawings, catalog cuts, brochures, performance charts, color samples, etc. and must include appropriate dimensions and clearances.

1.24 Project Substitution. The Site Furnishings (Section 129300) and Exterior Lighting (Section 265600) for this project shown in the Drawings and Specifications are specified as proprietary items. This is because SRDC wishes to keep the appearance and functionality of the trail consistent with existing adjacent sections of the trail. Contractors are advised to bid the project knowing that no substitutions will be permitted for these items. Substitutions for other items are covered under **Section 012500 – Substitution Procedures**.

1.25 Contract Modification Procedures.

A. Change Order Procedure

If a change in the design of any portion of the work or the requirements of the Project Manual is deemed necessary by SRDC, SRDC may order an alteration to, or a change in, the work covered by the Contract Documents, and the contractor shall comply with such orders. If such changes increase the cost of the work to the Contractor, SRDC will allow additional compensation. If such changes diminish the cost of the work to the Contractor SRDC may deduct the amount of the diminution. No consequential loss or profit due to reduction in the scope of work will be allowed the Contractor, but the Contractor may be entitled to an extension of time if the condition warrants it. No changes shall be made except upon an

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approved Change Order Form, signed and executed by the Contractor and SRDC authorizing the change and fixing the method of compensation or deduction. This Section specifies administrative and procedural requirements for handling and processing Change Orders.

The execution of a change order (increase or decrease) will require a proposal from the Contractor on company letterhead. Such proposal will include a complete description of the change and schedule impact and a complete cost breakdown including such items as Labor, Materials, Equipment, Crew Composition, Sub- Contractor costs, and associated Insurance and Bonding costs (if applicable). The proposal is to be submitted to SRDC Director of Capital Projects. Upon review and approval by SRDC Project Team, a signed Change Order Form will be forwarded to the Contractor for final execution.

B. Contractor's Responsibility to Inform

Communication, either verbal or written, between SRDC or its Design Professional and the Contractor, Subcontractors, or other parties involved, during the normal course of administration of the Contract, does not in any way constitute acceptance of a Change Order or direction to modify the Contract unless said communication is in the form of a written Change Order or Construction Change Directive as specified herein.

Communication from SRDC or its Design Professional including, but not limited to the following, does not constitute approval of a Change Order:

1. Submittal review including submittals returned with notations and corrections;
2. Site observation, conservation and reports;
3. Participation in pre-construction, pre-installation, progress or other meeting;
4. Clarification sketches or drawings.

It is the responsibility of the Contractor to inform SRDC that any communication has, in the Contractor's opinion, caused reason to modify the Contract. The Contractor shall not undertake work which, in his opinion, requires a Change Order without completing procedures outlined herein.

Work done without completing Change Order procedures is entirely at the Contractor's own risk, even if the Contractor believes that communications from SRDC or its Design Professional contain instructions to do work outside of the Contract scope.

SRDC and its Design Professional will not willfully instruct work to be done that differs from the contract except through the Change Order procedures contained herein.

C. Minor Changes in the Work

Supplemental instructions, not involving an adjustment to the Contract Sum or Contract Time, may be issued in writing by SRDC.

D. Force Account

When SRDC and Contractor are not in total agreement on the terms of a Change Order Proposal, SRDC may issue a Construction Change Directive instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

The Construction Change Directive will contain a complete description of the change in the Work.

Documentation – Maintain detailed records on a time and material basis of work required by the Construction Change Directive. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1. Contractor's documentation will not, by itself, establish the final cost.
2. SRDC reserves the right to determine the value of the change in Work per the requirements of this Section.

E. Determination of Cost

SRDC reserves the right to use established estimating methods (including but not limited to industry standards and unit prices listed in this manual) to determine a fair and reasonable cost for changes in the Work.

- 1.26 Project Testing and Warranty.** Upon completion of work, the lighting elements must endure a 30-day test period before acceptance by SRDC. Following acceptance, the lighting system must be warranted against any and all defects for an additional period of six (6) months. During this period, the contractor must replace/repair all defects including manufacturers' product failures and burnt out bulbs at no additional cost. These requirements are considered incidental to the items and must be considered in the bid. Refer to **Section 265600 – Exterior Lighting** for additional information relating to manufacturer's warranty for the lighting fixtures. The landscaping elements of the project are also subject to warranty, as described in **Section 329300 – Plants**.
- 1.27 Project Operating Manual – Lighting.** A project operating manual shall be prepared showing operating instructions and providing copies of manufacturer's warranties for the lighting system elements. Two copies of this manual must be delivered to SRDC prior to the project being completed. This manual is subject to review and acceptance by SRDC and/or the Design Engineer.
- 1.28 Closeout Procedures.** When the Work is considered complete and ready for final inspection, SRDC will make a final inspection and note any deficiencies. Contractor shall take immediate steps to remedy the stated deficiencies and notify SRDC when all work is completed. Once SRDC agrees that the project is 100% complete, the Contractor shall submit Underwriter's certificate, as-built drawings, operations and maintenance manuals, warranties, spare parts, etc. SRDC will process final payment once SRDC is satisfied with final submissions and after Project Testing and Warranty period described in part 1.25. Closeout procedures are covered in detail under **Section 017700 – Closeout Procedures**.

PART 2: BID ADVERTISEMENT & EVALUATION

- 2.1 Pre-Bid Site Visit.** Contractors are advised and strongly encouraged to visit the project site before quoting on this project to view and assess the project scope, site conditions and limitations. SRDC would be pleased to escort contractors on this site visit and answer any questions about the project. To make arrangements for such a visit, call or email Joseph Syrnick: 215-309-5523, extension 102 (office); 215-964-4179 (mobile). Joseph.syrnick@sdrdc.net (email).
- 2.2 Pre-Bid Meeting.** A non-mandatory pre-bid meeting will be held via conference call on **Tuesday, April 7, 2020 at 2:00pm**. Details for the call will be forwarded separately to interested parties. If you wish to participate in the Pre-Bid conference call, send a message by email to:
- A. Marc Morfei, Pennoni Associates, at mmorfei@pennoni.com
 - B. Joseph Syrnick, SRDC, Joseph.syrnick@sdrdc.net

Bidders are strongly encouraged to participate in this meeting. SRDC will compile minutes from this meeting and post to their website within **7 calendars days** from the pre-bid meeting.

- 2.3 Bid Format.** The bid format will be based on **Unit Prices** with a specified Total Bid Amount. The Total Bid Amount is intended to cover all elements of the project as describes in the Plans and Specifications, including the contractor's project management and supervision. The Bid Proposal Sheets provided in **Section 000300** are to be completed by the Bidder and submitted as part of the Bid.
- 2.4 Bid Submission.** Bids are due by **4:00pm on Thursday, April 30, 2020**. There will be no public bid opening. Bids may be submitted to SRDC as a hard copy (mailed or hand- delivered) to SRDC offices or by email to Lucy McDonald at lucy.mcdonald@srcd.net. Submission requirements are outlined in **Section 000200 – Bid Proposal Form**. It is the contractor's responsibility to assure delivery of the proper documents to SRDC by the prescribed deadline. Any questions related to this bid advertisement shall be submitted in writing via email to joseph.syrnick@srcd.net by **4:00pm on Tuesday, April 14**. Responses will be posted to SRDC's website within **10 calendar days** from this due date.
- 2.5 Bid Evaluation.** SRDC will evaluate the bids received and reserves the right to award the project to the bidder that best meets the Corporation's needs. SRDC reserves the right to contact the bidders after bid opening to clarify any aspect of the bid but no re-working or revision of the bid price will be considered or expected.

Cost (bid quotation) is an important consideration of award but is not the only consideration. The contractor's approach to the work and proposed scheduling of work may affect contractor selection. Should you wish to include a statement of your qualification and/or references you may do so with your bid (one page only please). This is optional.

SRDC reserves the right to reject any and all bids.

- 2.6 Addendums.** SRDC reserves the right to issue Addenda to the Contract Documents at any point during the bidding or construction periods to clarify, revise, or supersede information in the Specifications, Drawings, and/or previously issued Addenda. Portions of the Addenda affecting the Contract Documents will be incorporated into the Contract by enumeration of the Addendum in the Owner/Contractor Agreement.

END OF SECTION 000100

SECTION 000200
BID PROPOSAL FORM

SRDC PROJECT NO. 56/61 – 001

PROJECT TITLE: **Schuylkill River Trail Extension – 56th Street to 61st Street**

TO: SCHUYLKILL RIVER DEVELOPMENT CORPORATION
2401 WALNUT STREET, SUITE 603
PHILADELPHIA, PA 19103
ATTENTION: Lucy McDonald (lucy.mcdonald@srdc.net)

BID SUBMISSION DATE: **4:00pm Thursday, April 30, 2020.**

A. I/We, the undersigned Bidder hereby agree, that if this Proposal is accepted, to enter into a contract with the Schuylkill River Development Corporation (SRDC), to provide all labor, materials, tools, equipment, supervision and services necessary to perform and complete the work required for the General Construction improvements of the above referenced Project as defined in and in accordance with the Contract Documents.

B. PROJECT SCHEDULE

Work on this project is to be completed by **November 5, 2021**. Completion of the project earlier than this date is desirable, although no monetary bonus will be awarded. However, a scheduled early completion could affect contractor selection.

Our expectant start day for this project is _____. The project duration is expected to be _____ calendar days.

C. PERFORMANCE OF THE WORK BY CONTRACTOR:

I, the undersigned Bidder, shall perform on the site and with my own organization at least thirty percent (30%) of the total amount of work to be performed under this Contract.

I shall perform the following work (list by the Divisions outlined in **Section 000010**):

D. Our DBE % is _____.

E. I certify that I have received, read and understand the contract documents, including the minutes of the Pre-Bid meeting, ` answers/clarifications resulting from the meeting, and all addenda, and have a "complete" understanding of the project.

F. I certify that I have the required insurance and can provide an acceptable insurance certificate if I am the successful bidder.

G. I certify that I can provide performance and payment bonds in accordance with **Part 1.20** of Section 000100 Scope of Work.

H. BID

Our bid for this project is:

1. Total Amount of Bid \$_____

Note that **Section 000300 – Bid Proposal Sheets** must also be completed.

Note: This signed Bid Proposal Form (3 pages), the Bid Proposal Sheets (3 pages), the signed Certification Page, and acknowledgement sheets from any Addenda (if applicable) must be returned to SRDC to be considered a complete bid proposal.

The remainder of this page is intentionally left blank.

IF BIDDER IS AN INDIVIDUAL OR PARTNERSHIP, FORM MUST BE DATED AND SIGNED HERE

This _____ Day of _____, 2020.

Signature of Owner or Partner

Business Name of Bidder

Type of Print Name and Title

Address, including Zip Code

Telephone Number

IF BID IS BY A CORPORATION, THIS FORM MUST BE DATED AND SIGNED HERE BY A) THE PRESIDENT OR VICE PRESIDENT AND B) COUNTERSIGNED BY THE SECRETARY, ASSISTANT SECRETARY, TREASURER, OR ASSISTANT TREASURER AND THE CORPORATE SEAL SHALL BE AFFIXED. IF THIS FORM IS NOT SO SIGNED, A DULY CERTIFIED CORPORATE RESOLUTION AUTHORIZING FORM OR EXECUTION USED MUST BE ATTACHED TO THE BID EXECUTED BY THE DULY CERTIFIED INDIVIDUAL.

This _____ Day of _____, 2020

Corporate Seal

Corporate or Business Name of Bidder

Address, Including Zip Code

Telephone Number

Signature of President

Signature of Secretary

Type or Print Name and Title

Type or Print Name and Title

Federal Employer Identification Number:

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BID PROPOSAL FORM

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SECTION 000300

BID PROPOSAL FORM

Schuylkill River Development Corporation
Schuylkill River Trail Extension, 56th Street to 61st Street
SRDC Project No. 56/61 - 001

Item	QTY		Description	Unit Price	Total Amount
1	1	LS	Contractor Mobilization	\$ <u>lump sum</u>	\$_____
2	1	LS	Contractor Temporary Facilities	\$ <u>lump sum</u>	\$_____
3	1	LS	Survey Control and Construction Layout	\$ <u>lump sum</u>	\$_____
4	1	LS	Erosion and Sediment Control	\$ <u>lump sum</u>	\$_____
5	1	LS	Selective Demolition	\$ <u>lump sum</u>	\$_____
6	1	LS	Clearing and Grubbing	\$ <u>lump sum</u>	\$_____
7	6,380	CY	Earthwork and Grading	\$ <u>lump sum</u>	\$_____
8	177	CY	Imported Fill	\$_____	\$_____
9	2,713	SY	Asphalt Paving	\$_____	\$_____
10	6	EA	Pavement Markings (per set)	\$_____	\$_____
12	105	LF	Concrete Retaining Wall at Fishing Pier	\$_____	\$_____
12	90	LF	Concrete Seat Wall at Fishing Pier	\$_____	\$_____
13	100	LF	Concrete Curb	\$_____	\$_____
14	4,112	SF	Gravity Block Retaining Wall	\$_____	\$_____
15	12	EA	Seat Boulders	\$_____	\$_____
16	54	LF	15" RCP	\$_____	\$_____
17	15	LF	18" RCP	\$_____	\$_____
18	1	EA	Flared End Sections	\$_____	\$_____
19	2	EA	Outlet Structure	\$_____	\$_____

SCHUYLKILL RIVER TRAIL EXTENSION – 56th Street to 61st

Street SRDC PROJECT NO. 56/61-001

000300-1

BID PROPOSAL SHEETS

March 25, 2020

Item	QTY		Description	Unit Price	Total Amount
20	2	EA	Inlet	\$_____	\$_____
21	881	LF	Wood Post/Rail Fence	\$_____	\$_____
22	120	LF	4' Chain Link Fencing	\$_____	\$_____
23	1,410	LF	6' Chain Link Fencing	\$_____	\$_____
24	459	LF	Metal Railing at Gravity Block Wall	\$_____	\$_____
25	27	EA	Pedestrian Light Pole and Fixture	\$_____	\$_____
26	27	EA	Pedestrian Light Pole Foundation	\$_____	\$_____
27	2,173	LF	Pedestrian Pole Conduit and Wiring	\$_____	\$_____
28	14	EA	Handhole Box	\$_____	\$_____
29	6	EA	Electrical Courtesy Outlets	\$_____	\$_____
30	1	LS	Lighting Controls and Connections	\$ <u>lump sum</u>	\$_____
31	1	LS	LED Lighting at Fishing Pier	\$ <u>lump sum</u>	\$_____
32	1	LS	LED Lighting at Overlook	\$ <u>lump sum</u>	\$_____
33	2,610	CY	Planting Soil A – 9" depth	\$_____	\$_____
34	395	CY	Planting Soil B – 18" depth	\$_____	\$_____
35	355	CY	Planting Soil C – 30" depth	\$_____	\$_____
36	5,555	SY	Lawn Seed	\$_____	\$_____
37	4,833	SY	Meadow Seed	\$_____	\$_____
38	6,500	EA	Perennials and Grasses - Plugs	\$_____	\$_____
39	4,000	EA	Bulbs	\$_____	\$_____
40	37	EA	Canopy Trees	\$_____	\$_____
41	38	EA	Ornamental Trees	\$_____	\$_____
42	50	EA	Evergreen Trees	\$_____	\$_____

Item	QTY	Description	Unit Price	Total Amount
43	7,777	SY Erosion Control Blanket	\$_____	\$_____
44	3	EA Trash Receptacles	\$_____	\$_____
45	2	EA Granite Bench Relocation	\$_____	\$_____
46	6	EA Bollards w/cover	\$_____	\$_____
47	1	LS Overlook Structure	\$ <u>lump sum</u>	\$_____
48	1	LS Fishing Pier	\$ <u>lump sum</u>	\$_____
49	7	PDA Schuylkill Banks Logo Signs	\$ <u>1,175.00</u>	\$ <u>8,225.00</u>
50	1	PDA Schuylkill Banks Interpretive Sign	\$ <u>5,890.00</u>	\$ <u>5,890.00</u>
51	1	PDA RTG Fence Sign	\$ <u>950.00</u>	\$ <u>950.00</u>

Total Price Bid for Contract:

_____ DOLLARS \$_____

Note: This entire 3-page Bid Form must be submitted with Bid.

SECTION 000400

CERTIFICATION PAGE

This certifies that I/We understand that this project is being funded with State funding and as such has a number of special provisions that need to be met. These provisions entail additional requirements, administrative and otherwise, including additional reporting procedures, that may not be in other non-State funded projects and which may involve additional costs to satisfy.

The special Provisions include the following:

- Attachment A – Provisions for Commonwealth Contracts
- Attachment B – Nondiscrimination/Sexual Harassment Clause
- Attachment C – Department of Environmental Protection General Conditions
- Attachment D – Pennsylvania Prevailing Wage Rates
- Attachment E – Pennsylvania Steel Procurement Act
- Attachment F – Trade Practices Act

I/We have read and understand the Special Provisions contained in this Bid Proposal and understand that they are an important component of this project. We have considered them and included them in our bid.

Signature

Printed Name

Company Name

Note: This page must be submitted with Bid.

ATTACHMENT A- PROVISIONS FOR COMMONWEALTH CONTRACTS

CONTRACTOR INTEGRITY PROVISIONS

It is essential that those who seek to contract with the Commonwealth of Pennsylvania ("Commonwealth") observe high standards of honesty and integrity. They must conduct themselves in a manner that fosters public confidence in the integrity of the Commonwealth procurement process.

In furtherance of this policy, Contractor agrees to the following:

1. Contractor shall maintain the highest standards of honesty and integrity during the performance of this contract and shall take no action in violation of state or federal laws or regulations or any other applicable laws or regulations, or other requirements applicable to Contractor or that govern contracting with the Commonwealth.
2. Contractor shall establish and implement a written business integrity policy, which includes, at a minimum, the requirements of these provisions as they relate to Contractor employee activity with the Commonwealth and Commonwealth employees, and which is distributed and made known to all Contractor employees.
3. Contractor, its affiliates, agents and employees shall not influence, or attempt to influence; any Commonwealth employee to breach the standards of ethical conduct for Commonwealth employees set forth in the Public Official and Employees Ethics Act, 65 Pa.C.S. §§1101 et seq.; the State Adverse Interest Act, 71 P.S. §776.1 et seq.; and the Governor's Code of Conduct, Executive Order 1980-18, 4 Pa. Code §7.151 et seq., or to breach any other state or federal law or regulation.
4. Contractor, its affiliates, agents and employees shall not offer, give, or agree or promise to give any gratuity to a Commonwealth official or employee or to any other person at the direction or request of any Commonwealth official or employee.
5. Contractor, its affiliates, agents and employees shall not offer, give, or agree or promise to give any gratuity to a Commonwealth official or employee or to any other person, the acceptance of which would violate the Governor's Code of Conduct, Executive Order 1980-18, 4 Pa. Code §7.151 et seq. or any statute, regulation, statement of policy, management directive or any other published standard of the Commonwealth.
6. Contractor, its affiliates, agents and employees shall not, directly or indirectly, offer, confer, or agree to confer any pecuniary benefit on anyone as consideration for the decision, opinion, recommendation, vote, other exercise of discretion, or violation of a known legal duty by any Commonwealth official or employee.
7. Contractor, its affiliates, agents, employees, or anyone in privity with him or her shall not accept or agree to accept from any person, any gratuity in connection with the performance of work under the contract, except as provided in the contract.
8. Contractor shall not have a financial interest in any other contractor, subcontractor, or supplier providing services, labor, or material on this project, unless the financial interest is disclosed to the Commonwealth in writing and the Commonwealth consents to Contractor's financial interest prior to Commonwealth execution of the contract. Contractor shall disclose the financial interest to the Commonwealth at the time of bid or proposal submission, or if no bids or proposals are solicited, no later than Contractor's submission of the contract signed by Contractor.

Revised March 13, 2012

9. Contractor, its affiliates, agents and employees shall not disclose to others any information, documents, reports; data, or records provided to, or prepared by, Contractor under this contract without the prior written approval of the Commonwealth, except as required by the Pennsylvania Right-to-Know Law, 65 P.S. §§ 67.101-3104, or other applicable law or as otherwise provided in this contract. Any information, documents, reports, data, or records secured by Contractor from the Commonwealth or a third party in connection with the performance of this contract shall be kept confidential unless disclosure of such information is:
 - a. Approved in writing by the Commonwealth prior to its disclosure; or
 - b. Directed by a court or other tribunal of competent jurisdiction unless the contract requires prior Commonwealth approval; or
 - c. Required for compliance with federal or state securities laws or the requirements of national securities exchanges; or
 - d. Necessary for purposes of Contractor's internal assessment and review; or
 - e. Deemed necessary by Contractor in any action to enforce the provisions of this contract or to defend or prosecute claims by or against parties other than the Commonwealth; or
 - f. Permitted by the valid authorization of a third party to whom the information; documents, reports, data, or records pertain; or
 - g. Otherwise required by law.
10. Contractor certifies that neither it nor any of its officers, directors, associates, partners, limited partners or individual owners has been officially notified of, charged with, or convicted of any of the following and agrees to immediately notify the Commonwealth agency contracting officer in writing if and when it or any officer, director, associate, partner, limited partner or individual owner has been officially notified of, charged with, convicted of, or officially notified of a governmental determination of any of the following:
 - a. Commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property.
 - b. Commission of fraud or a criminal offense or other improper conduct or knowledge of, approval of or acquiescence in such activities by Contractor or any affiliate, officer, director, associate, partner, limited partner, individual owner, or employee or other individual or entity associated with:
 1. obtaining.
 2. attempting to obtain; or
 3. performing a public contract or subcontract

Contractor's acceptance of the benefits derived from the conduct shall be deemed evidence of such knowledge, approval or acquiescence.

 - c. Violation of federal or state antitrust statutes.

- d. Violation of any federal or state law regulating campaign contributions.
- e. Violation of any federal or state environmental law.
- f. Violation of any federal or state law regulating hours of labor, minimum wage standards or
- g. prevailing wage standards; discrimination in wages; or child labor violations.
- h. Violation of the Act of June 2, 1915 (P.L.736, No. 338), known as the Workers' Compensation
- i. Act, 77 P.S. 1 et seq.
- j. Violation of any federal or state law prohibiting discrimination In employment.
- k. Debarment by any agency or department of the federal government or by any other state.
- l. Any other crime involving moral turpitude or business honesty or integrity.

Contractor acknowledges that the Commonwealth may, in its sole discretion, terminate the contract for cause upon such notification or when the Commonwealth otherwise learns that Contractor has been officially notified, charged, or convicted.

11. If this contract was awarded to Contractor on a non-bid basis, Contractor must, (as required by Section 1641 of the Pennsylvania Election Code) file a report of political contributions with the Secretary of the Commonwealth on or before February 15 of the next calendar year. The report must Include an Itemized list of all political contributions known to Contractor by virtue of the knowledge possessed by every officer, director, associate, partner, limited partner, or individual owner that has been made by:
- a. Any officer, director, associate, partner, limited partner, individual owner or members of the immediate family when the contributions exceed an aggregate of one thousand dollars (\$1,000) by any individual during the preceding year; or
 - b. Any employee or members of his immediate family whose political contribution exceeded one thousand dollars (\$1,000) during the preceding year.

To obtain a copy of the reporting form, Contractor shall contact the Bureau of Commissions, Elections and Legislation, Division of Campaign Finance and Lobbying Disclosure, Room 210, North Office Building, Harrisburg, PA 17120.

12. Contractor shall comply with, requirements of the Lobbying Disclosure Act, 65 Pa.C.S. § 13A01 et seq., and the regulations promulgated pursuant to that law. Contractor employee activities prior to or outside of formal Commonwealth procurement communication protocol are considered lobbying and subjects the Contractor employees to the registration and reporting requirements of the law. Actions by outside lobbyists on Contractor's behalf, no matter the procurement stage, are not exempt and must be reported.
13. When Contractor has reason to believe that any breach of ethical standards as set forth In law, the Governor's Code of Conduct, or in these provisions has occurred or may occur, including but not limited to contact by a Commonwealth officer or employee which, if acted upon, would violate such ethical standards, Contractor shall Immediately notify the Commonwealth contracting officer or Commonwealth Inspector General in writing.

14. Contractor, by submission of its bid or proposal and/or execution of this contract and by the submission of any bills, invoices or requests for payment pursuant to the contract, certifies and represents that it has not violated any of these contractor integrity provisions in connection with the submission of the bid or proposal, during any contract negotiations or during the term of the contract.
15. Contractor shall cooperate with the Office of Inspector General in its investigation of any alleged Commonwealth employee breach of ethical standards and any alleged Contractor non-compliance with these provisions. Contractor agrees to make identified Contractor employees available for interviews at reasonable times and places. Contractor, upon the inquiry or request of the Office of Inspector General, shall provide, or if appropriate, make promptly available for inspection or copying, any information of any type or form deemed relevant by the Inspector General to Contractor's integrity and compliance with these provisions. Such information may include, but shall not be limited to, Contractor's business or financial records, documents or files of any type or form that refers to or concern this contract.
16. For violation of any of these Contractor Integrity Provisions, the Commonwealth may terminate this and any other contract with Contractor, claim liquidated damages in an amount equal to the value of anything received in breach of these provisions, claim damages for all additional costs and expenses incurred in obtaining another contractor to complete performance under this contract, and debar and suspend Contractor from doing business with the Commonwealth. These rights and remedies are cumulative, and the use or non-use of anyone shall not preclude the use of all or any other. These rights and remedies are in addition to those the Commonwealth may have under law, statute, regulation, or otherwise.
17. For purposes of these Contractor Integrity Provisions, the following terms shall have the meanings found in this Paragraph 17.
 - a. "Confidential information" means information that a) is not already in the public domain; b) is not available to the public upon request; c) is not or does not become generally known to Contractor from a third party without an obligation to maintain its confidentiality; d) has not become generally known to the public through an act or omission of Contractor; or e) has not been independently developed by Contractor without the use of confidential information of the Commonwealth.
 - b. "Consent" means written permission signed by a duly authorized officer or employee of the Commonwealth, provided that where the material facts have been disclosed, in writing, by pre-qualification, bid, proposal, or contractual terms, the Commonwealth shall be deemed to have consented by virtue of execution of this contract.
 - c. "Contractor" means the individual or entity that has entered into this contract with the Commonwealth, including those directors, officers, partners, managers, and owners having more than a five percent interest in Contractor.
 - d. "Financial interest" means:
 - 1; Ownership of more than a five percent interest in any business; or
 - 2; Holding a position as an officer, director, trustee, partner, employee, or holding any position of management.
 - e. "Gratuity" means tendering, giving or providing anything of more than nominal monetary value including, but not limited to; cash, travel, entertainment, gifts, meals, lodging, loans, subscriptions, advances, deposits of money, services, employment, or contracts of any kind. The exceptions set forth in the Governor's Code of Conduct, Executive Order 1980-18, the 4 Pa.

Code §7.153(b), shall apply.

- f. "Immediate family" means a spouse and any unemancipated child.
- g. "Non-bid basis" means a contract awarded or executed by the Commonwealth with Contractor without seeking bids or proposals from any other potential bidder or offeror.
- h. "Political contribution" means any payment, gift, subscription, assessment, contract, payment for services, dues, loan, forbearance, advance or deposit of money or any valuable thing, to a candidate for public office or to a political committee, including but not limited to a political action committee, made for the purpose of influencing any election in the Commonwealth of Pennsylvania or for paying debts incurred by or for a candidate or committee before or after any election.

OFFSET PROVISION

The Contractor agrees that the Commonwealth may set off the amount of any state tax liability or other obligation of the Contractor or its subsidiaries to the Commonwealth against any payments due the Contractor under any contract with the Commonwealth.

CONTRACTOR RESPONSIBILITY PROVISIONS

For the purpose of these provisions, the term Contractor is defined as any person, including, but not limited to, a bidder, offeror, loan recipient, grantee or subgrantee, who has furnished or seeks to furnish goods, supplies, services, or leased space, or who has performed or seeks to perform construction activity under contract, subcontract, grant, or subgrant with the Commonwealth, or with a person under contract, subcontract, grant, or subgrant with the Commonwealth or its state-affiliated entities, and state-related institutions. The term Contractor may include a permittee, licensee, or any agency, political subdivision, instrumentality, public authority, or other entity of the Commonwealth.

- a. The Contractor must certify, in writing, for itself and all its subcontractors, as of the date of its execution of any Commonwealth contract, that neither the Contractor, nor any subcontractors, nor any suppliers are under suspension or debarment by the Commonwealth or any governmental entity, instrumentality, or authority and, if the Contractor cannot so certify, then it agrees to submit, along with the bid/proposal, a written explanation of why such certification cannot be made.
- b. The Contractor must also certify, in writing, that as of the date of its execution, of any Commonwealth contract it has no tax liabilities or other Commonwealth obligations.
- c. The Contractor's obligations pursuant to these provisions are ongoing from and after the effective date of the contract through the termination date thereof. Accordingly, the Contractor shall have an obligation to inform the contracting agency if, at any time during the term of the contract, it becomes delinquent in the payment of taxes, or other Commonwealth obligations, or if it or any of its subcontractors are suspended or debarred by the Commonwealth, the federal government, or any other state or governmental entity; Such notification shall be made within 15 days of the date of suspension or debarment.
- d. The failure of the Contractor to notify the contracting agency of its suspension or debarment by the Commonwealth, any other state, or the federal government shall constitute an event of default of the contract with the Commonwealth.
- e. The Contractor agrees to reimburse the Commonwealth for the reasonable costs of investigation

incurred by the Office of Inspector General for investigations of the Contractor's compliance with the terms of this or any other agreement between the Contractor and the Commonwealth, which results in the suspension or debarment of the Contractor; Such costs shall include, but shall not be limited to, salaries of investigators, including overtime; travel and lodging expenses; and expert witness and documentary fees. The Contractor shall not be responsible for investigative costs for investigations which do not result in the Contractor's suspension or debarment.

- f. The Contractor may obtain the current list of suspended and debarred Commonwealth contractors by either searching the internet at <http://www.dgs.state.pa.us/> or contacting the:

Department of General Services
Office of Chief Counsel
603 North Office Building
Harrisburg, PA 17125
Telephone Number: (717) 783-6472
FAX Number: (717) 787-9138

THE AMERICANS WITH DISABILITIES ACT

- a. Pursuant to federal regulations promulgated under the authority of The Americans With Disabilities Act, 28 C.F.R. § 35.101 et seq., the Contractor understands and agrees that no individual with a disability shall, on the basis of the disability, be excluded from participation in this Contract or from activities provided for under this Contract. As a condition of accepting and executing this contract, the Contractor agrees to comply with the "General Prohibitions Against Discrimination", 28 C.F.R. § 35.130, and all other regulations promulgated under Title II of The Americans With Disabilities Act which are applicable to the benefits, services, programs, and activities provided by the Commonwealth of Pennsylvania through contracts with outside contractors.
- b. The Contractor shall be responsible for and agrees to indemnify and hold harmless the Commonwealth of Pennsylvania from all losses, damages, expenses, claims, demands, suits, and actions brought by any party against the Commonwealth of Pennsylvania as a result of the Contractor's failure to comply with the provisions of subparagraph a above.

RIGHT TO KNOW LAW

I. If this contract is a grant-agreement:

- a. Grantee or Subgrantee understands that this Grant Agreement and records related to or arising out of the Grant Agreement are subject to requests made pursuant to the Pennsylvania Right-to-Know Law, 65 P.S. §§ 67.101-3104 ("RTKL"). For the purpose of these provisions, the term "the Commonwealth" shall refer to the granting Commonwealth Agency.
- b. If the Commonwealth needs the Grantee's or Subgrantee's assistance in any matter arising out of the RTKL related to this. Grant Agreement, it shall notify the Grantee or Subgrantee using the legal contact information provided in the Grant Agreement. The Grantee or Subgrantee, at any time, may designate a different contact for such purpose upon reasonable prior written notice to the Commonwealth.
- c. Upon written notification from the Commonwealth that it requires Grantee's or Subgrantee's assistance in responding to a request under the RTKL for information related to this Grant Agreement that may be in Grantee's or Subgrantee's possession, constituting, or alleged to constitute, a public record in accordance with the RTKL ("Requested Information"), Grantee or Subgrantee shall:

- 1) Provide the Commonwealth, within ten (10) calendar days after receipt of written notification, access to, and copies of, any document or Information in Grantee's or Subgrantee's possession arising out of this Grant Agreement that the Commonwealth reasonably believes is Requested Information and may be a public record under the RTKL; and
 - 2) Provide such other assistance as the Commonwealth may reasonably request, in order to comply with the RTKL with respect to this Grant Agreement.
- d. If the Grantee or Subgrantee considers the Requested Information to include a request for a Trade Secret or Confidential Proprietary Information, as those terms are defined by the RTKL, or other information that Grantee or Subgrantee considers exempt from production under the RTKL, Grantee or Subgrantee must notify the Commonwealth and provide, within seven (7) calendar days of receiving the written notification, a written statement signed by the representative of Grantee or Subgrantee explaining why the requested material is exempt from public disclosure under the RTKL.
- e. The Commonwealth will rely upon the written statement from Grantee or Subgrantee in denying a RTKL request for the Requested Information unless the Commonwealth determines that the Requested Information is clearly not protected from disclosure under the RTKL. Should the Commonwealth determine that the Requested Information is clearly not exempt from disclosure, Grantee or Subgrantee shall provide the Requested Information within five (5) business days of receipt of written notification of the Commonwealth's determination.
- f. If Grantee or Subgrantee fails to provide the Requested Information within the time period required by these provisions, Grantee or Subgrantee shall indemnify and hold the Commonwealth harmless for any damages, penalties, costs, detriment or harm that the Commonwealth may incur as a result of Grantee's or Subgrantee's failure, including any statutory damages assessed against the Commonwealth.
- g. The Commonwealth will reimburse Grantee or Subgrantee for any costs associated with complying with these provisions only to the extent allowed under the fee schedule established by the Office of Open Records or as otherwise provided by the RTKL if the fee schedule is inapplicable.
- h. Grantee or Subgrantee may file a legal challenge to any Commonwealth decision to release a record to the public with the Office of Open Records, or in the Pennsylvania Courts, however, Grantee or Subgrantee shall indemnify the Commonwealth for any legal expenses incurred by the Commonwealth as a result of such a challenge and shall hold the Commonwealth harmless for any damages, penalties, costs, detriment or harm that the Commonwealth may incur as a result of Grantee's or Subgrantee's failure, including any statutory damages assessed against the Commonwealth, regardless of the outcome of such legal challenge. As between the parties, Grantee or Subgrantee agrees to waive all rights or remedies that may be available to it as a result of the Commonwealth's disclosure of Requested Information pursuant to the RTKL.
- i. The Grantee's or Subgrantee's duties relating to the RTKL are continuing duties that survive the expiration of this Grant Agreement and shall continue as long as the Grantee or Subgrantee has Requested Information in its possession.

II. If this contract is a lease agreement:

- a. The Pennsylvania Right-to-Know Law, 65 P.S. §§ 67.101-3104 ("RTKL") applies to this Lease. For the purpose of these provisions, the term "Commonwealth" shall refer to the Department of General Services or the tenant Commonwealth agency.

- b. If the Commonwealth needs the Lessor's assistance in any matter arising out of the RTKL related to this Lease, it shall notify the Lessor using the legal contact information provided in this Lease. The Lessor, at any time, may designate a different contact for such purpose upon reasonable prior written notice to the Commonwealth.
- c. Upon written notification from the Commonwealth that it requires the Lessor's assistance in responding to a request under the RTKL for information related to this Lease that may be in the Lessor's possession, constituting, or alleged to constitute, a public record in accordance with the RTKL ("Requested Information") the Lessor shall:
 - 1) Provide the Commonwealth, within ten (10) calendar days after receipt of written notification, access to, and copies of, any document or information in the Lessor's possession arising out of this Lease that the Commonwealth reasonably believes is Requested Information and may be a public record under the RTKL; and
 - 2) Provide such other assistance as the Commonwealth may reasonably request, in order to comply with the RTKL with respect to this Lease.
- d. If the Lessor considers the Requested Information to include a request for a Trade Secret or Confidential Proprietary Information, as those terms are defined by the RTKL, or other information that the Lessor considers exempt from production under the RTKL, the Lessor must notify the Commonwealth and provide, within seven (7) calendar days of receiving the written notification, a written statement signed by a representative of the Lessor explaining why the requested material is exempt from public disclosure under the RTKL.
- e. The Commonwealth will rely upon the written statement from the Lessor in denying a RTKL request for the Requested Information unless the Commonwealth determines that the Requested Information is clearly not protected from disclosure under the RTKL. Should the Commonwealth determine that the Requested Information is clearly not exempt from disclosure, the Lessor shall provide the Requested Information within five (5) business days of receipt of written notification of the Commonwealth's determination.
- f. If the Lessor fails to provide the Requested Information Within the time period required by these provisions, the Lessor shall indemnify and hold the Commonwealth harmless for any damages, penalties, costs, detriment or harm that the Commonwealth may incur as a result of the Lessor's failure, including any statutory damages assessed against the Commonwealth.
- g. The Commonwealth will reimburse the Lessor for any costs associated with complying with these provisions only to the extent allowed under that fee schedule established by the Office of Open Records or as otherwise provided by the RTKL if the fee schedule is inapplicable.
- h. The Lessor may file a legal challenge to any Commonwealth decision to release a record to the public with the Office of Open Records, or in the Pennsylvania Courts; however, the Lessor shall indemnify the Commonwealth for any legal expenses incurred by the Commonwealth as a result of such a challenge and shall hold the Commonwealth harmless for any damages, penalties, costs, detriment or harm that the Commonwealth may incur as a result of the Lessor's failure; including any statutory damages assessed against the Commonwealth, regardless of the outcome of such legal challenge. As between the parties, the Lessor agrees to waive all rights or remedies that may be available to it as a result of the Commonwealth's disclosure of Requested Information pursuant to the RTKL.
- i. Lessor's duties relating to the RTKL are continuing duties that survive the expiration of this Lease and shall continue as long as the Lessor has Requested Information in its possession.

III. If this contract is other than a grant or lease agreement:

- a. The Pennsylvania Right-to-Know Law, 65 P.S. §§ 67.101-3104 ("RTKL") applies to this Contract. For the purpose of these provisions, the term "Commonwealth" shall refer to the contracting Commonwealth agency.
- b. If the Commonwealth needs the Contractor's assistance in any matter arising out of the RTKL related to this Contract, it shall notify the Contractor using the legal contact information provided in this Contract. The Contractor, at any time, may designate a different contact for such purpose upon reasonable prior written notice to the Commonwealth.
- c. Upon written notification from the Commonwealth that it requires the Contractor's assistance in responding to a request under the RTKL for information related to this Contract that may be in the Contractor's possession, constituting, or alleged to constitute, a public record in accordance with the RTKL ("Requested Information") the Contractor shall:
 - 1) Provide the Commonwealth, within ten (10) calendar days after receipt of written notification, access to, and copies of, any document or information in the Contractor's possession arising out of this Contract that the Commonwealth reasonably believes is Requested Information and may be a public record under the RTKL; and
 - 2) Provide such other assistance as the Commonwealth may reasonably request, in order to comply with the RTKL with respect to this Contract.
- d. If the Contractor considers the Requested Information to include a request for a Trade Secret or Confidential Proprietary Information, as those terms are defined by the RTK , or other information that the Contractor considers exempt from production under the RTKL, the Contractor must notify the Commonwealth and provide, within seven (7) calendar days of receiving the written notification, a written statement signed by a representative of the Contractor explaining why the requested material is exempt from public disclosure under the RTKL.
- e. The Commonwealth will rely upon the written statement from the Contractor in denying a RTKL request for the Requested Information unless the Commonwealth determines that the Requested Information is clearly not protected from disclosure under the RTKL. Should the Commonwealth determine that the Requested information is clearly not exempt from disclosure, the Contractor shall provide the Requested Information within five (5) business days of receipt of Written notification of the Commonwealth determination.
- f. If the Contractor fails to provide the Requested Information within the time period required by these provisions, the Contractor shall indemnify and hold the Commonwealth harmless for any damages, penalties, costs, detriment or harm that the Commonwealth may incur as a result of the Contractor's failure, including any statutory damages assessed against the Commonwealth.
- g. The Commonwealth will reimburse the Contractor for any costs associated with complying with these provisions only to the extent allowed under the fee schedule established by the Office of Open Records or as otherwise provided by the RTKL if the fee schedule is inapplicable.
- h. The Contractor may file a legal challenge to any Commonwealth decision to release a record to the public with the Office of Open Records, or in the Pennsylvania Courts, however, the Contractor shall indemnify the Commonwealth for any legal expenses incurred by the Commonwealth as a result of such a challenge and shall hold the Commonwealth harmless for any damages, penalties, costs,

detriment or harm that the Commonwealth may incur as a result of the Contractor's failure, including any statutory damages assessed against the Commonwealth, regardless of the outcome of such legal challenge. As between the parties, the Contractor agrees to waive all rights or remedies that may be available to it as a result of the Commonwealth's disclosure of the Requested Information pursuant to the RTKL.

- i. The Contractor's duties relating to the RTKL are continuing duties that survive the expiration of this Contract and shall continue as long as the Contractor has Requested Information In its possession.

PENNSYLVANIA ELECTRONIC PAYMENT PROGRAM (PEPP):

I. For Procurement Contracts

- a. The Commonwealth will make contract payments through the Automated Clearing House (ACH) Network. Within 10 days of award of the contract or purchase order, the Contractor must submit or must have already submitted its ACH information within its user profile in the Commonwealth's procurement system (SRM).
- b. Contractor must submit a unique invoice number with each Invoice submitted. The unique invoice number will be listed on the Commonwealth of Pennsylvania's ACH remittance advice to enable the Contractor to properly apply the Department's payment to the invoice submitted.
- c. It is the responsibility of the Contractor to ensure that the ACH Information contained In SRM is accurate and complete. Failure to maintain accurate and complete information may result in delays in payments.
- d. Contractor may enroll for PEPP at:
<http://www.vendorregistration.state.pa.us/cvmu/paper/Forms/ACH-EFTenrollmentform.pdf>

II. For Grant Contracts:

- a. The Commonwealth will make payments to the Grantee through the Automated Clearing House (ACH) Network. Within 10 days of the grant award, the Grantee must submit or must have already submitted its ACH information to the Commonwealth's Payable Service Center, Vendor Data Management Unit at 717-241-0140 (FAX) or by mail to the Office of Comptroller Operations, Bureau of Payable Services, Payable Service Center, Vendor Data Management Unit, 555 Walnut Street - 9th Floor, Harrisburg, PA 17101
- b. The Grantee must submit a unique invoice number with each invoice submitted. The unique invoice number will be listed on the Commonwealth of Pennsylvania's ACH remittance advice to enable the Grantee to properly apply the Department's payment to the respective invoice or program.
- c. It is the responsibility of the Grantee to ensure that the ACH information contained in the Commonwealth's central vendor master file is accurate and complete. Failure to maintain accurate and complete information may result in delays in payments.
- d. Grantee may enroll for PEPP at:
<http://www.vendorregistration.state.pa.us/cvmu/paper/Forms/ACH-EFTenrollmentform.pdf>

NONDISCRIMINATION/SEXUAL HARASSMENT CLAUSE [Contracts]

The Contractor agrees:

1. In the hiring of any employee(s) for the manufacture of supplies, performance of work, or any other activity required under the contract or any subcontract, the Contractor, each subcontractor, or any person acting on behalf of the Contractor or subcontractor shall not, by reason of gender, race, creed, or color, discriminate against any citizen of this commonwealth who is qualified and available to perform the work to which the employment relates.
2. Neither the Contractor nor any subcontractor nor any person on their behalf shall in any manner discriminate against or intimidate any employee involved in the manufacture of supplies, the performance of work, or any other activity required under the contract on account of gender, race, creed, or color.
3. The Contractor and each subcontractor shall establish and maintain a written sexual harassment policy and shall inform their employees of the policy. The policy must contain a notice that sexual harassment will not be tolerated and employees who practice it will be disciplined.
4. The Contractor and each subcontractor shall not discriminate by reason of gender, race, creed, or color against any subcontractor or supplier who is qualified to perform the work to which the contract relates.
5. The Contractor and each subcontractor shall, within the time periods requested by the commonwealth, furnish all necessary employment documents and records and permit access to their books, records, and accounts by the contracting agency and the Bureau of Minority and Women Business Opportunities (BMWBO), for purpose of ascertaining compliance with provisions of this Nondiscrimination/Sexual Harassment Clause. Within fifteen (15) days after award of any contract, the Contractor shall be required to complete, sign and submit Form STD-21, the "Initial Contract Compliance Data" form. If the contract is a construction contract, then the Contractor shall be required to complete sign and submit Form STD-28, the "Monthly Contract Compliance Report for Construction Contractors", each month no later than the 15th of the month following the reporting period beginning with the initial job conference and continuing through the completion of the project. Those contractors who have fewer than five employees or whose employees are all from the same family or who have completed the Form STD-21 within the past 12 months may, within the 15 days, request an exemption from the Form STD-21 submission requirement from the contracting agency.
6. The Contractor shall include the provisions of this Nondiscrimination/Sexual Harassment Clause in every subcontract so that those provisions applicable to subcontractors will be binding upon each subcontractor.
7. The commonwealth may cancel or terminate the contract and all money due or to become due under the contract may be forfeited for a violation of the terms and conditions of this Nondiscrimination/Sexual Harassment Clause. In addition, the agency may proceed with debarment or suspension and may place the Contractor in the Contractor Responsibility File.

NON-DISCRIMINATION / SEXUAL HARASSMENT CLAUSE [Grants]

The Grantee agrees

1. In the hiring of any employee(s) for the manufacture of supplies, performance of work, or any other activity required under the grant agreement or any subgrant agreement, contract, or subcontract, the Grantee, a subgrantee, a contractor, a subcontractor, or any person acting on behalf of the Grantee shall not, by reason of gender, race, creed, or color, discriminate against any citizen of this commonwealth who is qualified and available to perform the work to which the employment relates.
2. The Grantee, any subgrantee, contractor or any subcontractor or any person on their behalf shall not in any manner discriminate against or intimidate any of its employees on account of gender; race, creed, or color.
3. The Grantee, any subgrantee, contractor or any subcontractor shall establish and maintain a written sexual harassment policy and shall inform their employees of the policy. The policy must contain a notice that sexual harassment will not be tolerated and employees who practice it will be disciplined.
4. The Grantee any subgrantee, contractor or any subcontractor shall not discriminate by reason of gender, race, creed, or color against any subgrantee, contractor, subcontractor or supplier who is qualified to perform the work to which the grant relates.
5. The Grantee, any subgrantee, any contractor or any subcontractor shall, within the time periods requested by the commonwealth, furnish all necessary employment documents and records and permit access to their books, records, and accounts by the granting agency and the Bureau of Minority and Women Business Opportunities (BMWBO), for purpose of ascertaining compliance with provisions of this Nondiscrimination/Sexual Harassment Clause. Within 15 days after award of any grant, the Grantee shall be required to complete, sign and submit Form STD-21, the "Initial Contract Compliance Data" form. Grantees who have fewer than five employees or whose employees are all from the same family or who have completed the STD-21 form within the past 12 months may, within the 15 days, request an exemption from the STD-21 form from the granting agency.
6. The Grantee, any subgrantee, contractor or any subcontractor shall include the provisions of this Nondiscrimination/Sexual Harassment Clause in every subgrant agreement, contract or subcontract so that those provisions applicable to subgrantees, contractors or subcontractors will be binding upon each subgrantee, contractor or subcontractor.
7. The commonwealth may cancel or terminate the grant agreement and all money due or to become due under the grant agreement may be forfeited for a violation of the terms and conditions of this Nondiscrimination/Sexual Harassment Clause. In addition, the granting agency may proceed with debarment or suspension and may place the Grantee, subgrantee, contractor, or subcontractor in the Contractor Responsibility File.

**DEPARTMENT OF ENVIRONMENTAL PROTECTION
GENERAL CONDITIONS**

1. Legality - All work under this Agreement shall be performed in accordance with applicable statutes, rules, and regulations of the Federal, State, and local governments.
2. Subcontracts - No contract or agreement may be entered into by the Contractor for execution of the project activities or provision of services to the project (other than purchases of supplies, or standard commercial or maintenance services) which is not incorporated in the approved Project Scope of Work or approved in advance by the Department. Any such arrangements shall provide that the Contractor will retain ultimate control and responsibility for the project, and that the subcontractor shall be bound by these conditions and any other requirements applicable to the Contractor in the conduct of the project.
3. Changes - The parties to the Agreement hereby agree to execute minor adjustments to this Agreement via a letter of mutual consent. Any significant adjustments to this Agreement shall, however, require a formally executed amendment. Significant adjustments shall include:
 - A. Changes to the scope of work involving the addition of specific work tasks.
 - B. Changes in payment terms. However, reallocation of contract budget category dollar amounts to and from other budget categories shall be considered minor adjustments, as long as the maximum contract dollar amount payable by Department to Contractor is not exceeded.
 - C. Increase in the maximum grant dollar amount to be paid by the Department to the Contractor.
4. Suspension - When the terms and conditions of this Agreement are not materially being met, the Department may, upon written notice to the Contractor, suspend the Agreement until corrective action has been taken to the satisfaction of the Department, or until the Agreement is terminated.
5. Assignment - Contractor and the Commonwealth recognize that in actual economic practice, overcharges by Contractor's suppliers resulting from violations of State or Federal antitrust laws are, in fact, borne by the Commonwealth. As part of the consideration for the award of this Agreement, and intending to be legally bound hereby, Contractor assigns to the Commonwealth all right, title, and interest in and to any claims Contractor now has or may hereafter acquire under State or Federal antitrust laws relating to the goods or services which are the subject of this Agreement.

6. Termination - The Department may terminate the Agreement in whole, or in part, at any time before the Project completion date:

A. Whenever it is determined that the terms and conditions of the Agreement have not been met. Prompt notification in writing of the termination, with effective date, will be made by the Department. Payments or recoveries by the Department shall be in accordance with the legal rights and obligations of the parties.

B. In the event that anticipated State and/or Federal funds are not obtained or continued at a sufficient level.

C. At the discretion of the Department upon written notification to the Contractor with effective termination date. Payments or recoveries by the Department shall be in accordance with the legal rights and obligations of the parties.

7. Extension of Time - Extensions of the Agreement period of performance for additional periods beyond its established Project completion date are minor adjustments which may be accomplished by a letter of mutual consent, subject to the approval of the Department Comptroller.'

8. Conflict of Interest

A. Interest of members of the Commonwealth and others - No officer, member, or employee of the Commonwealth, and no member of its General Assembly who exercises any function or responsibilities under this Agreement, shall participate in any decision relating to this Agreement which affects his personal interest or the interest of any corporation, partnership, or association in which he is directly or indirectly interested; nor shall any such officer, member, or employee of the Commonwealth, and no member of its governing body, have any interest, direct or indirect, in this Agreement or the proceeds thereof.

B. Interest of Contractor - The Contractor covenants that it presently has no interest and shall not acquire any interest, direct or indirect, which would conflict in any manner or degree with the performance of its work hereunder. The Contractor further covenants that in the performance of this Agreement, it shall not knowingly employ any person having such interest. Contractor further certifies that no member of the board of directors of the Contractor or any of its officers have such adverse interest.

9. Hold Harmless - Contractor shall be responsible for and agrees to indemnify and hold harmless the Commonwealth from and against damages to property or injuries (including death) to any persons and other losses, damages, expenses, claims, demands, suits, and actions by any party against the Commonwealth in connection with the work performed by Contractor.

10. Interest Payments - For purposes of the interest payments required under Act 266 of 1982, if additional work is directed by the Department which is not included herein, and no Agreement amendment has been executed by the parties for said work, or if the term of this Agreement has expired, payment will not be due hereunder until after the Agreement amendment for additional work or time extension has been fully executed by all of the parties.
11. Disputes - All questions or disputes arising between the parties hereto respecting any matter pertaining to this Agreement, or any part thereof, or any breach of said Agreement arising thereunder, shall be referred to the Board of Claims of the Commonwealth of Pennsylvania (as set forth in the Act of May 20, 1937 (P.L. 728, No.193), as amended, 72 P.S. §4651-1 et seq.), or otherwise resolved in accordance with applicable law.
12. Fiscal Records - Contractor agrees to maintain books, records, documents, correspondence, and other evidence pertaining to the costs and expenses of this Agreement (hereinafter collectively referred to as "the records"), to the extent and in such detail as will properly reflect all costs, direct and indirect, of labor, materials, equipment, supplies, and services, and other costs and expenses of whatever nature for which funding has been provided under the provisions of this Agreement, and in accordance with generally accepted accounting principles and the Department's fiscal regulations and guidelines. ,
13. Retention of Records - The records shall be retained and be made available for audit for a period of three (3) years after final payment is made and the Agreement has expired, and all other pending matters are resolved.
14. Right to Audit:- The Department and the Office of Auditor General, or any of their duly authorized representatives, shall have access to the records of the Contractor for the purpose of making an audit of financial transactions, compliance with Agreement terms, and an evaluation of Agreement performance. It is further understood that the Department is authorized to make examination, excerpts, copies, and transcriptions of such records during the course of an audit.
15. Copyright and Patent Indemnity- The Contractor shall indemnify and hold the Commonwealth harmless from and against any damages or suit or proceeding brought against the Commonwealth on account of any alleged infringement of any copyright or patent arising out of the performance of this Agreement, including all work, services, materials, reports, supplies, and computer programs provided by the Contractor.'
16. Copyright and Publication Rights - All publication rights and copyrights, in the documentation produced by the Contractor in connection with the work provided for under this Agreement, shall rest with the Commonwealth. The Contractor shall not publish any of the results of the work without the written permission of the Department.

17. Sensitive Information - The Contractor shall not publish or otherwise disclose, except to the Commonwealth and except matters of public record, any information or data obtained hereunder from private individuals, organizations, or public agencies, in a publication whereby the information or data furnished by or about any particular person or establishment can be identified, except with the consent of such person or establishment.
18. Indirect Costs - Where indirect costs are part of the amount charged the Department, the method of determining those costs must be identified with sufficient documentation to support its use. Regardless of the method used to calculate indirect costs, the amount charged must not exceed actual costs incurred.

Attachment D – Pennsylvania Prevailing Wage Act

The contract with the Contractor is subject to the provisions, duties, obligations, remedies, and penalties of the Pennsylvania Prevailing Wage Act, 43 P.S. 165-1 et seq., which is incorporated herein by reference as if fully set forth herein. The general prevailing minimum wage rates, as determined by the Secretary of Labor and Industry, shall be paid for each craft or classification of all workers needed to perform this Contract during the term hereof for the locality in which the work is to be performed.

Please go to:

<https://www.dlsecureweb.pa.gov/PrevWage/Pages/Project.aspx?ID=135057&PageTy>

to view the report, and produce a hard copy for your records.

The Pennsylvania Labor and Industry project serial number for this project is 20-02250.

To assure compliance with Prevailing Wage requirements, the Contractor is required to submit Certified Payrolls, including from all sub-contractors. These must be submitted on a regular (weekly or semi-monthly) basis on appropriate state forms. Certified payroll reports from all contractors and subcontractors should detail each employee's proper trade classification along with hourly pay rates AND hourly fringe benefit rates, itemized, in compliance with the PA Prevailing Wage Act. The State consultants have been directed to report all this information to the Commonwealth. Failure to provide this information will result in non-compliance findings. All certified payrolls will be randomly audited during the construction monitoring process by the State's consultant and again during close-out audit by the State's auditors. A sample of an acceptable certified payroll form is attached.

ATTACHMENT E

Pennsylvania Steel Procurement Act

Steel products used on this project must be made in the United States of America. Mill certifications are required to be submitted for all steel to document conformance with this provision. It is recommended that the certifications be collected at the time any steel for the project is purchased and delivered to ease the collection process.

These provisions are included in Title 73, Trade and Commerce, Chapter 25, Steel Products Procurement Act, a copy of which follows this special provision.

Bidders are also advised to review the Trade Practices Act, contained in this Section as it relates to the purchase of aluminum and steel products.

GUIDANCE ON STEEL CERTIFICATION

The following guidance is a clarification from the Office of the Budget regarding the requirements associated with the Steel Products Procurement Act. In the past, many a grantee has inquired about specific cases and we were able to provide each individual project with specific directions. Additionally, we had only accepted the ST-4 form (justification for the use of foreign steel) that the Department of General Services (DGS) has exclusively devised to address exceptions linked to the requirements of the Steel Products Procurement Act when it was necessary.

Effective immediately, we have decided to accept two more DGS ST forms (ST-2, ST-3) with some caveats, providing that the forms are properly filled out. The ST-1 form will not be accepted by the Office of the Budget. It is not necessary for the ST-2, ST-3, and ST-4 forms to be notarized. Please, be advised that this guidance is specifically tailored to suit the published and programmatic needs of the Office of the Budget as the overseer of the Redevelopment Assistance Capital Program (RACP). This is not a commonwealth-wide policy. Any attempt to impose this guidance on other state agencies is strongly discouraged.

Please, be aware that the aforementioned ST forms are acceptable only in cases where non-structural steel needs to be addressed. The DGS ST forms do not replace the steel certification forms associated with structural steel. The Office of the Budget will continue to require that steel mill certifications be submitted to demonstrate compliance with the steel requirements. Please, be further advised that the Office of the Budget DOES NOT need to approve the ST forms prior to the start of the construction period. The ST forms need to be submitted to demonstrate that compliance, when and where necessary, has been met. The ST forms exceptions are displayed below. Please, contact us if you have any questions.

RACP Policy for Compliance with the Steel Products Procurement Act:

Two distinct approaches are presented below:

Structural Steel Products

Pursuant to the Steel Products Procurement Act, the Office of Budget will require a mill certificate containing the statement “**milled, melted, and manufactured in the USA**” for all structural steel products used on RACP projects. We shall deem as ineligible all contracts that are unable to demonstrate compliance via the submission of steel certifications. Therefore, the value of construction contracts associated with non-compliant steel will be removed (both materials and labor costs) from the scope of the project. A sample of an acceptable steel certificate is provided at the end of this handbook.

Non-Structural Steel Products

Pursuant to the Steel Products Procurement Act, the Office of Budget will require, either, a mill certificate containing the statement “**milled, melted, and manufactured in the USA**” or the appropriate ST form to demonstrate compliance associated with the non-structural steel products

used on RACP projects. We shall deem as ineligible all contracts that are unable to demonstrate compliance via the submission of steel certifications/ST forms. Therefore, the value of construction contracts associated with non-compliant steel will be removed (both materials and labor costs) from the scope of the project.

Recycled products, melted from previously used steel, are acceptable, providing that adequate documentation from the supplier has been furnished. The supplier shall certify that the recycled steel product was produced in the USA.

Please, be kindly aware that the acceptance of ST forms is contingent upon the form being fully filled-in and compliant with the submission guidelines for steel certifications for DGS projects (see attached) with the following exceptions:

- E. It is not necessary for the forms to be notarized. We must receive the ST with original Signatures.
- F. Any Questions regarding steel certification submissions and/or compliance with the Act shall be submitted to the Office of Budget (Elias Joseph-ejoseph@state.pa.us)
- G. The Steel certification forms do NOT need to be submitted and approved by the Office of Budget before the steel product arrives on site so as not to interfere with the project construction schedule.
- H. Void in the entirety.
- K. The Office of Budget assumes responsibility for acceptance of the DGS ST forms in accordance with this policy.

Completion of the ST-2, ST-3, and ST-4 forms shall follow the DGS directions attached to the form with the following exceptions:

- ST forms do NOT need to be submitted and approved by the Office of Budget before the steel product arrives on site so as not to interfere with the construction schedule.
- RACP ME# assigned to the project shall be inserted in all areas requiring the DGS contract number (Line #5).
- RACP project name shall be inserted in all areas requiring the contract title (Line #6).
- All reference to GSC-23 shall be void (Line #8).

Note:

Acceptance of each ST form shall be determined by the Office of the Budget (OB) at its sole discretion. All documents and other information to be delivered in order to demonstrate compliance with the steel requirements shall be and are, in form, content and substance, subject to the approval of the Office of the Budget, which approval may be withheld or delayed at the discretion of the Office of the Budget. OB reserves the right to reject all improperly filled out ST forms.

ADMINISTRATIVE PROCEDURE NO. 12
SUBMISSION GUIDELINES FOR
STEEL CERTIFICATIONS FOR DGS PROJECTS
PURSUANT TO THE STEEL PRODUCTS PROCUREMENT ACT
73 P.S. § 1881, ET SEQ.

GENERAL INFORMATION CONCERNING THE STEEL PRODUCTS PROCUREMENT ACT AND STEEL CERTIFICATION

- A. All Prime Contractors shall submit Steel Certification forms to the Construction Inspector Supervisor assigned to the project. Only one fully-executed certification form for each product must be submitted to the Construction Inspector Supervisor.
- B. According to Section 1886 of the Steel Products Procurement Act (the Act), cast iron products are considered to be steel products. The appropriate certification form, therefore, is required to be submitted for cast iron products.
- C. Aluminum and brass products are not steel products; therefore, steel certification forms are not required for such items.
- D. Modification or alterations of the Steel Certification forms is strictly prohibited.
- E. If the entity executing an ST form has a corporate seal, that seal should be impressed in the signature area of the form. The signatures on the ST forms do not have to be notarized, but they must be original signatures. Signature stamps are not acceptable; a form submitted with such a stamp will be rejected.
- F. Questions regarding steel certification submissions and/or compliance with the Act shall be submitted **in writing** to the Construction Inspector Supervisor as soon as possible after the initial Job Conference. DGS will investigate and render a **written** response in a timely fashion.
- G. **Nothing in the Administrative Procedure should be construed as relieving any prime contractor, subcontractor, supplier or fabricator from complying with the requirements of the Act. Steel Certification forms must be submitted and approved by the Departmental personnel before a steel product arrives on site. Any contractor entering into a purchase order for a "steel product" prior to submitting an acceptable steel certifications does so at its own risk and faces penalties which include, but are not limited to, nonpayment, and/or replacement costs, and/or debarment. If steel products are incorporated into the project prior to the submission or proper certification, the contractor assumes the full risk of nonpayment, replacement costs and/or debarment if the products are not certifiable.**
- H. GSC-23 forms must be submitted within 15 or 45 days from the effective date of the contract, depending upon the value of the prime contract. (Refer to §8.16 of the General Conditions of the Contract between the Prime Contractor and DGS (1999 edition) and Administrative Procedure #6.) Within 30 days of the Professional's approval of any GSC-23 listing a "steel product", the prime contractor must submit a steel certification for that product.
- I. No application for Payment containing steel products will be processed until the appropriate steel certification form(s) has been approved by the Department.
- J. **Domestic availability will be determined as of the date the ST-4 form is submitted to DGS for approval.**
- K. The forms that follow ST-1 through ST-4 – have been developed by the Department of General Services for use on the Department's projects alone. The Department assumes no responsibility or liability for any use of these forms on the public works projects of any other entity subject to the Act.
- L. The North American Free Trade Agreement (NAFTA) does not supercede or preempt the Act.

ST-2

This form must be filled out for non-identifiable, non-structural steel products.

SECTION A **To be filled out by the Purchaser, the firm that pays the Fabricator**

Line #1 This is the name of the firm that is dealing directly with the Fabricator

Line #2 This is the purchaser's mailing address.

Line #3 This is the purchaser's business phone.

Line #4 This is the date the ST-2 form is sent to the fabricator.

Line #5 This is the DGS contract number or the project.

Line #6 This is the DGS project description.

Line #7 This is the "steel product" being certified, such as a chiller, condenser, hollow metal doors. The prime contractor may not fill in the line with a description like "structural steel", "heating unit" or "air conditioning Unit". The model number, if any, of the steel product must be listed as indicated.

LINE #7 IS THE MOST CRITICAL PART OF THE FORM. FAILURE TO PROPERLY FILL OUT LINE #7 ON EACH ST FORM MAKES THE ENTIRE FORM INVALID AND A NEW FORM MUST BE SUBMITTED.

Line #8 This refers to the corresponding GSC-23 submittal number.

SECTION B **To be filled out by the Fabricator, the firm that assembles the product listed on Line #7.**

Line #9 This is the Fabricator's name.

Line #10 This is the Fabricator's mailing address.

Line #11 This is the Fabricator's business phone.

Line #12 This is the date the Fabricator receives the ST-2 from the Purchaser.

Line #13 This is the Fabricator's Federal I.D. number.

SECTION C

1. Language - **No modifications, cross-outs or alterations of any type may be made to the language of this certification paragraph.**
2. Signature - Two signatures are required on the ST-2 form. The Prime Contractor's President/Vice President must sign on one line and the Secretary or Treasurer must sign as a witness. The names should be typed or printed beneath the signature lines. Failure to type in the names **does not** invalidate the ST form.

**ST-2 STEEL ORIGIN CERTIFICATION:
NON-IDENTIFIABLE, NON-STRUCTURAL STEEL**

This form must be executed by the Purchaser and the Fabricator of any item containing steel that is not structural steel. This form must be submitted to the CIS within 30 days from the date the Professional approves a GSC-23 listing a "steel product". No steel product may be delivered on-site unless DGS has received the ST form. Structural steel is defined as steel products used as a basic structural element of a project (i.e., steel beams, columns, decking stairways, reinforcing bars, pipes, etc.). Purchasers of structural steel products (contractors or subcontractors) must provide bills of lading, invoices and mill certifications that the steel was manufactured in the United States instead of this form. The Fabricator shall be herein defined as the firm that assembles the component parts of the product to be purchased. The Department of General Services will accept the certification of firms that are earlier in the chain of purchase (i.e., manufacturers of components, steel suppliers) in lieu of the Fabricator.

A. TO BE COMPLETED BY THE PURCHASER:

1. Name of purchasing firm: _____
2. Firm's address: _____
3. Firm's phone number: _____ 4. Date submitted to Fabricator: ____/____/____
5. Contract No. DGS _____ 6. Contract title: _____
7. Steel Product Certified: _____ 8. GSC-23# _____
- Model: _____

B. TO BE COMPLETED BY THE FABRICATOR/MANUFACTURER:

9. Name of firm: _____
10. Address of firm: _____
11. Firm's phone number: _____ 12. Date received: ____/____/____
13. Federal Employer ID. No.: _____

CERTIFICATION: I, the undersigned officer of the Fabricator/Manufacturer, do certify that our firm assembled/fabricated the components to the steel products listed in Section A, Item 7, and that all steel components therein are comprised of steel that is melted and/or manufactured in the United States. I understand that, by signing this document, I certify that I have received assurances from the suppliers/manufacturers of the components that said components do not contain foreign manufactured steel. I further understand that this document is subject to the provision of the Unsworn Falsification to Authorities Act (18 P.S. § 4904). I also understand that I am subject to the provisions of the Steel Products Procurement Act (73 P.S. § 1881, et seq.) which provides penalties including, but not limited to, debarment from supplying any products for Commonwealth of Pennsylvania public works projects for a period of five (5) years for violations therein. I agree to provide documentation supporting these facts if requested by the Commonwealth. The Commonwealth reserves the right to pursue any action deemed necessary to protect the Commonwealth's interest and ensure compliance with the laws of the Commonwealth.

WITNESS:

Name:
Secretary or Treasurer

Name: (Seal)
President or Vice President

(Rev. 6/1/99)

ST-3

2-STEP ELIGIBILITY ANALYSIS:

BEFORE A PRIME CONTRACTOR CAN SUBMIT AN ST-3, THE FOLLOWING ANALYSIS MUST BE SATISFIED

STEP #1: The contractor must establish that the "product" **contains BOTH:**

- Steel melted in the USA

AND

- Foreign Steel

Note: Step #1 focuses upon the content of the "product".

Note: The % need not be close; it can be 99-1, so long as there is both foreign and domestic steel in the "product".

STEP #2: The contractor must establish that 75% of the cost of the "product" has been mined, produced or manufactured in the USA.

Note: Step #2 focuses upon the cost of the entire "product", not just the steel within it.

SECTION A

Line #1 This is the Prime Contractor's name.

Line #2 This is the Prime Contractor's business address.

Line #3 This is the Prime Contractor's phone number.

Line #4 This is the date the ST-3 is submitted to the fabricator.

Line #5 This is the DGS contract number for the project.

Line #6 This is the DGS project description.

Line #7 This is the "steel product" being certified, such as a chiller, condenser, hollow metal doors. The prime contractor may not fill in the line with a description like "structural steel", "heating unit" or "air conditioning unit". The model number, if any, or the steel product must be listed as indicated.

**LINE #7 IS THE MOST CRITICAL PART OF THE FORM.
FAILURE TO PROPERLY FILL OUT LINE #7 ON EACH ST FORM
MAKES THE ENTIRE FORM INVALID AND A NEW FORM MUST BE
SUBMITTED.**

Line #8 This refers to the corresponding GSC-23 submittal number.

SECTION B **To be filled out by the Fabricator/Manufacturer, the firm that fabricates the product listed on Line #7.**

Line #9 This is the Fabricator's name.

Line #10 This is the Fabricator's business address.

Line #11 This is the Fabricator's business phone.

Line #12 This is the date the Fabricator receives the ST-3 from the purchaser.

Line #13 This is the Fabricator's Federal I.D. Number.

Line #14 The Fabricator must insert the percentage of the cost of the articles, materials and supplies which have been mined, produced or manufactured in the U.S. for the product listed on Line #7.

SECTION C

1. Language – **No modifications, cross-outs or alterations of any type may be made to the language of this certification paragraph.**
2. Signature – Two signatures are required on the ST-3 form. The Fabricator's President/Vice President must sign on one line **and** the Secretary or Treasurer must sign as a witness. The names should be typed or printed beneath the signature lines. Failure to type in the names does not validate the ST form.

NOTES on ST-3 Forms:

- It is not necessary to submit an ST-1 with the ST-3.
- **DGS reserves the right to request additional documentation to support the percentage specified on Line 14. If the Fabricator/manufacturer refuses to produce such documentation and/or DGS deems it to be in the Commonwealth's best interests, DGS may request the Office of Inspector General to investigate the submission of the ST-3 form.**

ST-3 75% U.S. MANUFACTURE CERTIFICATION

The Steel Products Procurement Act (73 P.S. § 1881, et seq.) allows the use of steel products with **both** foreign and domestic steel **if at least 75 percent of the cost** of the materials (including steel, rubber, wood, plastic, etc.) in the product are manufactured or produced, as the case may be, in the United States.

This form must be executed by a Fabricator of any item containing BOTH U.S. AND FOREIGN STEEL. The Fabricator shall hereby be defined as the firm that assembles the component parts of the product to be purchased. The Department of General Services will accept the certification of firms that are **earlier** in the chain of purchase (i.e., manufacturers of components, steel suppliers) in lieu of the Fabricator.

This form must be submitted to the CIS within 30 days from the date the Professional approves a GSC-23 listing a "steel product". No steel product may be delivered on-site unless DGS has received an ST form.

A. TO BE COMPLETED BY THE PRIME CONTRACTOR (PURCHASER):

1. Name of Contractor: _____
2. Address of Contractor: _____
3. Phone Number: _____ 4. Date submitted to Fabricator: ____/____/____
5. Contract No. DGS _____ 6. Contract Title: _____
7. Steel Product Certified: _____ 8. GSC-23# _____
- Model: _____

B. TO BE COMPLETED BY THE FABRICATOR/MANUFACTURER:

9. Name of Firm: _____
10. Address of Firm: _____
11. Firm's Phone number: (____) _____ 12. Date Received: ____/____/____ 13.
- Fed. Employer ID. No.: _____
14. Percentage of the cost of the articles, materials and supplies which have been mined,
produced or manufactured in the U. S. for the product listed above on Line 7: _____

CERTIFICATION: I, the undersigned Officer of the Fabricator/Manufacturer, do certify that our firm assembled/manufactured the components to the steel product listed in Section 7, that the steel in said product is both foreign and domestically manufactured, and that all the facts contained in this document are true. I agree to provide documentation supporting these facts if requested by the Commonwealth. I further understand that this document is subject to the provisions of the Unsworn Falsification to Authorities Act (18 P.S. § 4904) and the Steel Products Procurement Act (73 P.S. § 1881, et seq.) which provide penalties including, but not limited to, debarment from supplying any products for Commonwealth of Pennsylvania public works projects for a period of five (5) years for violations therein. The Commonwealth reserves the right to pursue any action deemed necessary to protect the Commonwealth's interest and ensure compliance with the laws of the Commonwealth.

Witness:

Name:
Secretary or Treasurer

Name: (Seal)
President or Vice President

(Rev. 6/1/99)

ST-4

This form may be submitted in circumstances where the Prime contractor believes that the "product" on Line #7 is not made in sufficient quantities to satisfy the requirements of the contract.

The information submitted by a Prime contractor is subject to verification by the Department. Any Prime contractor who executes a Purchase Order or other type of purchase agreement encompassing a "steel product" prior to receiving the Department's written determination that the "steel product" listed on Line #7 of the ST-4 form is not manufactured in sufficient quantity to meet the requirements of the project does so at its own risk and faces penalties including, but not limited to, non-payment for the product; removal and replacement of the product at its own costs; and/or an Office of Inspector General investigation which may lead to debarment.

**Domestic availability will be determined as of the date
the ST-4 form is submitted to DGS for approval**

Line #1 this is the Prime Contractor's formal business name.

Line #2 This is the Prime Contractor's business address.

Line #3 This is the Prime Contractor's business phone.

Line #4 This is the date the ST-4 form is submitted to DGS.

Line #5 This is the DGS contract number for the project.

Line #6 This is the DGS project description.

Line #7 This is the "steel product" being certified, such as a chiller, condenser, hollow metal doors. The prime contractor may not fill in the line with a description like "structural steel", "heating unit" or air conditioning unit".

**LINE #7 IS THE MOST CRITICAL PART OF THE FORM.
FAILURE TO PROPERLY FILL OUT LINE #7 ON EACH ST FORM
MAKES THE ENTIRE FORM INVALID AND A NEW FORM MUST BE
SUBMITTED FOR APPROVAL.**

Line #8 This refers to corresponding GSC-23 submittal number.

Line #9 These four lines, (a) through (d), are to be filled out completely by the Prime Contractor. At least four suppliers/manufacturers must be contacted by the Prime Contractor to ascertain if the "product" on Line #7 is manufactured with domestic steel.

CERTIFICATION

1. Language – No modifications, cross-outs or alterations of any type may be made to the language of this certification paragraph.
2. Signature – Two signatures are required on the ST-4 form. The Prime Contractor's President/Vice President must sign on one line and the Secretary or Treasurer must sign as a witness. The names should be typed or printed beneath the signature line. Failure to type in the names **does not** invalidate the ST form.

NOTE ON ST-4 FORMS:

- It is not necessary to submit an ST-1 form with an ST-4 form.

ST-4 NOT DOMESTICALLY MANUFACTURED: PRIME CONTRACTOR

This form must be executed by the Prime Contractor and submitted to the CIS within 30 days from the date the Professional approves a GSC-23 listing a "steel product". No steel product may be delivered on-site unless DGS has received, reviewed and provided written approval of the ST-4 form. An ST-4 form can only be submitted for approval when a steel product is not domestically produced in sufficient quantities. DGS will verify the accuracy of the information on the ST-4 form and will contact additional suppliers/manufacturers to ascertain the availability of a domestic steel product.

1. Prime Contractor: _____ 2. Address: _____
3. Phone Number: _____ 4. Date Submitted: _____ 5. Contract No. DGS: _____
6. Contract Title: _____ 7. Steel Product: _____ 8. GSC-23: _____
9. Suppliers/Manufacturers contacted by the Prime Contractor that claimed that the above product is not produced/manufactured with U.S.-manufactured steel. **At least** four Suppliers/Manufacturers are needed. **Manufacturers listed in specifications must be contacted.**
 - a. Firm Name: _____ Phone Number: _____
 Address: _____ Date Contacted: ____/____/____
 Person Contacted: _____ Phone Number: _____
 - b. Firm Name: _____ Phone Number: _____
 Address: _____ Date Contacted: ____/____/____
 Person Contacted: _____ Phone Number: _____
 - c. Firm Name: _____ Phone Number: _____
 Address: _____ Date Contacted: ____/____/____
 Person Contacted: _____ Phone Number: _____
 - d. Firm Name: _____ Phone Number: _____
 Address: _____ Date Contacted: ____/____/____
 Person Contacted: _____ Phone Number: _____

CERTIFICATION: I, the undersigned Officer of the Contractor, do certify that I have contacted the firms listed in Section 9, and was informed that said firms do not produce/manufacture the steel product listed on Line 7 with U.S. Steel in sufficient quantities to complete the above-referenced project. I understand that this document is subject to the provisions of the Unsworn Falsification to Authorities Act (18 P.S. Sec. 4904) and the Steel Products Procurement Act, which provide penalties including, but not limited to, debarment from bidding on any Commonwealth of Pennsylvania public works project for a period of five years. The Commonwealth reserves the right to pursue any action deemed necessary to protect the Commonwealth's interest and ensure compliance with the laws of the Commonwealth.

WITNESS:

Name: _____
 Secretary or Treasurer

Name: _____
 President or Vice President

(SEAL)

(Rev. 6/1/99)

PENNSYLVANIA STATUTES
TITLE 73. TRADE AND COMMERCE
CHAPTER 25. STEEL PRODUCTS PROCUREMENT ACT
(2013)

§ 1881. Short title

This act shall be known and may be cited as the "Steel Products Procurement Act."

§ 1882. Police power

This act shall be deemed to be an exercise of the police powers of the Commonwealth for the protection of the health, safety and general welfare of the people of the Commonwealth.

§ 1883. Public policy

It is hereby determined by the General Assembly of Pennsylvania and declared as a matter of legislative findings that:

(1) The Commonwealth of Pennsylvania is one of the leading states in the United States in the production of steel.

(2) The production of steel products constitutes a major industry of the Commonwealth and, as such, provides the jobs and family incomes of hundreds of thousands of the people of this Commonwealth and, in turn, millions of persons in the United States.

(3) The taxes paid to the Commonwealth and its political subdivisions by employers and employees engaged in the production and sale of steel products are one of the largest single sources of public revenues in this Commonwealth.

(4) It has, for many years, been the policy of the Commonwealth to aid and support the development and expansion of industry in this Commonwealth in order to foster the economic well-being of the Commonwealth and its people.

(5) The economy and general welfare of the Commonwealth and its people, as well as the economy, general welfare and national security of the United States, are inseparably related to the preservation and development of the steel industry in the Commonwealth and in the other states of the United States.

The Pennsylvania General Assembly therefore declares it to be the policy of the Commonwealth of Pennsylvania that all public officers and agencies should, at all times, aid and promote the development of the steel industry of the United States in order to stimulate and improve the economic well-being of the Commonwealth and its people.

§ 1884. Required contract provisions

(a) Every public agency shall require that every contract document for the construction, reconstruction, alteration, repair, improvement or maintenance of public works contain a provision that, if any steel products are to be used or supplied in the performance of the contract, only steel products as herein defined shall be used or supplied in the performance of the contract or any subcontracts thereunder.

(b) This section shall not apply in any case:

(1) where the head of the public agency, in writing, determines that steel products as herein defined are not produced in the United States in sufficient quantities to meet the requirements of the contract; or

(2) to items on a list of exempt machinery and equipment steel products, which have been identified by the Department of General Services as not produced in the United States in sufficient quantities in the previous calendar year, and published on the department's publicly accessible Internet website, which contractors, subcontractors, suppliers, bidders, offerors and public agencies can rely upon in preparing bids and contracts. The list of exempt machinery and equipment steel products shall be updated annually on a date selected by the Department of General Services. The Department of General Services may not make changes to the list during the year following publication. Prior to publication on the Internet website, and in each subsequent year, the Department of General Services shall publish the list of exempt machinery and equipment steel products in the Pennsylvania Bulletin and provide for a 30-day public comment period. The Department of General Services shall, through a statement of policy, establish a process for creating the list of exempt machinery and equipment steel products and resolving disputes with respect to items on the list raised during the public comment period prior to the publication of the Internet website. The provisions of 2 Pa.C.S. Ch. 5 Subch. A (relating to practice and procedure of Commonwealth agencies) shall not apply to this section.

§ 1885. Payments under contracts; action to recover unauthorized payments; prohibitions for violations; procedure

(a) No public agency shall authorize, provide for or make any payments to any person under any contract containing the provision required by section 4 unless, when unidentified steel products are supplied under a contract, such person has provided documentation including, but not limited to, invoices, bills of lading, and mill certification that the steel was melted and manufactured in the United States, which establish that such person has fully complied with such provision. If a steel product is identifiable from its face, such person must submit certification which satisfies the public agency that such person has fully complied with the provision required by section 4. Any such payments made to any person by any public agency which should not have been made as a result of this section shall be recoverable directly from the contractor, subcontractor, manufacturer or supplier who did not comply with section 4 by either such public agency or the Attorney General of Pennsylvania.

(b) In addition to the withholding of payments, any person who willfully violates any of the provisions of this act shall be prohibited from submitting any bids to any public agency for any contract for a period of five years from the date of the determination that a violation has occurred. In the event the person who violates the provisions of section 4(a) is a subcontractor, manufacturer or supplier, such person shall be prohibited from performing any work or supplying any materials to a public agency for a period of five years from the date of the determination that a violation has occurred.

(c) Title 2 of the Pennsylvania Consolidated Statutes (relating to administrative law and procedure) applies to decisions by public agencies that a person has violated section 4(a).

§ 1886. Definitions

The following words and phrases when used in this act shall have, unless the context clearly indicates otherwise, the meanings given to them in this section:

"PERSON." Natural persons as well as corporations, partnerships, business units and associations.

"PUBLIC AGENCY."

(1) the Commonwealth and its departments, boards, commissions and agencies;

(2) counties, cities, boroughs, townships, school districts, and any other governmental unit or district;

(3) the State Public School Building Authority, the State Highway and Bridge Authority, and any other authority now in existence or hereafter created or organized by the Commonwealth;

(4) all municipal or school or other authorities now in existence or hereafter created or organized by any county, city, borough, township or school district or combination thereof; and

(5) any and all other public bodies, authorities, officers, agencies or instrumentalities, whether exercising a governmental or proprietary function.

"PUBLIC WORKS." Any structure, building, highway, waterway, street, bridge, transit system, airport or other betterment, work or improvement whether of a permanent or temporary nature and whether for governmental or proprietary use. The term includes, but is not limited to, any railway, street railway, subway, elevated and monorail passenger or passenger and rail rolling stock, self-propelled cars, gallery cars, locomotives, passenger buses, wires, poles and equipment for electrification of a transit system, rails, tracks, roadbeds, guideways, elevated structures, buildings, stations, terminals, docks, shelters and repairs to any of the foregoing.

"STEEL PRODUCTS." Products rolled, formed, shaped, drawn, extruded, forged, cast, fabricated or otherwise similarly processed, or processed by a combination of two or more of such operations, from steel made in the United States by the open hearth, basic oxygen, electric furnace, Bessemer or other steel making process and shall include cast iron products and shall include machinery and equipment listed in United States Department of Commerce Standard Industrial Classification 25 (furniture and fixture), 35 (machinery, except electrical) and 37 (transportation equipment) and made of, fabricated from, or containing steel components. If a product contains both foreign and United States steel, such product shall be determined to be a United States steel product only if at least 75% of the cost of the articles, materials and supplies have been mined, produced or manufactured, as the case may be, in the United States. Transportation equipment shall be determined to be a United States steel product if it complies with section 165 of Public Law 97-424 (96 Stat. 2136).

"UNITED STATES." The United States of America and includes all territory, continental or insular, subject to the jurisdiction of the United States.

§ 1887. Purpose of act; liberal construction

This act is intended as remedial legislation designed to promote the general welfare and stimulate the economy of the Commonwealth and its people and each and every provision hereof is intended to receive a liberal construction such as will best effectuate that purpose and no provision is intended to receive a strict or limited construction.

ATTACHMENT F

TRADE PRACTICES ACT

In accordance with the Trade Practices Act of July 23, 1968, P.L. 686 (71 P.S. § 773.101 et seq.), the Grantee cannot and shall not use or permit to be used in the work any aluminum or steel products made in a foreign country which is listed below as a foreign country which discriminates against aluminum or steel products manufactured in Pennsylvania. The countries of Argentina, Brazil, South Korea, and Spain have been found to discriminate against certain products manufactured in Pennsylvania. Therefore, the purchase or use of those countries' products, as listed below, is not permitted:

- **Argentina:** carbon steel wire rod and cold-rolled carbon steel sheet.
- **Brazil:** welded carbon steel pipes and tubes; carbon steel wire rod; tool steel; certain stainless steel products, including hot-rolled stainless steel bar; stainless steel wire rod and cold-formed stainless steel bar; pre-stressed concrete steel wire strand; hot-rolled carbon steel plate in coil; hot-rolled carbon steel sheet; and cold-rolled carbon steel sheet.
- **South Korea:** welded carbon steel pipes and tubes; hot-rolled carbon steel plate; hot-rolled carbon steel sheet; and galvanized steel sheet.
- **Spain:** certain stainless steel products, including stainless steel wire rod, hot-rolled stainless steel bars; and cold-formed stainless steel bars; pre-stressed concrete steel wire strand; and certain steel products, including hot-rolled steel plate, cold-rolled carbon steel plate, carbon steel structural shapes; galvanized carbon steel sheet, hot-rolled carbon steel bars, and cold-formed carbon steel bars.

Penalties for violation of the above paragraphs may be found in the Trade Practices Act, which penalties include becoming ineligible for public works contracts for a period of three years.

This provision in no way relieves the Grantee of responsibility to comply with those provisions which prohibit the use of foreign-made steel and cast iron products.

GENERAL REQUIREMENTS

SECTION 011000

SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Access to site.
 - 4. Work restrictions.
 - 5. Specification and drawing conventions.

- B. Related Requirements:

- 1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
 - 2. Section 000100 "Scope of Work" for Site Access Information

1.3 PROJECT INFORMATION

- A. **Project Identification:** Schuylkill River Trail Extension – 56th Street to 61st Street

- 1. **Project Location:** West bank of Schuylkill River, Philadelphia, PA

- B. **Owner:**

Schuylkill River Development Company (SRDC), 2401 Walnut Street, suite 603, Philadelphia, PA, 19103

- 1. **Owner's Representative:** Joseph R. Synchron, PE, PLS, President & CEO

- C. **Design Engineer:** Pennoni, 1900 Market Street, Suite 300, Philadelphia, PA 19103; Marc Morfe, RLA Project Manager, 215-222-3000.

- D. **Design Engineer's Consultants:** The Design Engineer has retained the following design professionals who have prepared designated portions of the Contract Documents:

SCHUYLKILL RIVER TRAIL EXTENSION – 56th Street to 61st Street

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SUMMARY

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1. **Landscape Architect:** Ground Reconsidered, LRSLA Studio, Inc., 230 S. Broad Street, Suite 604, Philadelphia, PA, 19102; Julie A. Bush, ASLA

E. Construction Manager: To Be Determined

Construction Manager may be engaged for this Project to serve as an advisor to Owner and to provide assistance in administering the Contract for Construction between Owner and Contractor, according to a separate contract between Owner and Construction Manager.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. This project involves the construction of an approximately 1,900-foot long trail segment along the east bank of the Schuylkill from South Street to the vicinity of Christian Street. The north end of this trail segment will tie in to the southern end of the Schuylkill Banks Boardwalk, which was completed in October 2014, and the existing stair tower to the South Street Bridge. The site area within the project property is approximately 146,273 square feet (3.5 Acres). The anticipated limit of construction consists of 121,476 square feet (2.79 Acres).

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.5 ACCESS TO SITE

A. General: Refer to Section 000100 – Scope of Work, for information about site access.

1.6 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

C. Controlled Substances: Use of tobacco products and other controlled substances on project site is not permitted.

1.7 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012100

ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
 - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances.
 - 2. Unit-cost allowances.
 - 3. Quantity allowances.
 - 4. Contingency allowances.
 - 5. Testing and inspecting allowances.
- C. Related Requirements:
 - 1. Section 012200 "Unit Prices" for procedures for using unit prices.
 - 2. Section 014000 "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.

1.3 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Design Engineer of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At Design Engineer's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Design Engineer from the designated supplier.

1.4 ACTION SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 COORDINATION

- A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.7 LUMP-SUM AND QUANTITY ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Design Engineer under allowance and shall include taxes, freight and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Design Engineer under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - 1. If requested by Design Engineer, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.8 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed by Design Engineer for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
- B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.

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- C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.
- D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.9 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
 - 3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
 - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
 - 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

- A. Allowance No.1: Lump-Sum Allowance: Include the sum indicated on the bid form for the installation of signs as identified in Special Provision for Signage. This allowance includes material cost, receiving, handling, and installation, and Contractor overhead and profit.

END OF SECTION 012100

SECTION 012200

UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Requirements:
 - 1. Section 000100 "Scope of Work" for procedures for submitting and handling Change Orders.
 - 2. Section 014000 "Quality Requirements" for general testing and inspecting requirements.

1.3 DEFINITIONS

- A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

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UNIT PRICES

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PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 DESCRIPTION OF BID ITEMS

A. Refer to Bid Proposal Form, section 000300

1. Item 1, Mobilization: includes preparatory work and operations necessary for the movement of personnel, equipment, supplies, and incidentals to the project site; for premiums on bond and insurance for the work; and for other operations performed or costs incurred before the beginning of work. Payment: Lump sum.
2. Item 2, Contractor Temporary Facilities: Installation and mobilization of temporary office facilities and project required equipment according to Section 015000 “Temporary Facilities and Controls”. Payment: Lump sum.
3. Item 3, Survey Control and Construction Layout: Survey and Layout as described in Section 017300 “Execution”. Payment: Lump sum.
4. Item 4, Erosion and Sediment Control: Installation, Maintenance and Removal of Erosion and Sedimentation Controls. Payment: Lump sum.
5. Item 5, Selective Demolition: Removal and appropriate disposal of items noted on the plans for removal and demolition. Payment: Lump sum.
6. Item 6, Clearing and Grubbing: The clearing, grubbing and removal of invasive species, trees and debris as required, according to Section 311000 “Earthwork”. Payment: Lump sum.
7. Item 7, Earthwork and Grading: Excavation and re-grading of the site, including preparation of rough grades, and establishment of finished grades, according to Section 311000 “Earthwork”. Lump Sum bid shall include transporting, stockpiling and maintenance of all material to be reused; protection of existing infrastructure; unclassified excavation; preparation of the subgrade, compaction, proofrolling; protection of the subgrade until installation of the stone subbase; and all appurtenant labor, work, supervision, tools, equipment, materials and all other items incidental thereto.
 - a) Payment: lump sum. (Bid quantity for information only.)
 - b) If the actual quantity of any item is more or less than what is stated in the bid, the Contractor shall not be entitled to compensation over or above nor less than the lump sum price bid for the project. If the base contract scope of work is decreased, the Contractor shall have no claim for damages on the basis of loss of anticipated profits.
 - c) The Contractor shall make adjustments to his Unit Price and Lump Sum prices bid to compensate for any work and/or materials that he believes is necessary beyond the minimum limits and quantities noted on the contract drawings and in Exhibit “A” (Proposal).
8. Item 8, Imported Fill. Furnish and install imported fill as needed to achieve required finished grades, according to Section 311000 “Earthwork”. Payment: cubic yard.

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9. Item 9, Asphalt Paving: Furnish and install asphalt paving for trail and associated areas, in accordance with sections 321123 "Aggregate Materials" and 321216 "Asphalt Paving." Includes preparation of the subbase; removal of all unsuitable surface material; furnishing and installation of the minimum compacted thickness of each material; compaction; protection of the new paving; restoration of all disturbed areas adjacent to the trail; cleanup; shop drawings; and all other appurtenant labor, work, supervision, tools, equipment, materials and all other items incidental thereto. Payment: Square Yard.
10. Item 10, Pavement Markings: Furnish and install trail striping as specified in Section 321723 "Pavement Markings". Payment: each set of markings (center line and 2 arrows) as indicated on the plans.
11. Item 11, Concrete Retaining wall at Fishing Pier: Furnish and install complete in place the retaining wall along the back edge of the fishing pier, including excavation, compaction, formwork, all materials; cleanup; shop drawings; and all other appurtenant labor, work, supervision, tools, equipment, materials and all other items incidental thereto. Payment: linear feet.
12. Item 12, Concrete Seat Wall at Fishing Pier: Furnish and install complete in place the concrete sitting wall along the back edge of the fishing pier, including excavation, compaction, formwork, all materials, decorative finishing in accordance with section 321316 "Decorative Concrete Finishes"; cleanup; shop drawings; and all other appurtenant labor, work, supervision, tools, equipment, materials and all other items incidental thereto. Payment: linear feet.
13. Item 13, Concrete Curb: Complete in place. Payment: Linear feet.
14. Item 14, Gravity Block Retaining Wall. Furnish and install complete in place the gravity block retaining wall, in accordance with section 323215 "Precast Modular Gravity Block Retaining Wall." Payment: square feet of exposed wall face.
15. Item 15, Seat Boulders. Salvage existing boulders on site as directed by the Engineer, and place them as shown on plans. Includes transportation and protection. Payment: Each.
16. Item 16, 15" RCP: Includes furnishing and installation of all pipe, joint materials and accessories; and all appurtenant labor, work, supervision, tools, equipment, materials and all other items incidental thereto. Payment: linear feet.
17. Item 17, 18" RCP: Includes furnishing and installation of all pipe, joint materials and accessories; and all appurtenant labor, work, supervision, tools, equipment, materials and all other items incidental thereto. Payment: linear feet.
18. Item 18, Flared End Section: Includes furnishing and installation of precast concrete end sections. Payment: each.
19. Item 19, Outlet Structures: Includes furnishing and installation of stormwater outlet structure. Payment: each.
20. Item 20: Inlet. Furnish and install stormwater drainage inlet, in accordance with section 334100 "Stormwater Utility Drainage Piping." Payment: Each.
21. Item 21, Wood Post and Rail Fence: Furnish and install complete in place wood post and rail fence, including gate(s) as shown on plans. Payment: linear feet, including gate(s).
22. Item 22, 4' Chain Link Fencing: Furnish and install complete in place 4' high chain link fencing, including gate(s) as shown on plans. Payment: linear feet, including gate(s).

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23. Item 23, 6' Chain Link Fencing: Furnish and install complete in place 6' high chain link fencing, including gate(s) as shown on plans. Payment: linear feet, including gate(s).
24. Item 24, Metal Railing at Gravity Block Wall: Furnish and install complete in place railing on top of gravity block wall, including all hardware and appurtenances. Payment: linear feet.
25. Item 25, Pedestrian Light Pole and Fixture: Furnish and install pedestrian pole and fixture as indicated on plans. Complete pole and assembly includes one (1) pole, one (1) fixture, and all wiring and associated elements necessary to make final electrical connections at the pole base. Payment: Each assembly.
26. Item 26, Pedestrian Light Pole Foundation: Furnish and install concrete pole foundation. Payment: Each.
27. Item 27, Pedestrian Pole Conduit and Wiring: Furnish and install all conduit and wiring necessary to provide a complete and fully functional pedestrian lighting system. Includes trench excavation and backfill, wiring, conduit, and connections. Conduit elbows, fittings, and appurtenances are incidental. Payment: linear feet.
28. Item 28, Handhole box: Furnish and install electrical handhole box. Payment: each.
29. Item 29, Electrical Courtesy Outlets: Furnish and install electrical Courtesy Outlets as shown on plans. Includes all wiring, fittings, and appurtenances. Payment: each.
30. Item 30, Lighting Controls and Connections: Includes all lighting controls and other work associated with electrical connection to the existing panel box. Payment: lump sum.
31. Item 31, LED Lighting at Fishing Pier: Furnish and install complete functional LED lighting system at the fishing pier. Includes LED fixtures, controllers, electrical transformers, junction boxes, conduit, wiring, attachments, and appurtenances. Payment: lump sum.
32. Item 32, LED Lighting at Overlook: Furnish and install complete functional LED lighting system at the overlook structure. Includes LED fixtures, controllers, electrical transformers, junction boxes, conduit, wiring, attachments, and appurtenances. Payment: lump sum.
33. Item 33, Planting Soil A: Furnish and install planting soil in accordance with section 329100 "Planting Soil." Includes soil, transportation, spreading, fine grading to achieve finish grades, fertilizers, mulch, and amendments. Payment: cubic yard.
34. Item 34, Planting Soil B: Furnish and install planting soil in accordance with section 329100 "Planting Soil." Includes soil, transportation, spreading, fine grading to achieve finish grades, fertilizers, mulch, and amendments. Payment: cubic yard.
35. Item 35, Planting Soil C: Furnish and install planting soil in accordance with section 329100 "Planting Soil." Includes soil, transportation, spreading, fine grading to achieve finish grades, fertilizers, mulch, and amendments. Payment: cubic yard.
36. Item 36, Lawn Seed: Furnish and install lawn seed in accordance with section 329200 "Turf and grasses." Payment: square yard.
37. Item 37, Meadow Seed: Furnish and install meadow seed in accordance with section 329250 "Meadow." Payment: square yard.
38. Item 38, Perennial and Grasses - Plugs: Furnish and install perennial plants and plugs in accordance with section 329300 "Plants." Includes mulch, fertilizers, and soil

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amendments. Payment: Each.

39. Item 39, Bulbs: Furnish and install perennial plants and plugs in accordance with section 329300 "Plants." Includes mulch, fertilizers, and soil amendments. Payment: Each.
40. Item 40, Canopy Trees: Furnish and install trees in accordance with section 329300 "Plants." Includes mulch, fertilizers, and soil amendments. Payment: Each.
41. Item 41, Ornamental Trees: Furnish and install trees in accordance with section 329300 "Plants." Includes mulch, fertilizers, and soil amendments. Payment: Each.
42. Item 42, Evergreen Trees: Furnish and install trees in accordance with section 329300 "Plants." Includes mulch, fertilizers, and soil amendments. Payment: Each.
43. Item 43, Erosion Control Blanket: Furnish and install erosion control blanket in accordance with section 329200 "Turf and grasses." Payment: square yard.
44. Item 44, Trash Receptacles: Furnish and install Trash Receptacles in accordance with section 129300, "Site Furnishings." Includes installation of concrete base pad. Payment: Each.
45. Item 45, Granite Bench Relocation: Furnish and install relocated granite benches. Includes transportation from off-site location on MLK Drive. Approximate weight 3000 lbs. Payment: Each.
46. Item 46, Bollards with cover: Furnish and install bollard and cover in accordance with section 129300, "Site Furnishings." Payment: Each assembled unit.
47. Item 47, Overlook Structure: Furnish and install complete in place the Overlook Structure as shown on plans. Includes excavation; footings and piles; concrete abutments; complete structure including railings; restoration of all disturbed areas adjacent to the trail; cleanup; shop drawings; and all other appurtenant labor, work, supervision, tools, equipment, materials and all other items incidental thereto. Payment: Lump Sum.
48. Item 48, Fishing Pier: Furnish and install complete in place the Fishing Pier as shown on plans. Includes excavation; footings and piles; concrete abutments; complete structure including railings; restoration of all disturbed areas adjacent to the trail; cleanup; shop drawings; and all other appurtenant labor, work, supervision, tools, equipment, materials and all other items incidental thereto. Payment: Lump Sum.
49. Item 49, Schuylkill Banks Logo Signs: Pre-determined allowance for sign fabricator to furnish and install signs, in accordance with section 012100 "Allowances," and "Special Provision for Signage."
50. Item 50, Schuylkill Banks Interpretive Sign: Pre-determined allowance for sign fabricator to furnish and install sign, in accordance with section 012100 "Allowances," and "Special Provision for Signage."
51. Item 51, RTG Fence Signss: Pre-determined allowance for sign fabricator to furnish and install sign, in accordance with section 012100 "Allowances," and "Special Provision for Signage."

END OF SECTION 012200

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SECTION 012500
SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for products selected under an allowance.
 - 2. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI Form 13.1A facsimile of form provided in Project Manual.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be

- provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - d. Samples, where applicable or requested.
 - e. Certificates and qualification data, where applicable or requested.
 - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - i. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Owner's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Owner will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Owner does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. Conditions: Owner will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
- a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Not allowed unless otherwise indicated.
- C. Substitutions for Convenience: Owner will consider requests for substitution if received within 60 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Owner.
1. Conditions: Owner will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
- a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Substitution request is fully documented and properly submitted.
 - e. Requested substitution will not adversely affect Contractor's construction schedule.
 - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - g. Requested substitution is compatible with other portions of the Work.

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- h. Requested substitution has been coordinated with other portions of the Work.
- i. Requested substitution provides specified warranty.
- j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 013100

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. Requests for Information (RFIs).
 - 4. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
 - 1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request from Owner, Construction Manager, Design Engineer, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

- 1. Name, address, and telephone number of entity performing subcontract or supplying products.
- 2. Number and title of related Specification Section(s) covered by subcontract.

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3. Drawing number and detail references, as appropriate, covered by subcontract.

- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

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1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
 - b. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - c. Location of pull boxes and junction boxes, dimensioned from column center lines.
2. Review: Design Engineer will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
3. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."

C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
2. File Preparation Format: DWG, Version 2012 operating in Microsoft Windows operating system.
3. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the forms specified.

1. Owner's Rep will return RFIs submitted to Owner's Rep by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Design Engineer and Construction Manager.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.

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10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Design Engineer.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Design Engineer's and Construction Manager's Action: Design Engineer and Construction Manager will review each RFI, determine action required, and respond. Allow seven working days for Design Engineer's response for each RFI. RFIs received by Design Engineer or Construction Manager after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Design Engineer and Construction Manager in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use CSI Log Form 13.2B. Include the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Design Engineer and Construction Manager.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.

6. Date the RFI was submitted.
 7. Date Design Engineer's and Construction Manager's response was received.
- F. On receipt of Design Engineer's and Construction Manager's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Design Engineer and Construction Manager within seven days if Contractor disagrees with response.
1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

- A. General: Scheduled by SRDC (Owner) as needed. Meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, Construction Manager, and Design Engineer, within three days of the meeting.
- B. Preconstruction Conference: Construction Manager will schedule and conduct a pre-construction conference before starting construction, at a time convenient to Owner and Design Engineer, but no later than 15 days after execution of the Agreement. Meeting to be held at SRDC office.
1. Conduct the conference to review responsibilities and personnel assignments.
 2. Attendees: Authorized representatives of Owner, Construction Manager, Design Engineer, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Lines of communications.
 - f. Procedures for processing field decisions and Change Orders.
 - g. Procedures for RFIs.
 - h. Procedures for testing and inspecting.
 - i. Procedures for processing Applications for Payment.
 - j. Distribution of the Contract Documents.

- k. Submittal procedures.Preparation of record documents.
 - l. Use of the premises.
 - m. Work restrictions.
 - n. Working hours.
 - o. Owner's occupancy requirements.
 - p. Responsibility for temporary facilities and controls.
 - q. Procedures for moisture and mold control.
 - r. Procedures for disruptions and shutdowns.
 - s. Construction waste management and recycling.
 - t. Parking availability.
 - u. Office, work, and storage areas.
 - v. Equipment deliveries and priorities.
 - w. First aid.
 - x. Security.
 - y. Progress cleaning.
4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

END OF SECTION 013100

SECTION 013200

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Startup construction schedule.
 - 2. Contractor's construction schedule.
 - 3. Construction schedule updating reports.
 - 4. Daily construction reports.
 - 5. Material location reports.
 - 6. Site condition reports.
 - 7. Special reports.
- B. Related Requirements:
 - 1. Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.

- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. Working electronic copy of schedule file, where indicated.
 - 2. PDF electronic file.
 - 3. Two paper copies.
- B. Startup construction schedule.
 - 1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- E. Construction Schedule Updating Reports: Submit with Applications for Payment.
- F. Daily Construction Reports: Submit at weekly intervals.
- G. Material Location Reports: Submit at monthly intervals.

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- H. Site Condition Reports: Submit at time of discovery of differing conditions.
- I. Special Reports: Submit at time of unusual event.
- J. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
 - 1. Review software limitations and content and format for reports.
 - 2. Verify availability of qualified personnel needed to develop and update schedule.
 - 3. Discuss constraints, including phasing work stages area separations and interim milestones.
 - 4. Review delivery dates for Owner-furnished products.
 - 5. Review schedule for work of Owner's separate contracts.
 - 6. Review submittal requirements and procedures.
 - 7. Review time required for review of submittals and resubmittals.
 - 8. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - 9. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
 - 10. Review and finalize list of construction activities to be included in schedule.
 - 11. Review procedures for updating schedule.

1.6 COORDINATION

- A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 - 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - 3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 - 4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 - 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Design Engineer's and Construction Manager's administrative procedures necessary for certification of Substantial Completion.
 - 6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 - 1. Phasing: Arrange list of activities on schedule by phase.
 - 2. Work under More Than One Contract: Include a separate activity for each contract.
 - 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 - 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 - 5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 - 6. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.

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- c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use of premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
- 7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Building flush-out.
 - m. Startup and placement into final use and operation.
- 8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Completion of electrical installation.
 - c. Substantial Completion.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
 - 1. Unresolved issues.
 - 2. Unanswered Requests for Information.
 - 3. Rejected or unreturned submittals.
 - 4. Notations on returned submittals.
 - 5. Pending modifications affecting the Work and Contract Time.
- F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- G. Computer Scheduling Software: Prepare schedules using current version of a program that has

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been developed specifically to manage construction schedules.

1. Use Microsoft Project, for Windows XP operating system.

2.2 STARTUP CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven days of date established for the Notice to Proceed.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice to Proceed. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's construction schedule using a cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.
 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 60 days after date established for the Notice to Proceed.
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Design Engineer's approval of the schedule.
 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
 1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

- a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing.
 - j. Punch list and final completion.
 - k. Activities occurring following final completion.
2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Design Engineer's approval prior to assigning costs to fabrication and delivery activities. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents, and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.
 - a. Each activity cost shall reflect an appropriate value subject to approval by Architect.
 - b. Total cost assigned to activities shall equal the total Contract Sum.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.
- F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
 1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.
 3. Main events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.

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9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
 - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
 - b. Submit value summary printouts one week before each regularly scheduled progress meeting.

2.4 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Work Change Directives received and implemented.

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16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

B. Material Location Reports: At weekly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.
 1. In-House Option: Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
 2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.
- B. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate final completion percentage for each activity.
- C. Distribution: Distribute copies of approved schedule to Design Engineer, Construction Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

SECTION 014000
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Design Engineer, Owner, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.
 - 4. Specific test and inspection requirements are not specified in this Section.
- C. Related Requirements:
 - 1. Section 012100 "Allowances" for testing and inspecting allowances.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Design Engineer.

- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.
 2. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
 3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Design Engineer for a decision before proceeding.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
 - 1. Indicate manufacturer and model number of individual components.
 - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data : For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Owner's Rep. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
 - 1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 - 1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
 - 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
 - 3. Owner-performed tests and inspections indicated in the Contract Documents.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Design Engineer has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.

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6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.9 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:

- a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. When testing is complete, remove test specimens, assemblies, and mockups; do not reuse products on Project.
2. Testing Agency Responsibilities: Submit a payroll written report of each test, inspection, and similar quality-assurance service to Design Engineer, through Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.10 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
 3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with Design Engineer, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Design Engineer, Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.

7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
 1. Distribution: Distribute schedule to Owner, Design Engineer, Construction Manager, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in Statement of Special Inspections attached to this Section, and as follows:
- B. Special Tests and Inspections: Conducted by a qualified special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections and in Statement of Special Inspections attached to this Section, and as follows:
 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Design Engineer, Construction Manager, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Design Engineer through Construction Manager, with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 ACCEPTABLE TESTING AGENCIES

- A. A Licensed Professional or their assigned designee.

3.2 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Design Engineer's and Construction Manager's reference during normal working hours.

3.3 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014200

REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

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

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if

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bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
 - 1. AABC - Associated Air Balance Council; www.aabc.com.
 - 2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
 - 3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
 - 4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
 - 5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
 - 6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
 - 7. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
 - 8. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
 - 9. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
 - 10. AF&PA - American Forest & Paper Association; www.afandpa.org.
 - 11. AGA - American Gas Association; www.aga.org.
 - 12. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
 - 13. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
 - 14. AI - Asphalt Institute; www.asphaltinstitute.org.
 - 15. AIA - American Institute of Architects (The); www.aia.org.
 - 16. AISC - American Institute of Steel Construction; www.aisc.org.
 - 17. AISI - American Iron and Steel Institute; www.steel.org.
 - 18. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
 - 19. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
 - 20. ANSI - American National Standards Institute; www.ansi.org.
 - 21. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
 - 22. APA - APA - The Engineered Wood Association; www.apawood.org.
 - 23. APA - Architectural Precast Association; www.archprecast.org.

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24. API - American Petroleum Institute; www.api.org.
25. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
26. ARI - American Refrigeration Institute; (See AHRI).
27. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
28. ASCE - American Society of Civil Engineers; www.asce.org.
29. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
30. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
31. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
32. ASSE - American Society of Safety Engineers (The); www.asse.org.
33. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
34. ASTM - ASTM International; (American Society for Testing and Materials International); www.astm.org.
35. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
36. AWEA - American Wind Energy Association; www.awea.org.
37. AWI - Architectural Woodwork Institute; www.awinet.org.
38. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
39. AWPAA - American Wood Protection Association; (Formerly: American Wood-Preservers' Association); www.awpa.com.
40. AWS - American Welding Society; www.aws.org.
41. AWWA - American Water Works Association; www.awwa.org.
42. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
43. BIA - Brick Industry Association (The); www.gobrick.com.
44. BICSI - BICSI, Inc.; www.bicsi.org.
45. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.com.
46. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
47. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bwfbadminton.org.
48. CDA - Copper Development Association; www.copper.org.
49. CEA - Canadian Electricity Association; www.electricity.ca.
50. CEA - Consumer Electronics Association; www.ce.org.
51. CFFA - Chemical Fabrics & Film Association, Inc.; www.chemicalfabricsandfilm.com.
52. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
53. CGA - Compressed Gas Association; www.cganet.com.
54. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
55. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
56. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
57. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
58. CPA - Composite Panel Association; www.pbmdf.com.
59. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
60. CRRC - Cool Roof Rating Council; www.coolroofs.org.
61. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
62. CSA - Canadian Standards Association; www.csa.ca.
63. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
64. CSI - Construction Specifications Institute (The); www.csinet.org.

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65. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
66. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
67. CWC - Composite Wood Council; (See CPA).
68. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
69. DHI - Door and Hardware Institute; www.dhi.org.
70. ECA - Electronic Components Association; (See ECIA).
71. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
72. ECIA ? Electronic Components Industry Association; www.eciaonline.org
73. EIA - Electronic Industries Alliance; (See TIA).
74. EIMA - EIFS Industry Members Association; www.eima.com.
75. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
76. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
77. ESTA - Entertainment Services and Technology Association; (See PLASA).
78. EVO - Efficiency Valuation Organization; www.evo-world.org.
79. FIBA - F?d?ration Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
80. FIVB - F?d?ration Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
81. FM Approvals - FM Approvals LLC; www.fmglobal.com.
82. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
83. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridarroof.com.
84. FSA - Fluid Sealing Association; www.fluidsealing.com.
85. FSC - Forest Stewardship Council U.S.; www.fscus.org.
86. GA - Gypsum Association; www.gypsum.org.
87. GANA - Glass Association of North America; www.glasswebsite.com.
88. GS - Green Seal; www.greenseal.org.
89. HI - Hydraulic Institute; www.pumps.org.
90. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
91. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
92. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
93. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
94. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
95. IAS - International Accreditation Service; www.iasonline.org.
96. IAS - International Approval Services; (See CSA).
97. ICBO - International Conference of Building Officials; (See ICC).
98. ICC - International Code Council; www.iccsafe.org.
99. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
100. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
101. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
102. IEC - International Electrotechnical Commission; www.iec.ch.
103. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
104. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
105. IESNA - Illuminating Engineering Society of North America; (See IES).
106. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
107. IGMMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
108. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
109. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.

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110. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
111. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
112. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
113. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
114. ISO - International Organization for Standardization; www.iso.org.
115. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
116. ITU - International Telecommunication Union; www.itu.int/home.
117. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
118. LMA - Laminating Materials Association; (See CPA).
119. LPI - Lightning Protection Institute; www.lightning.org.
120. MBMA - Metal Building Manufacturers Association; www.mbma.com.
121. MCA - Metal Construction Association; www.metalconstruction.org.
122. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
123. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
124. MHIA - Material Handling Industry of America; www.mhia.org.
125. MIA - Marble Institute of America; www.marble-institute.com.
126. MMPA - Moulding & Millwork Producers Association; (Formerly: Wood Moulding & Millwork Producers Association); www.wmmpa.com.
127. MPI - Master Painters Institute; www.paintinfo.com.
128. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
129. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
130. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
131. NADCA - National Air Duct Cleaners Association; www.nadca.com.
132. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
133. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
134. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
135. NCMA - National Concrete Masonry Association; www.ncma.org.
136. NEBB - National Environmental Balancing Bureau; www.nebb.org.
137. NECA - National Electrical Contractors Association; www.necanet.org.
138. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
139. NEMA - National Electrical Manufacturers Association; www.nema.org.
140. NETA - InterNational Electrical Testing Association; www.netaworld.org.
141. NFHS - National Federation of State High School Associations; www.nfhs.org.
142. NFPA - NFPA; (National Fire Protection Association); www.nfpa.org.
143. NFPA - NFPA International; (See NFPA).
144. NFRC - National Fenestration Rating Council; www.nfrc.org.
145. NHLA - National Hardwood Lumber Association; www.nhla.com.
146. NLGA - National Lumber Grades Authority; www.nlga.org.
147. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
148. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
149. NRCA - National Roofing Contractors Association; www.nrca.net.
150. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
151. NSF - NSF International; (National Sanitation Foundation International); www.nsf.org.
152. NSPE - National Society of Professional Engineers; www.nspe.org.

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153. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
154. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
155. NWFA - National Wood Flooring Association; www.nwfa.org.
156. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
157. PDI - Plumbing & Drainage Institute; www.pdionline.org.
158. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
159. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
160. RFCI - Resilient Floor Covering Institute; www.rfci.com.
161. RIS - Redwood Inspection Service; www.redwoodinspection.com.
162. SAE - SAE International; (Society of Automotive Engineers); www.sae.org.
163. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
164. SDI - Steel Deck Institute; www.sdi.org.
165. SDI - Steel Door Institute; www.steeldoor.org.
166. SEFA - Scientific Equipment and Furniture Association; www.sefalabs.com.
167. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
168. SIA - Security Industry Association; www.siaonline.org.
169. SJI - Steel Joist Institute; www.steeljoist.org.
170. SMA - Screen Manufacturers Association; www.smainfo.org.
171. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
172. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
173. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
174. SPIB - Southern Pine Inspection Bureau; www.spib.org.
175. SPRI - Single Ply Roofing Industry; www.spri.org.
176. SRCC - Solar Rating and Certification Corporation; www.solar-rating.org.
177. SSINA - Specialty Steel Industry of North America; www.ssina.com.
178. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
179. STI - Steel Tank Institute; www.steeltank.com.
180. SWI - Steel Window Institute; www.steelwindows.com.
181. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
182. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
183. TCNA - Tile Council of North America, Inc.; (Formerly: Tile Council of America); www.tileusa.com.
184. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
185. TIA - Telecommunications Industry Association; (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
186. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
187. TMS - The Masonry Society; www.masonrysociety.org.
188. TPI - Truss Plate Institute; www.tpinst.org.
189. TPI - Turfgrass Producers International; www.turfgrasssod.org.
190. TRI - Tile Roofing Institute; (Formerly: National Tile Roofing Manufacturing Association); www.tilerroofing.org.
191. UBC - Uniform Building Code; (See ICC).
192. UL - Underwriters Laboratories Inc.; www.ul.com.
193. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
194. USAV - USA Volleyball; www.usavolleyball.org.

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195. USGBC - U.S. Green Building Council; www.usgbc.org.
196. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
197. WASTEC - Waste Equipment Technology Association; www.wastec.org.
198. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
199. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
200. WDMA - Window & Door Manufacturers Association; www.wdma.com.
201. WI - Woodwork Institute; (Formerly: WIC - Woodwork Institute of California); www.wicnet.org.
202. WMMPA - Wood Moulding & Millwork Producers Association; (See MMPA).
203. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
204. WPA - Western Wood Products Association; www.wppa.org.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut für Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up-to-date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; <http://dodssp.daps.dla.mil>.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; <http://eetd.lbl.gov>.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeia; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

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E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
2. DOD - Department of Defense; Military Specifications and Standards; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.
 - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic Appliance and Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas Forest Service; Forest Resource Development and Sustainable Forestry; <http://txforestservation.tamu.edu>.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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SECTION 014500

POLLUTION PREVENTION AND ENVIRONMENTAL REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section provides for specific and general pollution prevention actions by the Contractor during the performance of the work. It also identifies general environmental requirements applicable for the work.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Schuylkill River Development Corporation, Supplemental Provisions to Standard Contract Requirements, Special Provisions and Division 1 Specification Sections, and PADEP and USEPA standards apply to this Section.
- B. The Erosion and Sedimentation (E&S) Control Plan Narrative and Plan as approved by the Philadelphia Water Department (PWD) are a material part of this contract and are included by reference. The Contractor shall base his/her bid on the E&S Control Plans in the bid package.
- C. Commonwealth of Pennsylvania Department of Environmental Protection (PADEP) Erosion and Sediment Pollution Control Manual, April 2000.
- D. 2014 Urban Engineers, Inc. Soil and Waste Management Plan for Schuylkill River Trail Extension – South Street to Christian Street.

1.3 QUALITY ASSURANCE

- A. The Contractor is responsible for quality and control, and meeting requirements of the related documents. The Contractor is also responsible for the payment of any fines or penalties that may be imposed by regulatory agencies as a result of environmental non-compliance resulting from the Contractor's work or failure to comply with the contract documents.

1.4 SUBMITTALS

- A. Materials Source: Submit name of materials supplier.
- B. Product Data: Submit data on products.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Provide erosion and sediment control measures as specified on the approved Erosion and Sedimentation Control Plans and Details.

PART 3 - EXECUTION

3.1 The Contractor will observe the following general procedures, during the contract life:

- A. The Owner has secured the required PWD Stormwater Management Plan Approval, including approval of the Erosion and Sedimentation Control Plans. The Contractor is responsible for fully complying with all approval conditions and regulatory requirements that may be established within approvals/permits. Where permit conditions or approvals refer to actions by the Owner/Permittee, it is clearly understood to be a condition placed upon the Contractor and an action solely required to be performed by the Contractor.
- B. The Contractor is solely responsible for the Preparation, Submission and Securing of Amendments to the acquired approvals, if needed, because of his/her specific means and methods used for the performance of the work.
- C. The Contractor shall conduct operations to comply with the approved Erosion and Sedimentation Control Plan. If the approved plan(s) cannot be followed, the Contractor shall obtain written approval of Alternative Erosion and Sedimentation Controls by the appropriate regulatory agency. At no time shall water containing sediments or pollutants be discharged into drainage ditches, stormwater pipes or watercourses.
- D. In preparing for and setting up the work areas, follow the requirements regarding Borrow, Waste and Staging Areas.
 - 1. Separate water(s) originating outside of the project (Clean Water) or clean surface runoff from those originating within (Dirty Water). Direct dirty water away from project construction areas and into an appropriate erosion and sedimentation control device.
- E. If the Contractor proposes to use, store, process or dispose of chemicals, solvents, or other hazardous wastes (including fuel oils and gasoline), then in accordance with 25 Pa. Code § 101.3, the Contractor shall prepare, implement, and maintain a Preparedness, Prevention, and Contingency (PPC) Plan for all operations (including subcontractor operations) that may discharge into stormwater or site runoff. The PPC Plan must be prepared prior to bringing any hazardous materials on to the project site. The PPC Plan must be maintained on-site at all times and be implemented prior to the start of construction.
- F. Do not enter ditches or water courses, construct rock crossings, causeways or cofferdams unless authorized by provisions of a Pennsylvania Department of Environmental Protection Water Obstruction and Encroachment Permit.
- G. Control grading areas by placing erosion and sedimentation control devices in advance of performing earth disturbance activities. Do not place stabilization devices “after-the- fact” or as earth disturbance activity(s) progress.
- H. If and when dewatering of the site is required, control the dewatering operation to limit impacts on adjacent non-work areas and control the discharge from the pumping operation outlet(s). Each groundwater discharge outlet and pumped water outlet protection control is to have a properly sized RipRap Apron Outlet Protection and other appropriate erosion and sedimentation controls.

- I. Seed or stabilize all disturbed areas, ditches and outlet channel banks immediately upon completion of both rough and final grading. All disturbed areas shall be stabilized by seeding and mulching them on a weekly basis unless other coverings are shown or area has obtained 80% growth. As an alternative the contract may cover disturbed areas with 4 inches of a non-erodible aggregate. Areas shall not be left bare.
 - J. If excavated material is to be stockpiled, each stockpile is to be surrounded by filter fabric fence or other appropriate device to control the migration of sediments and include a rock construction entrance. If stockpiled for more than twenty (20) days, take additional stabilization measures (such as temporary seeding) to minimize erosion of the stockpile slopes and fugitive dust.
 - K. The Contractor shall be responsible for the daily maintenance and/or replacement of erosion and sedimentation control devices.
 - L. The Contractor shall inspect all erosion and sedimentation control devices weekly, before any anticipated precipitation event, and after all precipitation events. The Contractor shall provide a description of inspection procedures and schedules.
 - M. The Contractor shall clearly identify the contractor(s) or subcontractor(s) responsible for implementation of each pollution control measure.
 - N. The Contractor shall be solely responsible for the coordination of his work and the work of his subcontractors, with other site personnel, and is solely responsible for the protection of persons having access to the site. The Contractor shall inform the Owner and other contractors/personnel of any hazards that may exist on the site or be encountered during performance of the work. The Contractor shall also implement a Hazard Communication Program, complying with OSHA standards, and provide the CCD and other contractors/personnel with copies of Safety Data Sheets (SDS) for all products brought to the site. The Contractor must comply with the supplemental provision regarding approvals for use of Environmentally Sensitive Materials.
 - O. The Contractor is hereby designated as the project's Safety Compliance Manager and shall be solely responsible for providing all OSHA required site training and for the monitoring of the work site impacted by his or her operations including sub-contractors and vendors.
- 3.2 Alternate Erosion and Sedimentation Control(s)
- A. The Owner has obtained a PWD Stormwater Management Plan Approval for the project. This approval is issued based upon an approved Erosion and Sedimentation Control Plan Narrative and Drawings/Plans that are herein included by reference as part of the scope of this contract. The plan includes a specific sequencing and staging of operations that must be strictly followed.
 - B. Where the Contractor cannot comply with the provisions in the approved Erosion and Sedimentation Control Plan(s), or must modify the sequencing or staging of the work, the Contractor must comply with the following requirements when submitting an alternate plan to the PWD for accomplishing equal or better temporary and permanent erosion and water pollution control(s):

1. Do not start work until the alternate erosion and sedimentation control plan, amendments/modifications, schedule and operation methods have been approved by the PWD.
2. Apply for any earth disturbance permits or permit amendments not included in the proposal documents that are required because of the nature of the contemplated construction procedures.
3. Prepare and furnish, with the applications, plans and documents that are required by the PWD.
4. Provide simultaneously to Owner a copy of all plans and documents that affect the construction requirements.
5. Provide immediately to Owner any modifications that are made to the plans and documents that are required by the PWD.
6. Obtain approvals of Owner and from the PWD prior to beginning any work. A permit may be required if fill is proposed in a wetland area or near a watercourse, for any earth disturbance activities other than those specifically shown on the plans, or near wildlife habitat including both animal and plant species.
7. If alternate erosion and sedimentation controls require the use of property or areas outside of the designated/approved work area, then the Contractor shall acquire those areas at no cost to the Owner.

3.3 Borrow, Waste and Staging Areas

- A. In the process of locating borrow, waste, and staging areas, including access and haul roads the Contractor must consult with the appropriate state agencies to acquire available information on the presence of cultural resources, hazardous waste sites, wetlands, sensitive environmental features, on-site utilities and the applicable regulatory requirements for using such areas.
- B. When cultural resources, hazardous waste sites, wetlands, sensitive environmental features, or on-site utilities will be affected by such staging areas, the Contractor shall conduct the engineering, environmental analysis, subsurface investigations and prepare the necessary documents and permit(s) applications while consulting with the Owner. All necessary environmental approvals and/or permits shall be obtained by the Contractor prior to start of work in areas of affected features. Two (2) copies of each approval and permit shall be submitted to the Owner.

3.4 Subsurface and Ground Water Conditions

- A. The Contractor is solely responsible for managing his/her activities (and the activities of his/her subcontractors/vendors) so as to provide full compliance with all federal and state health and safety standards. Appropriate personnel protective procedures and equipment, including those necessary to protect worker health/safety and comply with OSHA and railroad regulations, must be provided by the Contractor to all site personnel, including the Owner and Regulatory Department Representatives.
- B. The Contractor shall prepare a Site Specific Health and Safety Plan covering all work conducted at the site. This safety plan shall be available on site for review by regulatory department personnel.
- C. The Contractor is also solely responsible for determining the disposal method for any municipal, demolition or residual wastes that may be encountered or generated during the

project. Such wastes must be disposed of in accordance with all local, state and federal standards. Disposal of such wastes is incidental to the work and shall be performed at no additional cost to the Owner.

- D. If subsurface material(s) or ground water contamination is identified, or other waste material(s) are found, the Contractor shall implement all appropriate actions to contain the contamination/wastes and to avoid the cross-contamination of the site and its surrounding areas. The Contractor shall then notify the Owner and request direction before proceeding with the work.

3.5 Approvals for use of Environmentally Sensitive Materials

- A. The Contractor and its sub-contractors shall provide a Hazardous Waste Management Plan to the Owner for review and approval prior to commencement of any action. If environmentally sensitive materials or substances are to be utilized by or on behalf of the Contractor, the Contractor shall provide copies of Safety Data Sheets to the Owner and other contractors/personnel on the site. If required by federal, state or local law, apply for and obtain on behalf of the Owner, a temporary Resource Conservation and Recovery Act (RCRA) generator identification number and RCRA hazardous waste permit or its Pennsylvania equivalent, which permits shall be limited to generation and transportation. The Contractor shall not, under any circumstances, allow any hazardous wastes to remain on or about the premises for any period in excess of ninety (90) days from the date of initial finding. Any violation of these requirements shall be deemed a material breach of this contract.

3.6 Cleaning of Construction Equipment and Cement Truck Wastes

- A. The Contractor shall not allow cleaning of construction equipment, subcontractor or vendor equipment, worker vehicles, and/or the cleaning of cement truck wastes on any property at the project site without the prior written approval of the Owner. If approved, such activities shall only be allowed at designated locations and the Contractor shall be responsible for providing measures to ensure that wash waters are properly treated prior to discharge. Cement wastes are particularly harmful to wildlife and shall never be discharged into drainage ditches or drainage pipes, waterways, wetland areas or wildlife habitat. The Contractor shall also secure all necessary local and state Permits for the discharge of such wash waters at no cost to the Owner.

3.7 Dust Control

- A. Prepare, submit, and obtain approval of, and implement a Fugitive Dust Control Plan meeting the standards of the City of Philadelphia's Department of Health - Air Management Service Unit.
- B. Employ construction methods and means that will keep flying dust to the minimum. Provide for the laying of water on the project, and on roads, streets, and other areas immediately adjacent to the project limits, wherever traffic, or buildings that are occupied or in use, are affected by such dust caused by hauling or other operations.
- C. Provide for prompt removal from existing pavements of all dirt and other materials that have been spilled, washed, tracked or otherwise deposited thereon by hauling and other operations whenever the accumulation is sufficient to cause the formation of mud, interfere with drainage, damage pavement or create a traffic hazard.

3.8 Rock Construction Entrance

- A. Rock Construction Entrance(s) (tire cleaning pads) shall be constructed as indicated on the approved Erosion and Sedimentation Control Plan Details. The pad shall be in place prior to any excavation or earthmoving operations. In the event that the pad becomes clogged with soil, it shall either be replaced or supplemental stone added. At the completion of construction, the cleaning pad shall be removed and the area restored to its original condition that may include full-depth pavement and/or top soiled and seeded according to the location.

3.9 Dewatering of the Construction Site

- A. Subject to approval by the Philadelphia Water Department's Industrial Waste Unit, the Contractor may discharge pumped stormwater and/or ground water to the local sanitary sewer lines. If the Contractor chooses this as an option, they will be required to apply for a Stormwater Discharge Permit and/or a Groundwater Discharge Permit.
 - 1. Application shall be submitted to: Industrial Waste Unit, 1101 Market Street, 3rd Floor, Philadelphia, PA 19107. Phone: 215-685-6236.
- B. At the start and completion of the work, the Contractor shall inspect all sanitary sewers, drainage and storm pipes (in and around the work site), and submit a report of their finding to the Owner. Upon completion of the work, the Contractor shall flush and power clean all sanitary sewers, drainage and storm water pipes in the area so that they are restored to their original condition.

END OF SECTION 014500

SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.
 - 2. Section 312319 "Dewatering" for disposal of ground water at Project site.
 - 3. Section 321216 "Asphalt Paving" for construction and maintenance of asphalt pavement for temporary roads and paved areas.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to Owner's construction forces, testing agencies, and authorities having jurisdiction.
- B. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

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- C. Dust Plan: Submit coordination drawing and narrative that indicates the dust control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
 - 1. Locations of dust-control partitions at each phase of work.
 - 2. Waste handling procedures.
 - 3. Other dust-control measures.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails, with galvanized barbed-wire top strand.
- B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide concrete bases for supporting posts.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

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2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - 1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- C. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Install electric power service underground unless otherwise indicated.
 - 2. Connect temporary service to Owner's existing power source, as directed by Owner.
- D. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 - 2. Install lighting for Project identification sign.

- E. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications. Equip computer with not less than the following:
1. Processor: Intel Pentium D or Intel CoreDuo, 3.0 GHz processing speed.
 2. Memory: 4 gigabyte.
 3. Disk Storage: 300 gigabyte hard-disk drive and combination DVD-RW/CD-RW drive.
 4. Display: 22-inch LCD monitor with 256-Mb dedicated video RAM.
 5. Full-size keyboard and mouse.
 6. Network Connectivity: 10/100BaseT Ethernet.
 7. Operating System: Microsoft Windows XP Professional or Microsoft Windows Vista Business.
 8. Productivity Software:
 - a. Microsoft Office Professional, XP or higher, including Word, Excel, and Outlook.
 - b. Adobe Reader 7.0 or higher.
 - c. WinZip 7.0 or higher.
 9. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions.
 10. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum 384 Kbps upload and 1 Mbps download speeds at each computer.
 11. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.
 12. Backup: External hard drive, minimum 40 gigabyte, with automated backup software providing daily backups.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
1. Provide construction for temporary offices, shops, and sheds located within construction area that is noncombustible according to ASTM E 136. Comply with NFPA 241.
 2. Maintain support facilities until Design Engineer schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas as indicated on Drawings.
1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 312000 "Earth Moving."
 3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
 4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 321216 "Asphalt Paving."
- D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
1. Protect existing site improvements to remain including curbs, pavement, and utilities.
- E. Parking: Provide temporary parking areas for construction personnel.
- F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 2. Remove snow and ice as required to minimize accumulations.
- G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 3. Maintain and touchup signs so they are legible at all times.
- H. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."
- J. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- K. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 1. Comply with work restrictions specified in Section 011000 "Summary."
- C. Temporary Erosion and Sedimentation Control: Comply with requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Section 311000 "Site Clearing."
- D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings] [requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- F. Tree and Plant Protection: Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."
- G. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- H. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control

procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

- I. Site Enclosure Fence: Prior to commencing earthwork, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- J. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- K. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- L. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- M. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- N. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.
- D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- E. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 016000

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for products selected under an allowance.
 - 2. Section 012500 "Substitution Procedures" for requests for substitutions.
 - 3. Section 014200 "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other

characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 - 2. Design Engineer's Action: If necessary, Design Engineer will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Design Engineer will notify Contractor through Construction Manager of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
 - b. Use product specified if Design Engineer does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
 - 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.

2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
5. Protect stored products from damage and liquids from freezing.
6. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Design Engineer will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures:
1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 3. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
 - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
 4. Manufacturers:
 - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.

- b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
 - 5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Design Engineer's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 - 1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Design Engineer from manufacturer's full range" or similar phrase, select a product that complies with requirements. Design Engineer will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Design Engineer will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Design Engineer may return requests without action, except to record noncompliance with these requirements:
 - 1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 - 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - 3. Evidence that proposed product provides specified warranty.
 - 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 - 5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300

EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for limits on use of Project site.
 - 2. Section 013300 "Submittal Procedures" for submitting surveys.
 - 3. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For land surveyor and professional engineer.

- B. Certificates: Submit certificate signed by land surveyor and professional engineer certifying that location and elevation of improvements comply with requirements.
- C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
 - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 - 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- E. Certified Surveys: Submit two copies signed by land surveyor or professional engineer.
- F. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Design Engineer of locations and details of cutting and await directions from Design Engineer before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 - a. Light Posts
 - b. Retaining Wall.
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in

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increased maintenance or decreased operational life or safety. Operational elements include the following:

- a. Electrical wiring systems.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
 - a. Water, moisture, or vapor barriers.
 - b. Equipment supports.
 - c. Piping, ductwork, vessels, and equipment.
- C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
 - D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Design Engineer for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 1. Before construction, verify the location and invert elevation at points of connection of storm sewer; underground electrical services, and other utilities.

2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 1. Examine roughing-in for electrical conduit to verify actual locations of connections before equipment and fixture installation.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 1. Description of the Work.
 2. List of detrimental conditions, including substrates.
 3. List of unacceptable installation tolerances.
 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Design Engineer and Construction Manager promptly.

- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Design Engineer and Construction Manager when deviations from required lines and levels exceed allowable tolerances.
 - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Design Engineer and Construction Manager.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Design Engineer or Construction Manager. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Design Engineer and Construction Manager before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

- D. Certified Survey: On completion of retaining wall, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
 - 1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
 - 2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."
- F. Existing Utility Services: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 - 5. Proceed with patching after construction operations requiring cutting are complete.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.

- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
 - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 - 2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 - 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls." Section 017419 "Construction Waste Management and Disposal."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017419

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition and construction waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.
- B. Related Requirements:
 - 1. Section 311000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of 50 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:

1. Demolition Waste:

- a. Asphalt paving.
- b. Concrete.
- c. Concrete reinforcing steel.
- d. Brick.
- e. Concrete masonry units.
- f. Wood studs.
- g. Wood joists.
- h. Plywood and oriented strand board.
- i. Wood paneling.
- j. Wood trim.
- k. Structural and miscellaneous steel.
- l. Rough hardware.
- m. Equipment.
- n. Piping.
- o. Valves.
- p. Electrical conduit.
- q. Copper wiring.
- r. Lighting fixtures.
- s. Lamps.
- t. Ballasts.
- u. Electrical devices.

2. Construction Waste:

- a. Masonry and CMU.
- b. Lumber.
- c. Metals.
- d. Piping.
- e. Electrical conduit.
- f. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.
 - 2) Cardboard.
 - 3) Boxes.
 - 4) Plastic sheet and film.
 - 5) Polystyrene packaging.
 - 6) Wood crates.
 - 7) Plastic pails.

1.5 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 7 days of date established for commencement of the Work.

1.6 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste and Form CWM-8 for demolition waste. Include the following information:
 - 1. Material category.
 - 2. Generation point of waste.
 - 3. Total quantity of waste in tons.
 - 4. Quantity of waste salvaged, both estimated and actual in tons.
 - 5. Quantity of waste recycled, both estimated and actual in tons.
 - 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. LEED Submittal: LEED letter template for Credit MR 2, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
- H. Qualification Data: For waste management coordinator.
- I. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements, that employs a LEED-Accredited Professional, certified by the USGBC, as waste management coordinator.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss waste management plan including responsibilities of waste management coordinator.
 - 2. Review requirements for documenting quantities of each type of waste and its disposition.
 - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - 5. Review waste management requirements for each trade.

1.8 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition site-clearing and construction waste generated by the Work. Use Form CWM-1 for construction waste and Form CWM-2 for demolition waste. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste and Form CWM-4 for demolition waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 - 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 - 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.

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5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.
- D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use Form CWM-5 for construction waste and Form CWM-6 for demolition waste. Include the following:
1. Total quantity of waste.
 2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
 3. Total cost of disposal (with no waste management).
 4. Revenue from salvaged materials.
 5. Revenue from recycled materials.
 6. Savings in hauling and tipping fees by donating materials.
 7. Savings in hauling and tipping fees that are avoided.
 8. Handling and transportation costs. Include cost of collection containers for each type of waste.
 9. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
1. Distribute waste management plan to everyone concerned within three days of submittal return.
 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

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- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 - 2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until installation.
 - 4. Protect items from damage during transport and storage.
 - 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- B. Salvaged Items for Sale and Donation: Not permitted on Project site.
- C. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area designated by Owner.
 - 5. Protect items from damage during transport and storage.
- D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
- E. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- F. Plumbing Fixtures: Separate by type and size.
- G. Lighting Fixtures: Separate lamps by type and protect from breakage.
- H. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - 4. Store components off the ground and protect from the weather.
 - 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

SECTION 017700

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Project record documents.
 - 4. Warranties.
 - 5. Final cleaning.
 - 6. Repair of the Work.
- B. Related Requirements:
 - 1. Section 017300 "Execution" for progress cleaning of Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
 - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Construction Manager. Label with manufacturer's name and model number where applicable.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Construction Manager's signature for receipt of submittals.
 - 5. Submit test/adjust/balance records.
 - 6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Advise Owner of pending insurance changeover requirements.
 - 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - 3. Complete startup and testing of systems and equipment.
 - 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 - 5. Advise Owner of changeover in heat and other utilities.

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6. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 8. Complete final cleaning requirements, including touchup painting.
 9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Design Engineer and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Design Engineer and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A.
1. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 2. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Design Engineer and Construction Manager.
 - d. Name of Contractor.
 - e. Page number.
 3. Submit list of incomplete items in the following format:
 - a. MS Excel electronic file. Design Engineer, through Construction Manager, will return annotated file.
 - b. PDF electronic file. Design Engineer, through Construction Manager, will return annotated file.
 - c. Three paper copies. Design Engineer, through Construction Manager, will return two copies.

1.9 RECORD DOCUMENT SUBMITTALS

1. General: Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure, fire resistant location. Provide access to record documents for the Engineer's reference during normal working hours.
2. Record Drawings: Maintain a clean, undamaged set of blue or black line white prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the work as originally shown. Mark which drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
 - a. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the work.
 - b. Mark new information that is important to the Owner but was not shown on Contract Drawings or Shop Drawings.
 - c. Note related change order numbers where applicable.
 - d. Organize record drawing sheets into manageable sets. Bind sets with durable paper cover sheets; print suitable titles, dates and other identification on the cover of each set.
3. Record Specifications: Maintain one (1) complete copy of the Project Manual, including addenda. Include with the Project Manual one (1) copy of other written construction documents, such as Change Orders and modifications issued in printed form during construction.

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- a. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications.
 - b. Give particular attention to substitutions and selection of options and information on concealed construction that cannot otherwise be readily discerned later by direct observation.
 - c. Note related record drawing information and Product Data.
 - d. Upon completion of the Work, submit record Specifications to the Engineer for the Owner's records.
4. Record Product Data: Maintain one (1) copy of each Product Data submittal. Note related Change Orders and markup of record drawings and Specifications.
 - a. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site and from the manufacturer's installation instructions and recommendations.
 - b. Give particular attention to concealed products and portions of the Work that cannot otherwise be readily discerned later by direct observation.
 - c. Upon completion of markup, submit complete set of record Product Data to the Engineer for the Owner's records.
5. Record Sample Submitted: Immediately prior to Substantial Completion, the Contractor shall meet with the Engineer and the Owner's personnel at the Project Site to determine which Samples are to be transmitted to the Owner for record purposes. Comply with the Owner's instructions regarding delivery to the Owner's Sample storage area.
6. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order. Identify miscellaneous records properly and bind or file, ready for continued use and reference. Submit to the Engineer for the Owner's records.

1.10 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Design Engineer for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 3. Identify each binder on the front and spine with the typed or printed title
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"WARRANTIES," Project name, and name of Contractor.

4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access.
 - f. Clean exposed exterior finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior

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surfaces. Restore reflective surfaces to their original condition.

- g. Remove labels that are not permanent.
 - h. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - i. Clean light fixtures to function with full efficiency.
 - j. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls." Section 017419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
- 1. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 - 2. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

END OF SECTION 01770

**TECHNICAL
SPECIFICATIONS**

SECTION 024119
SELECTIVE DEMOLITION

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. Demolition and removal of selected site elements.
 - 2. Patching and repairs.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section "Summary of Work" for use of the building and phasing requirements.
 - 2. Division 1 Section "Contract Closeout" for record document requirements.

1.3 DEFINITIONS

- A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the owner's property.
- B. Remove and Salvage: Items indicated to be removed and salvaged remain the Owner's property. Remove, clean and pack or crate items to protect against damage. Identify contents of containers and deliver to Owner's designated storage area.
- C. Existing to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the Engineer, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.

1.4 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.

1.5 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections, for information only, unless otherwise indicated.
- B. Proposed dust-control measures.
- C. Proposed noise-control measures.

1.6 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Engage an experienced firm that has successfully completed selective demolition Work similar to that indicated for this Project.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before starting selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Predemolition Conference: Conduct conference at Project site to comply with preinstallation conference requirements of Division 1 Section "Project Meetings."

1.7 SCHEDULING

- A. Arrange selective demolition schedule so as not to interfere with Owner's on-site operations.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

- A. Use repair materials identical to existing materials.
 - 1. Where identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 2. Use materials whose installed performance equals or surpasses that of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

- D. When unanticipated electrical or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Engineer.
- E. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

- A. Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to owner and to governing authorities.
 - a. Provide not less than 72 hours' notice to Owner/Engineer if shutdown of service is required during changeover.
- B. Utility Requirements: Locate, identify, disconnect and seal or cap off indicated utility services.
 - 1. Arrange to shut off indicated utilities with utility companies.
 - 2. Where utility services are required to be removed, relocated or abandoned, provide bypass connections to maintain continuity of service before proceeding with selective demolition.
 - 3. Cut off pipe or conduit to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit after bypassing.
- C. Utility Requirements: Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

- A. Drain, purge or otherwise remove, collect and dispose of chemicals, gases, explosives, acids, flammables or other dangerous materials before proceeding with selective demolition operations.
- B. Conduct demolition operations and remove debris to insure 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 Lower Merion Township and other authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- C. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around selective demolition area.

1. Erect temporary protection, such as walks, fences, railings, canopies and covered passageways, where required by authorities having jurisdiction.
2. Protect existing site improvements, appurtenances and landscaping to remain.
3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
4. Provide temporary weather protection, during interval between demolition and removal of existing construction, on exterior surfaces and new construction to insure that no water leakage or damage occurs to structure or interior areas.

3.4 POLLUTION CONTROLS

- A. Use water mist, temporary enclosures and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.
 1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding and pollution.
- B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- C. Clean adjacent structures and improvements of dust, dirt and debris caused by selective demolition operations. Return adjacent areas to condition existing before start of selective demolition.

3.5 SELECTIVE DEMOLITION

- A. Demolish and remove existing above and below grade construction only to the extent necessary to facilitate new construction and as indicated. Use methods required to complete Work within limitations of governing regulations and as follows:
 1. Proceed with selective demolition systematically, from higher to lower level.
 2. Neatly cut openings and holes plumb, square and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. To minimize disturbance of adjacent surfaces, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 3. Dispose of demolished items and materials promptly. On-site storage or sale of removed items is prohibited.
 4. Return elements of construction and surfaces to remain to condition existing before start of selective demolition operations.
- B. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain, using power-driven masonry saw or hand tools; do not use power-driven impact tools.
- C. Remove slabs, paving, curbs, and all aggregate bases as indicated.
 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

- D. Removal of existing paving includes removal of all subbase materials to a firm subgrade.

3.6 PATCHING AND REPAIRS

- A. Promptly patch and repair holes and damaged surfaces caused to adjacent construction by selective demolition operations.
- B. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
 - 1. Completely fill holes and depressions in existing masonry walls to remain with an approved masonry patching material, applied according to manufacturer's printed recommendations.
- C. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction to remain in a manner that eliminates evidence of patching and refinishing.
- D. Patch and repair sidewalk surfaces where demolition extends from one finished area onto another. Provide a flush and even surface of uniform color and appearance.
 - 1. Closely match texture and finish of existing adjacent surface.
 - 2. Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
 - 3. Inspect and test patched areas to demonstrate integrity of the installation, where feasible.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials to be salvaged at area designated by Owner.
- D. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION 024119

SECTION 03 30 01

CONCRETE FORMWORK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Contract Provisions, Special Provisions, Supplementary Conditions, and Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. Provisions of this section include installation and removal of formwork necessary to form cast-in-place concrete.

1.3 REFERENCES

- A. ACI 318 – Building Code Requirements for Reinforced Concrete
- B. ACI 347 – Guide To Formwork For Concrete
- C. ACI 305 – Hot Weather Concreting
- D. ACI 306 – Cold Weather Concreting.

PART 2 PRODUCTS

2.1 GENERAL.

- A. The Contractor shall be responsible for the design, construction and safety of all formwork, in accordance with ACI 347.

2.2 FORM COATINGS.

- A. Form surfaces which will be in contact with concrete must be treated with an effective bond-breaking form coating, in accordance with ACI 347.

2.3 TIES.

- A. The form ties used shall have waterstops designed for the liquid pressure to be retained. They shall not be pulled completely out of the wall. The ends of the tie metal after breaking shall be at least 1.5 inches from the face of the wall.

PART 3 EXECUTION

3.1 INSTALLATION

- A. In hot (greater than 90 °F), dry (less than 30% relative humidity) climates, wood forms remaining in place shall not be considered adequate for curing, but shall be removed or loosened so that the concrete surfaces can be kept moist by soaking with weeper hoses or coated with a curing membrane. In cold weather, removal of formwork shall be deferred, or formwork shall be replaced with insulation blankets, to avoid thermal shock and consequent crazing of the concrete surface.
- B. Suggestions for good formwork, curing, and finishing practices are found in ACI 302, ACI 306, ACI 347, ACI 318, ACI 605 and ACI Committee 308.
- C. Large horizontal concrete sections shall be poured in an approved sequence to reduce shrinkage stresses.
- D. Approved bar chairs shall be used where required. The use of large aggregate or brick will not be permitted to provide clearance between the formwork and reinforcing steel.
- E. Formwork must be anchored to the shores below so that movement of any part of the formwork system will be prevented during concreting.
- F. Formwork shall be designed to support the poured concrete and achieve the correct dimensions within established tolerances.

3.2 SURFACE PREPARATION

- A. Prior to placing concrete, forms will be inspected for cleanliness and accuracy of alignment. Form surfaces which will be in contact with concrete must be treated with an effective bond-breaking form coating, in accordance with ACI 347. Re-shoring shall be done in accordance with ACI 301.

3.3 REMOVAL OF FORMS

- A. Formwork shall not be removed before the concrete has developed at least 70 percent of its design strength, unless approved by the Engineer.
- B. No formwork shall be removed prior to 12 hours after concrete has been poured.
- C. Forms shall be removed in a manner such that no damage to the concrete occurs.

PART 4 CONTRACTOR'S QUALITY CONTROL REQUIREMENTS

4.1 GENERAL

- A. Comply with applicable provisions of Division 01 Section "Quality Requirements".

END OF SECTION 03 30 01

SECTION 03 30 53

MISCELLANEOUS 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 reinforcement, concrete materials, mixture design, placement procedures, and finishes for:
 - 1. Concrete pads for benches
 - 2. Concrete foundations for fence posts
 - 3. Concrete foundations for light poles
- B. Section does not include cast-in-place concrete for:
 - 1. Design-Build Retaining Wall
- C. Related Requirements:
 - 1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.
 - 2. Special Provision for Design-Build Retaining Wall

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture.

1.4 QUALITY ASSURANCE

- A. Ready-Mix-Concrete 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.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. Comply with the following sections of ACI 301 unless modified by requirements in the Contract Documents:
 - 1. "General Requirements."
 - 2. "Formwork and Formwork Accessories."
 - 3. "Reinforcement and Reinforcement Supports."
 - 4. "Concrete Mixtures."
 - 5. "Handling, Placing, and Constructing."
 - 6. "Lightweight Concrete."
- B. Comply with ACI 117.

2.2 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
- B. Plain-Steel Wire: ASTM A 1064/A 1064M, as drawn.
- C. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.
- D. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, flat sheet.

2.3 CONCRETE MATERIALS

- A. Regional Materials: Concrete shall be manufactured within 500 miles of Project site from aggregates and cementitious materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
- B. 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.
- C. Cementitious Materials:
 - 1. Portland Cement: ASTM C 150/C 150M, Type I.
 - 2. Fly Ash: ASTM C 618, Class C or F.
 - 3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
 - 4. Blended Hydraulic Cement: ASTM C 595/C 595M, Type IP, portland-pozzolan cement.
- D. Normal-Weight Aggregate: ASTM C 33/C 33M, 1-1/2-inch nominal maximum aggregate size.
- E. Lightweight Aggregate: ASTM C 330/C 330M, 1-inch nominal maximum aggregate size.

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- F. Air-Entraining Admixture: ASTM C 260/C 260M.
- G. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 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.
- H. Water: ASTM C 94/C 94M.

2.4 FIBER REINFORCEMENT

- A. Synthetic Micro-Fiber: Monofilament polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1/2 to 1-1/2 inches long.

2.5 RELATED MATERIALS

- A. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

2.6 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth or cotton mats.
- 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.
- F. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
 - 1. VOC Content: 200 g/L or less.

2.7 CONCRETE MIXTURES

- A. Comply with ACI 301.

B. Normal-Weight Concrete:

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Maximum W/C Ratio: 0.40.
3. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
4. Slump Limit: 4 inches, plus or minus 1 inch.
5. Air Content: Maintain within range permitted by ACI 301. Do not allow air content of trowel-finished floor slabs to exceed 3 percent.

C. Structural Lightweight Concrete Mix: ASTM C 330/C 330M, proportioned to produce concrete with a minimum compressive strength of 3000 psi at 28 days and a calculated equilibrium unit weight of 110 lb/cu. ft. plus or minus 3 lb/cu. ft., as determined by ASTM C 567/C 567M. Concrete slump at point of placement shall be the minimum necessary for efficient mixing, placing, and finishing.

1. Limit slump to 5 inches for troweled slabs and 4 inches for other slabs.

D. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate, but not less than a rate of 1.0 lb/cu. yd..

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.

1. 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 mixer capacity 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 mixer capacity 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, mix type, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, construct, erect, brace, and maintain formwork according to ACI 301.

3.2 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 STEEL REINFORCEMENT INSTALLATION

- A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.4 CONCRETE PLACEMENT

- A. Comply with ACI 301 for placing concrete.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
- C. Do not add water to concrete during delivery, at Project site, or during placement.
- D. Consolidate concrete with mechanical vibrating equipment according to ACI 301.
- E. Equipment Bases and Foundations:
 - 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 - 2. Construct concrete bases 4 inches high unless otherwise indicated; and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
 - 3. Minimum Compressive Strength: 3000 psi at 28 days.
 - 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 - 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor them into structural concrete substrate.
 - 6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.5 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 exceeding 1/2 inch.
 - 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 defective areas. Remove fins and other projections exceeding 1/8 inch.
 - 1. Apply to concrete surfaces exposed to public view,
- C. Rubbed Finish: Apply the following rubbed finish, defined in ACI 301, to smooth-formed-finished as-cast concrete where indicated:
 - 1. Smooth-rubbed finish.
 - 2. Grout-cleaned finish.
 - 3. Cork-floated finish.
- 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.

3.6 FINISHING UNFORMED SURFACES

- A. General: Comply with ACI 302.1R for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on surface.
 - 1. Do not further disturb surfaces before starting finishing operations.
- C. Scratch Finish: Apply scratch finish to surfaces indicated and surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, portland cement terrazzo, and other bonded cementitious floor finishes unless otherwise indicated.
- D. Float Finish: Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, fluid-applied or direct-to-deck-applied membrane roofing, or sand-bed terrazzo.
- E. Trowel Finish: Apply a hard trowel finish to surfaces indicated and to floor and slab 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.
- F. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset methods. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.
- G. Slip-Resistive Broom Finish: Apply a slip-resistive finish to surfaces indicated and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

3.7 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 with ACI 301 for hot-weather protection during curing.
- B. 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.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure formed and unformed concrete for at least seven days 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 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, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - 3. 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.
 - 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.

3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests: Perform according to ACI 301.
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

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

END OF SECTION 033053

SECTION 05 73 00

ORNAMENTAL ALUMINUM RAILINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Ornamental Aluminum Railing.
- B. Wall mounted and guardrail mounted handrails.

PART 2 RELATED SECTIONS

- A. Section 04 2000 - Unit Masonry: Placement of anchors in masonry

2.2 REFERENCES

- A. ANSI A1264.1 - Safety Requirements for Workplace Floor and Wall Openings, Stairs, and Railing Systems.
- B. ASTM B 211 - Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, Wire.
- C. ASTM B 247 - Standard Specification for Aluminum and Aluminum Die Forgings, Hand Forgings and rolled Ring Forgings.
- D. ASTM B 429 - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
- E. ASTM E 935 - Standard Test Methods for Permanent Metal Railing Systems and Rails for Buildings.

2.3 DESIGN / PERFORMANCE REQUIREMENTS

- A. Comply with requirements of building authorities having jurisdiction in Project location and the following:
 - 1. Handrail Standard: ANSI A1264.1
 - 2. Occupational Safety and Health Administration - 29 CFR 1910.23 - Guarding floor and wall openings.
- B. Structural Performance: Engineer, fabricate, and install handrails, guardrails, and railing systems to withstand, when tested per ASTM E 935, loadings required by applicable building and safety codes but not less than the following:
 - 1. Design Loads: Design to the following requirements. Concentrated and uniform loading need not be applied simultaneously.
 - 2. Uniform load: 50 pounds per foot (74.3 kg/m) applied at the top in any direction.
 - 3. Concentrated load: 200 pounds (90.6 kg) applied at the top in any direction.

2.4 SUBMITTALS

- A. Submit under provisions of Section 01 3000 - Administrative Requirements, for submittal procedures
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Details of material and construction. ^[1]_{SEP}
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods and requirements.
- C. Shop Drawings: Submit shop drawings for fabrication and installation of ornamental metalwork. Include plans, elevations and detail sections. Indicate materials, methods, finishes and types of joinery, fasteners, anchorages and accessory items.
- D. Load Tests: Submit test results from ASTM E 935 conducted on the manufacturer's supplied system indicating compliance with required structural loading.
- E. Selection Samples: For each finish product specified, two complete sets of color charts representing manufacturer's full range of available colors and patterns.
- F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- G. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic cleaning and maintenance of all components.

2.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 3 years documented experience producing systems specified in this section.
- B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.
 - 4. Accepted mock-ups shall be comparison standard for remaining Work

2.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened, properly labeled, original packaging until ready for installation.

- B. Store components to avoid damage from moisture, abrasion, and other construction activities.
- C. Keep handling to a minimum. Exercise caution to avoid damage to factory applied finishes.

2.7 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

2.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Field Measurements: Take measurements of actual dimensions where necessary for fit without gaps. Indicate measurements on shop drawings.

PART 3 PRODUCTS

3.1 MANUFACTURERS

- A. Acceptable Manufacturer: Superior Aluminum Products, Inc.; 555 E. Main St., P. O. Box 430, Russia, OH 45363. Phone: 937-526-4065. Fax: 937-526-3904. Email: info@superioraluminum.com. Web: www.superioraluminum.com. **OR APPROVED EQUIVALENT.**

- 1. Product: Guard Rail Series 9000 Heavy-Duty Aluminum Railing.

- B. Requests for substitutions will be considered in accordance with provisions of Section 01 6000 - Product Requirements.

3.2 ORNAMENTAL ALUMINUM RAILINGS

- A. Guard Rail Series 9000 Heavy-Duty Aluminum Railing: Series 9000 railings run between posts which shall contain machined openings for level applications and mechanical swivel brackets for locations at angles exceeding 10 degrees. Brackets shall not be used to attach railings to posts on level applications utilizing standard components. Pickets shall be 3/4-inch (1.91 cm) square on 4-1/2 inch (11.43 cm) maximum centers, and shall run between the top and bottom rail. Picket fasteners are concealed by a screw cover in matching finish.

- 1. Series 9000 Design
 - a. Rail Style B: Double top rail and single bottom rail, three-line railing system with opening between top rails.
 - 1) Top Rail Size

- (a) Standard 2 inch (5.08 cm) wide by 1-5/8 inch (4.13 cm) high double top rail.
 - 2) Bottom/Mid Rail Size
 - (a) 3/4 inch (1.91 cm) wide by 1-5/8 inch (4.13 cm) high.
- b. Square Posts:
 - 1) 2-1/2 inch (6.35 cm)
 - 2) 4-inch (10.16cm)
- c. Height:
 - 1) Commercial: 42 inch (106.68 cm)
- d. Design
 - 1) Straight Rail Panel Design: As indicated
 - 2) Step Rail Panel Design: As indicated
 - 3) Design: As indicated on the Drawings.
- B. Base: Size to fit the posts specified
 - 1. Heavy-Duty Surface Mount Base
 - 2. Side-Mount Corner Base
 - 3. Side-Mount Base
 - 4. As indicated on the Drawings.

3.3 RAILING MATERIALS

- A. Rail, Post and Pickets: Aluminum extrusions; alloy and temper 6063-T4 or 6063-T6 for rail and posts, and 6063-T5 for square pickets.
 - 1. Tube: ASTM B 211.
- B. Base Flanges, Anchors, and railing accessories: ASTM B 247.
 - 1. Bases cast from manufacturer's standard A-356-T6, 535, or 713 aluminum alloys or solid extruded 6063 aluminum alloy stock.
 - 2. Base flanges and railing accessories cast from manufacturer's standard 319, A-356, A-356-T6, 535, or 713 aluminum alloys.
 - 3. Anchorages: Provide concrete anchorage for fastening and complying with applicable Federal standards. All fasteners used in the system shall be aluminum or stainless steel.

- C. Fasteners: Provide concrete anchorage for fastening and complying with applicable Federal standards. All fasteners used in the system shall be aluminum or stainless steel.
- D. Grout: Non-shrink Portland cement-based hydraulic grout, mixed and applied in accordance with manufacturer's instructions; gypsum-based material is not acceptable. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and recommended by manufacturer for exterior use.

3.4 FINISH

- A. Standard Architectural Coating (AAMA 2603):
 - 1. Color: As selected by OWNER.

3.5 FABRICATION

- A. Tolerances: Verify dimensions on site prior to shop fabrication for proper connection to building structure or substrate.
- B. Components or railing sections shall be fabricated to exact measurements specified through Drawings and field dimensions.
- C. Railing sections shall be fabricated at the manufacturing facility in largest practical site delivery sizes.
- D. For railings angled horizontally 10 degrees or less, machine to proper angle into the post, for railings angled horizontally 10 degrees or greater use cast swivel brackets to attach to post.
- E. Fabricate railing system to meet step railing requirements; riser and tread dimensions of the steps.
- F. All posts grouted in concrete to have one nominal 1/4 inch (6.0 mm) nominal diameter weep hole, 1/2 inch (12.0 mm) nominal above post collar, in the plane of the rail
- G. Provide components required for anchorage of framing. Fabricate anchors and related components of material and finish as required, or as specifically noted.

PART 4 EXECUTION

4.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared. Fully review the supporting structure and substrate to verify a structurally sound base for anchoring railing system.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

4.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Ensure that adjacent surfaces, structures, and finishes are protected from damage by construction activities of this section.
- C. Use wood blocks and padding to prevent damage to railing members and fittings during erection.
- D. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

4.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and inline, accurately fitted, free of distortion or defects and securely anchored to building structure and/or substrate.
- C. Provide grounds, clips, backing materials, adhesives, brackets, anchors, and accessories necessary for a complete installation.
- D. Expansion Bolt Mounting: Anchor through base plates to concrete substrate.
- E. Sleeve Mounting:
 - 1. Arrange for casting of sleeves or core drill concrete to provide holes for railing uprights.
 - 2. After setting, fill holes with hydraulic grout; brace members until grout is cured.
- F. Connect railing components in accordance with manufacturer's instructions applicable to the specified system.
- G. Tighten all fasteners so that completed railing is rigid and free of play at joints and component attachments.

4.4 ERECTION TOLERANCES

- A. Install railings plumb and level, securely fastened, with vertical members plumb.
 - 1. Maximum variation from plumb: 1/4 inch (6.0 mm).
 - 2. Maximum misalignment from true position: 1/4 inch (6.0 mm).
 - 3. Maximum misalignment between adjacent separated members: 1/8 inch (3.0 mm).

4.5 CLEANING

- A. Remove dust or other foreign matter from component surfaces; clean finishes in accordance with AAMA 609 and AAMA 610-02.

4.6 PROTECTION

- A. Protect installed products until completion of project. Touch-up, repair or replace damaged products before Substantial Completion.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 05 73 00

SECTION 12 93 00

SITE FURNISHINGS

PART 1 GENERAL

1.01 SUMMARY

- A. The work required under this section consists of furnishing all labor, materials, equipment, services and related items necessary to supply and install Site Furnishings related work, complete as indicated on the drawings or specified herein.
- B. Major items of work include, but are not limited to, supplying and installing:
 - 1. Benches
 - 2. Trash Receptacles
 - 3. Bollards and Bollard Covers

1.02 RELATED SPECIFICATIONS

- A. Section 033053 – Miscellaneous Cast-in-Place Concrete

1.04 SUBMITTALS

- A. Manufacturer's Data: Submit manufacturer's shop drawings and/or catalogue cuts for each site furnishing.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Bench
 - 1. Manufacturer: Victor Stanley Inc.; Dunkirk, MD 20754. Ph: (800) 368-2573
OR APPROVED EQUIVALENT.
 - 2. Model: FS-50 Street Sites Series, horizontal steel rod contour bench with back and special order end arm rests.
 - 3. Length: 4 feet.
 - 4. Mounting on concrete surface: Surface mount with stainless steel wedge anchors in predrilled holes.
 - 5. Pier Deck Mounting: per details indicated on plans.
 - 6. Finish: Polyester powder coat, 8-10 mils thickness.
 - 7. Color: Black.
- B. Trash Receptacle
 - 1. Manufacturer: Landscape Forms Inc., 7800 E Michigan Ave, Kalamazoo, MI 49048.
Ph: (800) 521-2546 **OR APPROVED EQUIVALENT.**
 - 2. Model: Petoskey, hinged top, freestanding.

3. Materials: 11 gauge steel.
4. Dimensions: 20.5" x 42".
5. Capacity: 30 gallon.
6. Mounting: Surface mount with stainless steel wedge anchors in predrilled holes.
7. Finish: Polyester powder coat, 8-10 mils thickness.
8. Color: Black.

C. Bollard Covers

1. Manufacturer: Bollards USA Inc. a Division of J.R. Hoe, 101 Ironwood Road, Middlesboro, KY 40965; www.jrhoe.com
Ph: (606) 248-5560 **OR APPROVED EQUIVALENT.**
2. Model: 380-SF.
3. Dimensions: 8" dia. x 36"H
4. Material: 304 Stainless Steel, Schedule 40. Material certification required as per PA Steel Procurement Act.
5. Finish: Satin buffed.
6. Installation: Three (3) set screws at base. Cover installed over 6" Sch. 40 steel post set in concrete footing. See detail on plans.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine the subgrade, finished surfaces and installation conditions. Do not commence work until all unsatisfactory conditions are corrected.

3.02 LAYING OUT THE WORK

- A. The trade performing the work of this section assumes full and sole responsibility for the accuracy and correctness of all layouts, lines, levels, grades and other aspects of the work under this section. Layout all work in accordance with the requirements as indicated in the drawings.

3.03 INSTALLATION

- A. Locate all site furnishings where indicated on the drawings and attach as detailed on the drawings and as elaborated upon in the specifications and in conformance with manufacturer's recommendations.
- B. Any item locations not specifically detailed in the Contract Documents shall be located at the direction of the Owner's Representative.

3.04 CLEANING

- A. Perform cleaning during installation of the work and upon completion of the work.
- B. Remove from the project site all excess material and equipment at the completion of the work of this section.

C. Repair damage resulting from Site Furnishings' installation work.

END OF SECTION 12 93 00

SECTION 31 10 00

SITE CLEARING

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. Clearing and grubbing.
 - 2. Removing above- and below-grade site improvements.
 - 3. Disconnecting, capping or sealing, and abandoning site utilities in place.
 - 4. Temporary erosion and sedimentation control measures.

1.3 DEFINITIONS

- A. 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 nonsoil materials.
- B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined beyond 10 feet by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.4 MATERIAL OWNERSHIP

- A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 SUBMITTALS

- A. Photographs or (optional) videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

- B. Record drawings, according to Division 01 Section "Project Record Documents," identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

- A. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.7 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- B. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- C. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.
- D. Access: Provide the Philadelphia Water Department (PWD) with unrestricted access to existing easements and right-of-way located on-site

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 Section "Earth Moving."
 - 1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.

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- B. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner and governing jurisdiction.

3.2 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 requirements of authorities having jurisdiction.
- 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.

3.3 UTILITIES

- A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
 - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.
- B. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
 - 1. Arrange with utility companies to shut off indicated utilities.
 - 2. Owner will arrange to shut off indicated utilities when requested by Contractor.
- C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.

3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.5 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
 2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.
- C. Coordinate removal of all on-site existing storage areas, debris, Jersey barriers, sheds, etc. associated with the I-95 CP2 project with the owner

3.6 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property. The project is an Act 2 site and is subject to PADEP requirements. The site is required to be constructed in accordance with the PADEP approved Remedial Action Plan and Clean-Up Plan.

END OF SECTION 31 10 00

SECTION 31 20 00

EARTH MOVING

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. Pennoni Associates report entitled "Geotechnical Engineering Services, MaST II Charter School, 6501 New State Road Philadelphia, Pennsylvania dated December 4, 2015.

1.2 SUMMARY

A. Section Includes:

- 1. Preparing subgrades, walks, pavements, turf and grasses and plants.
- 2. Excavating and backfilling for buildings and structures.
- 3. Drainage course for concrete slabs-on-grade.
- 4. Subbase course for concrete walks pavements.
- 5. Subbase course and base course for asphalt paving.
- 6. Subsurface drainage backfill for walls and trenches.
- 7. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Sections:

- 1. Division 01 Section "Construction Progress Documentation and Photographic Documentation" for recording pre-excavation and earth moving progress.
- 2. Division 01 Section "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities; also for temporary site fencing if not in another Section.
- 3. Divisions 21, 22, 23, 26, 27, 28, and 33 Sections for installing underground mechanical and electrical utilities and buried mechanical and electrical structures.
- 4. Division 31 Section "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
- 5. Division 31 Section "Dewatering" for lowering and disposing of ground water during construction.
- 6. Division 31 Section "Excavation and Support" for shoring, bracing, and sheet piling of excavations.
- 7. Division 32 Section "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.

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8. Division 32 Section "Plants" for finish grading in planting areas and tree and shrub pit excavation and planting.

1.3 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an 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: Aggregate layer placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as structural fill or backfill.
- E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Geotechnical Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions. Contractor shall provide lump sum fee proposal for Authorized Additional Excavation.
 2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Geotechnical Engineer, shall be without additional compensation.

Fill: Soil materials used to raise existing grades.

- G. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
 1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch-wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700

- lbf and stick-crowd force of not less than 18,400 lbf with extra-long reach boom; measured according to SAE J-1179.
2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp flywheel power and developing a minimum of 47,992-lbf breakout force with a general-purpose bare bucket; measured according to SAE J-732.
- H. 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.
- I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
1. Geotextiles.
 2. Controlled low-strength material, including design mixture.
 3. Warning tapes.
- B. Samples for Verification: For the following products, in sizes indicated below:
1. Geotextile: 12 by 12 inches.
 2. Warning Tape: 12 inches long; of each color.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
1. Classification according to ASTM D 2487.
 2. Laboratory compaction curve according to ASTM D 698, where required.
 3. Laboratory compaction curve according to ASTM D 1557, where required.

- 1.6 QUALITY ASSURANCE Retain first paragraph below if explosives are permitted.
- A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.
 - B. Pre-excavation Conference: Conduct conference at Project site.
- 1.7 PROJECT CONDITIONS
- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
 - B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
 - 1. Do not proceed with work on adjoining property until directed by Architect.
 - C. Utility Locator Service: Notify PA One Call for area where Project is located before beginning earth moving operations. Hand excavate around utilities as required
 - D. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in Division 01 Section "Temporary Facilities and Controls," Division 31 Section "Site Clearing," are in place.
 - E. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water.
 - 6. Excavation or other digging unless otherwise indicated.
 - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
 - F. Do not direct vehicle or equipment exhaust towards protection zones.
 - G. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, GC, SW, SP and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve or recycled material from an approved PennDOT supplier meeting Bulletin 14 (PennDOT Publication 34).
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve or recycled material from an approved PennDOT supplier meeting Bulletin 14 (PennDOT Publication 34).
- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve or recycled material from an approved PennDOT supplier meeting Bulletin 14 (PennDOT Publication 34).
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve or recycled material from an approved PennDOT supplier meeting Bulletin 14 (PennDOT Publication 34).
- H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.
- I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 7; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.
- J. Sand: ASTM C 33; fine aggregate.

2.2 GEOTEXTILES

- A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: Class 2; AASHTO M 288.
 2. Grab Tensile Strength: 120 lbf; ASTM D 4632.
 3. Tear Strength: 50 lbf; ASTM D 4533.
 4. Puncture Strength: 50 lbf; ASTM D 4833.
 5. Apparent Opening Size: No. 70 sieve, maximum; ASTM D 4751.
 6. UV Stability: 70 percent after 500 hours' exposure; ASTM D 4355.
- B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: Class 2; AASHTO M 288.
 2. Grab Tensile Strength: 200 lbf; ASTM D 4632.
 3. Tear Strength: 75 lbf; ASTM D 4533.
 4. Puncture Strength: 75 lbf; ASTM D 4833.
 5. Apparent Opening Size: No. 40 sieve, maximum; ASTM D 4751.
 6. Permittivity: 0.05 per second, minimum; ASTM D 4491.
 7. UV Stability: 70 percent after 500 hours' exposure; ASTM D 4355.

2.3 CONTROLLED LOW-STRENGTH MATERIAL

- A. Controlled Low-Strength Material: Self-compacting, low-density, flowable concrete material produced from the following:
1. Portland Cement: ASTM C 150, Type I Type II or Type III.
 2. Fly Ash: ASTM C 618, Class C or F.
 3. Normal-Weight Aggregate: ASTM C 33, 3/4-inch 3/8-inch nominal maximum aggregate size.
 4. Foaming Agent: ASTM C 869.
 5. Water: ASTM C 94/C 94M.
 6. Air-Entraining Admixture: ASTM C 260.
- B. Produce low-density, controlled low-strength material with the following physical properties:
1. As-Cast Unit Weight: 30 to 36 lb/cu. ft. at point of placement, when tested according to ASTM C 138/C 138M.
 2. Compressive Strength: 140 psi, when tested according to ASTM C 495.

- C. Produce conventional-weight, controlled low-strength material with 140-psi compressive strength when tested according to ASTM C 495.

2.4 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Orange: Telephone and other communications.
 - 4. Blue: Water systems.
 - 5. Green: Sewer systems.
- B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Orange: Telephone and other communications.
 - 4. Blue: Water systems.
 - 5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth moving operations.
- C. Strip and remove all topsoil and vegetation from areas of proposed construction.
- D. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. 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.

3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavation with unit prices for obstructions/buried foundations in the fill as well as unit rates for undercuts at foundation/slab/pavement subgrades as needed. Unclassified excavated materials may include rock, soil materials, and obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
 - 2. Remove rock to lines and grades indicated to permit installation of permanent construction.

3.5 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.
 - 1. Perform ground improvement as outlined in the Geotechnical Engineering Report.
 - 2. 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 grades to leave solid base to receive other work.
 - 3. 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.
- B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Cut and protect roots according to requirements in Division 01 Section "Temporary Tree and Plant Protection."

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
 1. Clearance: 12 inches each side of pipe or conduit.
- C. Trench Bottoms: Excavate trenches 6 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.8 SUBGRADE INSPECTION

- A. Notify Geotechnical Engineer when excavations have reached required subgrade elevation.
- B. If Geotechnical Engineer determines that unsatisfactory bearing soil is present at the subgrade elevation, continue excavation until a satisfactory soil is reached and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
 2. Excavate soils disclosing soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Geotechnical Engineer, and replace with compacted backfill or fill as directed.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Geotechnical Engineer, without additional compensation.

3.9 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 1500 psi, may be used when approved by Geotechnical Engineer.
1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Geotechnical Engineer.

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. Do not store within drip line of remaining trees.

3.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
1. Construction below finish grade including, where applicable, sub drainage, damp proofing, 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. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; or fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03 Section "Cast-in-Place Concrete."
- D. Trenches under Roadways: Provide 4-inch-thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course.
- E. Backfill voids with satisfactory soil while removing shoring and bracing.
- F. Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
 - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- G. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches over the pipe or conduit. Coordinate backfilling with utilities testing.
- H. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- I. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.
- J. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.
 - 2. Under walks and pavements, use satisfactory soil material.

3. Under steps and ramps, use engineered fill.
 4. Under building slabs, use engineered fill.
 5. Under footings and foundations, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.14 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for fine grain soil and 10 inches loose depth for granular soil material, compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials no less than the following percentages of maximum dry unit weight according to ASTM D 1557 (Geotechnical Engineer may direct ASTM D 698 be used in areas based on the materials and equipment being used):
1. Under structures and building slabs, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 (98) percent.
 2. Under pavements, steps, walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 93 (95) percent.
 3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 (88) percent compaction.
 4. For utility trenches, compact each layer of initial and final backfill soil material at 85 (88) percent in landscaped areas. Utility trenches beneath pavement and slab subgrades should be compacted to 95 (98) percent.

3.16 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 - 1. Turf or Unpaved Areas: Plus or minus 1 inch.
 - 2. Walks: Plus or minus 1 inch.
 - 3. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.17 SUBSURFACE DRAINAGE

- A. Sub drainage Pipe: Specified in Division 33 Section "Storm Utility Drainage Piping."
- B. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick.

3.18 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:
 - 1. Place base course material over subbase course under hot-mix asphalt pavement.
 - 2. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.19 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

Place drainage course on subgrades free of mud, frost, snow, or ice.

- A. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
1. Install sub drainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
 2. Place drainage course 6 inches or less in compacted thickness in a single layer.
 3. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.20 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
 2. Determine that fill material and maximum lift thickness comply with requirements.
 3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.
- B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed 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 Geotechnical Engineer.
- E. 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. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet or less of wall length, but no fewer than two tests.
 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length, but no fewer than two tests.

- F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; re-compact and retest until specified compaction is obtained.

3.21 PROTECTION

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

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.
- B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.
 - 1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 31 20 00

SECTION 31 21 00

SOIL EROSION AND SEDIMENTATION

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 DESCRIPTION

- A. This work shall consist of temporary measures to control erosion and sediment during the life of the contract, as shown on the Plans and as approved by the PA DEP.
- B. The temporary control provisions contained herein shall be coordinated with the permanent improvements (grass, pavement and other restorations) specified elsewhere in the contract to the extent practical to assure effective and continuous erosion and sediment control throughout the construction and post-construction period.
- C. The erosion and sediment control measures described herein shall be continued until the construction is complete and final restorations installed.

1.3 MATERIALS

- A. All materials and methods of construction shall be in accordance with the Pennsylvania DEP Standards for Soil Erosion and Sediment Control.

1.4 METHODS OF CONSTRUCTION

- A. Contractor shall comply with the construction requirements shown on the plans entitled, "Erosion and Sediment Control Plan," "Erosion and Sediment Control Detail," "Erosion and Sediment Control Notes."
- B. Contractor shall adhere, as closely at practicable, to the construction sequence provided on the plan entitled, "Erosion & Sediment Control Notes".
- C. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other federal or state or location agencies, the more restrictive laws, rules or regulations shall apply.

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- D. The Contractor will be responsible for maintaining all soil erosion and sediment control measures as specified on the Plans. All temporary measures shall be removed by the Contractor as approved by the Engineer.
- E. In case of repeated failures on the part of the Contractor to control erosion, pollution, and/or siltation, the Owner reserves the right to employ outside assistance or to use his own forces to provide the necessary corrective measures. Further, the PA DEP may order the Contractor to cease operations until all soil erosion and sediment control measures are satisfactory. Such incurred costs of remediation and time delays will be charged to the Contractor, with no additional costs to the Owner.

END OF SECTION 312100

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SECTION 31 23 19

DEWATERING

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 construction dewatering.
- B. Related Sections:
 - 1. Division 01 Section Construction Progress Documentation for recording preexisting conditions and dewatering system progress.
 - 2. Division 31 Section "Earth Moving" for excavating, backfilling, site grading, and for site utilities.

1.3 PERFORMANCE REQUIREMENTS

- A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.
 - 1. Delegated Design: Design dewatering system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
 - 2. Continuously monitor and 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.
 - 3. Prevent surface water from entering excavations by grading, dikes, or other means.
 - 4. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.

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5. Remove dewatering system when no longer required for construction.
6. Place filter bags on stable or well vegetated areas which are flatter than 5% and which will not erode when subjected to bag discharge. If stable or well vegetated area is unavailable. The contractor will be required to discharge runoff to City owned combined or sanitary sewer system. An industrial waste permit from PWD is required prior to pumping to City owned infrastructure. The contractor shall obtain an industrial discharge permit through the Industrial Waste Unit. Discharge must be connected directly to a combined or sanitary sewer lateral.

1.4 ACTION SUBMITTALS

- A. Shop Drawings: For dewatering system. Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, and discharge lines; and means of discharge, control of sediment, and disposal of water.
 1. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.
 2. Include a written plan for dewatering operations including control procedures to be adopted if dewatering problems arise.
- B. Delegated-Design Submittal: For dewatering system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Field quality-control reports.
- C. Other Informational Submittals:
 1. Photographs: Show existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer that has specialized in dewatering work.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning dewatering. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Pre-installation Conference: Conduct conference at Project site.

1. Review methods and procedures related to dewatering including, but not limited to, the following:
 - a. Inspection and discussion of condition of site to be dewatered including coordination with temporary erosion control measures and temporary controls and protections.
 - b. Geotechnical report.
 - c. Proposed site clearing and excavations.
 - d. Existing utilities and subsurface conditions.
 - e. Coordination for interruption, shutoff, capping, and continuation of utility services.
 - f. Construction schedule. Verify availability of Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - g. Testing and monitoring of dewatering system.

1.7 PROJECT CONDITIONS

- A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
 1. Notify Architect no fewer than two days in advance of proposed interruption of utility.
 2. Do not proceed with interruption of utility without Architect's written permission.
- B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this data.
 1. Make additional test borings and conduct other exploratory operations necessary for dewatering.
 2. The geotechnical report is included elsewhere in the Project Manual.
- C. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
 1. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.
 - 1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
 - 2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.
- B. Install dewatering system 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 and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Provide temporary grading to facilitate dewatering and control of surface water.
- D. Monitor dewatering systems continuously.
- E. Promptly repair damages to adjacent facilities caused by dewatering.
- F. Protect and maintain temporary erosion and sedimentation controls, which are specified in Division 31 Section "Site Clearing" during dewatering operations.

3.2 INSTALLATION

- A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.
 - 1. Space well points or wells at intervals required to provide sufficient dewatering.
 - 2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.

- B. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, 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 foundations, drains, sewers, and other excavations.
 - 1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
- D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
 - 1. Maintain piezometric water level a minimum of 24 inches surface of excavation.
- E. 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 and sediment in a manner that avoids inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.
- F. 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.
 - 1. 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.
- G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

END OF SECTION 31 23 19

SECTION 31 50 00
EXCAVATION AND SUPPORT

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 excavation support and protection systems.
- B. Related Sections include the following:
 - 1. Division 31 Section "Earth Moving" for excavating and backfilling.

1.03 PERFORMANCE REQUIREMENTS

- A. Design, provide, monitor, and maintain an anchored and braced excavation support and protection system capable of resisting soil and hydrostatic pressure and supporting sidewalls of excavations.
 - 1. Work includes removing excavation support and protection systems when no longer needed.
 - 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, utilities and other improvements adjacent to excavation.

1.04 SUBMITTALS

- A. Shop Drawings: Prepared by or under the supervision of a qualified professional engineer for excavation support and protection systems. System design and calculations must be acceptable to authorities having jurisdiction.
 - 1. Include Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.

- B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of similar completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- C. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by excavation support and protection systems.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing excavation support and protection systems similar to those required for this Project and with a record of successful in-service performance.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where the Project is located and who is experienced in providing engineering services for designing excavation support and protection systems that are similar to those indicated for this Project in material, design, and extent.
 - 1. Engineering Responsibility: Engage a qualified professional engineer to prepare or supervise the preparation of data for the excavation support and protection system including drawings and comprehensive engineering analysis that shows the system's compliance with specified requirements.

1.06 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by the Owner or others unless permitted in writing by the architect and then only after arranging to provide temporary utility services according to requirements indicated.
- B. Project Site Information: A geotechnical report has been prepared for this Project and is available for information only. The report is part of the Contract Documents. The opinions expressed in this report are those of the engineer and represent interpretations of the subsoil conditions, tests, and results of analyses conducted by the engineer. Owner will not be responsible for interpretations or conclusions drawn from this data by Contractor.
 - 1. Make additional test borings and conduct other exploratory operations as necessary.
- C. Survey adjacent structures and improvements, employing a qualified professional engineer or surveyor; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
 - 1. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with

original elevations. Promptly notify Engineer if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

1.07 PRODUCTS

- A. None

1.08 MATERIALS

- A. Materials need not be new but must be in serviceable condition.
- B. Structural Steel: ASTM A 36.
- C. Steel Sheet Piling: ASTM A 328 or ASTM A 572.
- D. Wood Lagging: Lumber, mixed hardwood, nominal rough thickness of 3 inches.

1.09 EXECUTION

- A. Not Applicable

1.10 PREPARATION

- A. Protect structures, utilities, 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 and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- C. Locate excavation support and protection systems clear of permanent construction and to permit forming and finishing of concrete surfaces.
- 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 excavation support and protection systems remain stable.
- E. Promptly repair damages to adjacent facilities, to the satisfaction of the Owner caused by installing excavation support and protection systems.

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1.11 SOLDIER BEAMS AND LAGGING

- A. Install steel soldier piles before starting excavation. Space soldier piles at intervals indicated. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.
- B. Install wood lagging within flanges of soldier piles as excavation proceeds. Trim excavation as required to install lagging. Fill voids behind lagging with soil and compact.
- C. Install walls horizontally at centers indicated and secure to soldier piles.

1.12 SHEET PILING

- A. Install one-piece sheet piling and tightly interlock to form a continuous barrier. Accurately align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment. Cut tops of sheet piling to uniform elevation at top of excavation.

1.13 TIEBACKS

- A. Tiebacks: Drill for, install, tension and grout tiebacks into position. Test load-carrying capacity of each tieback and replace and retest deficient tiebacks.

1.14 BRACING

- A. Bracing: Locate bracing to clear columns, floor framing construction and other permanent work. If necessary to move a brace, install new bracing before removing original brace.
 - 1. Do not place bracing where it will be cast into or included in permanent concrete work, unless otherwise approved by architect.
 - 2. Install internal bracing, if required, to prevent spreading or distortion of braced frames.
 - 3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

1.15 REMOVAL AND REPAIRS

- A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils and damaging structures, pavements, facilities and utilities.
 - 1. Remove excavation support and protection systems to a minimum depth of 48 inches below overlying construction and abandon remainder.

2. Repair or replace, as approved by architect, adjacent work damaged or displaced by removing excavation support and protection systems.

END OF SECTION 315000

SECTION 32 11 23

AGGREGATE MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Contract Provisions, Special Provisions, Supplementary Conditions, and Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This item consists of a bedding, backfill, and base courses composed of open graded and crushed aggregates constructed on a prepared subbase for bituminous, concrete or sidewalk pavements in accordance with these specifications and in conformity to the dimensions and typical cross sections shown on the plans.
- B. This item may be used for utility trench backfill.

1.3 TESTING REQUIREMENTS

- A. ASTM C 29 Unit Weight of Aggregate
- B. ASTM C 88 Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
- C. ASTM C 117 Materials Finer than 75um (No. 200) Sieve in Mineral Aggregates by Washing
- D. ASTM C 131 Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine
- E. ASTM C 136 Sieve or Screen Analysis of Fine and Coarse Aggregate
- F. ASTM D 75 Sampling Aggregate
- G. ASTM D 693 Crushed Stone, Crushed Slag, and Crushed Gravel for Dry-or Water-Bound Macadam Base Courses and Bituminous Macadam Base and Surface Courses of Pavements.
- H. ASTM D 1556 Density of Soil in Place by the Sand - Cone Method
- I. ASTM D 1557 Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.5kg) Rammer and 18 in (457 mm) Drop
- J. ASTM D 2419 Sand Equivalent Value of Soils and Fine Aggregate
- K. ASTM D 2922 Density of Soil and Soil-Aggregate in Place by Nuclear Methods

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- L. ASTM D 3017 Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods
- M. ASTM D 3665 Random Sampling of Paving Materials
- N. ASTM D 4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.4 SUBMITTALS

- A. Materials Source: Submit names of materials suppliers.
- B. Submit material data on the following:
 - 1. Aggregate material source
 - 2. Aggregate material data and test reports
 - 3. Gradation analysis

PART 2 - PRODUCTS

2.1 COARSE AGGREGATE MATERIALS

- A. Conforming to PennDOT Pub 408, Section 703, Type A Coarse Aggregate
 - 1. General Backfill: PennDOT No. OGS (gravel),
 - 2. Roadway, pavement, sidewalk or other base course: PennDOT No. 2A
 - 3. Bedding or Drainage course: PennDOT No. 57 Stone.
 - 4. Slag is not permitted as a coarse aggregate.

1.2 FINE AGGREGATE MATERIALS

- A. Conforming to PennDOT Pub 408, Section 703, Type A Fine Aggregate.
 - 1. Slag is not permitted as a fine aggregate.

PART 3 - EXECUTION

3.1 PREPARING UNDERLYING COURSE

- A. The underlying course shall be checked and accepted by the Engineer or Owner's Representative before placing and spreading operations are started. Any ruts or soft yielding places caused by improper drainage conditions, hauling, or any other cause shall be corrected at the Contractor's expense before the base course is placed thereon. Material shall not be placed on frozen subgrade.

3.2 MIXING

- A. The aggregate shall be uniformly blended during crushing operations or mixed in a plant. The plant shall blend and mix the materials to meet the specifications and to secure the proper moisture content for compaction.

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3.3 PLACING

- A. The crushed aggregate base material shall be placed on the moistened subgrade in layers of uniform thickness with a mechanical spreader.
- B. The maximum depth of a compacted layer shall be 6 inches. If the total depth of the compacted material is more than 6 inches, it shall be constructed in two or more layers. In multi-layer construction, the base course shall be placed in approximately equal-depth layers.
- C. The previously constructed layer should be cleaned of loose and foreign material prior to placing the next layer. The surface of the compacted material shall be kept moist until covered with the next layer.

3.4 COMPACTION

- A. Immediately upon completion of the spreading operations, the crushed aggregate shall be thoroughly compacted. The number, type, and weight of rollers shall be sufficient to compact the material to the required density specified or shown on the details.
- B. The moisture content of the material during placing operations shall not be below, nor more than 1-1/2 percentage points above, the optimum moisture content as determined by ASTM D 1557.

3.5 ACCEPTANCE SAMPLING AND TESTING FOR DENSITY

- A. All quality control and quality assurance testing and sampling will be paid for by the contractor.
- B. Aggregate base course shall be accepted for density on a lot basis. A lot will consist of one day's production where it is not expected to exceed 2400 square yards. A lot will consist of one-half day's production where a day's production is expected to consist of between 2400 and 4800 square yards.
- C. Each lot shall be divided into two equal sublots. One test shall be made for each sublot. Sampling locations will be determined by the Engineer on a random basis in accordance with statistical procedures contained in ASTM D 3665.
- D. Each lot will be accepted for density when the field density is at least 98 percent of the maximum density of laboratory specimens prepared from samples of the base course material delivered to the job site. The specimens shall be compacted and tested in accordance with ASTM D 1557. The in-place field density shall be determined in accordance with ASTM D 1556 or D 2922. If the specified density is not attained, the entire lot shall be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached.
- E. In lieu of the core method of field density determination, acceptance testing may be accomplished using a nuclear gage in accordance with ASTM D 2922. The gage should be field calibrated in accordance with paragraph 4 of ASTM D 2922. Calibration tests shall be conducted on the first lot of material placed that meets the density requirements.

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- F. Use of ASTM D 2922 results in a wet unit weight, and when using this method, ASTM D 3017 shall be used to determine the moisture content of the material. The calibration curve furnished with the moisture gages shall be checked as described in paragraph 7 of ASTM D 3017. The calibration checks of both the density and moisture gages shall be made at the beginning of a job and at intervals as determined by the Engineer.
- G. If a nuclear gage is used for density determination, two random readings shall be made for each subplot.

3.6 FINISHING

- A. The surface of the aggregate base course shall be finished by blading or with automated equipment especially designed for this purpose.
- B. In no case will the addition of thin layers of material be added to the top layer of base course to meet grade. If the elevation of the top layer is 1/2 inch or more below grade, the top layer of base shall be scarified to a depth of at least 3 inches, new material added, and the layer shall be blended and recompact to bring it to grade. If the finished surface is above plan grade, it shall be cut back to grade and rerolled.

3.7 SURFACE TOLERANCES

- A. The finished surface shall not vary more than 3/8 inch when tested with a 16-foot straightedge applied parallel with or at right angles to the centerline. Any deviation of this amount shall be corrected by the Contractor at the Contractor's expense.

3.8 THICKNESS CONTROL

- A. The completed thickness of the base course shall be within 1/2 inch of the design thickness. Four determinations of thickness shall be made for each lot of material placed. The lot size shall be consistent with that specified in paragraph 3.5. Each lot shall be divided into four equal sublots. One test shall be made for each subplot. Sampling locations will be determined by the Engineer on a random basis in accordance with procedures contained in ASTM D 3665. Where the thickness is deficient by more than 1/2 inch, the Contractor shall correct such areas at no additional cost by excavating to the required depth and replacing with new material. Additional test holes may be required to identify the limits of deficient areas.

3.9 MAINTENANCE

- A. The base course shall be maintained in a condition that will meet all specification requirements until the work is accepted. Equipment used in the construction of an adjoining section may be routed over completed portions of the base course, provided no damage results and provided that the equipment is routed over the full width of the base course to avoid rutting or uneven compaction.

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PART 4 - QUALITY CONTROL REQUIREMENTS

4.1 GENERAL

- A. Conform to all applicable provisions of Division 01 section, "Quality Requirements".
- B. All testing shall be performed in accordance with PennDOT Pub 408 for the placement and compaction of the aggregate as bedding, base course, or foundation.
- C. When tests indicate materials do not meet specified requirements, removal and replacement will be required.
- D. The Contractor or the Contractor's quality control testing service shall take all samples and perform all tests required for quality control sampling and testing to be performed by the Contractor or the testing service and all quality assurance samples to be tested by the Owner's Representative. All costs for all quality control and quality assurance sampling and quality control testing shall be included in the Contractor's cost for the project. Unless otherwise noted, the number of samples for quality control testing and sampling shall be the same for quality assurance testing.
- E. All of the Contractor's or testing agency test results shall be provided to the Owner or Owner's Representative.

END OF SECTION 321123

SECTION 32 12 16
ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Hot-mix asphalt paving.
- 2. Asphalt surface treatments.
- 3. Pavement-marking paint.

B. Related Sections:

- 1. Division 32 Section "Pavement Joint Sealants" for joint sealants and fillers at paving terminations.

1.3 DEFINITION

- A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
 - 1. Job-Mix Designs: For each job mix proposed for the Work.
- B. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.
- C. Material Certificates: For each paving material, from manufacturer.
- D. Material Test Reports: For each paving material.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Imprinted-asphalt manufacturer's authorized installer who is trained and approved for installation of imprinted asphalt required for this Project.
- B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.
- C. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of any regulatory agency for asphalt paving work.
- D. Pre-installation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:
 - a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
 - b. Review condition of subgrade and preparatory work.
 - c. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
 - d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
 - 1. Tack Coat: Minimum surface temperature of 60 deg F.
 - 2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
 - 3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

- B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Coarse Aggregate: ASTM D 692, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.
- C. Fine Aggregate: ASTM D 1073, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.

2.2 ASPHALT MATERIALS

- A. Asphalt Binder: AASHTO M 320, of required performance grade.
- B. Asphalt Cement: ASTM D 3381 for viscosity-graded material.
- C. Tack Coat: ASTM D 977 emulsified asphalt, of suitable grade and consistency for application.
- D. Water: Potable.

2.3 AUXILIARY MATERIALS

- A. Joint Sealant: ASTM D 6690, Type I, hot-applied, single-component, polymer-modified bituminous sealant.
- B. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO M 248; colors complying with FS TT-P-1952.
 - 1. Color: As indicated.
- C. Glass Beads: AASHTO M 247, Type 1.

2.4 MIXES

- A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and complying with the following requirements:

1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proof-roll subgrade below 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, Limit vehicle speed to 3 mph.
 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- C. Proceed with paving only after unsatisfactory conditions have been corrected.
- D. Verify that utilities, traffic loop detectors, and other items requiring a cut and installation beneath the asphalt surface have been completed and that asphalt surface has been repaired flush with adjacent asphalt prior to beginning installation of imprinted asphalt.

3.2 PATCHING

- A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd.
 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- C. Patching: Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.
- D. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.3 REPAIRS

SCHUYLKILL RIVER TRAIL EXTENSION – 56th Street to 61st Street
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ASPHALT PAVING

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- A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch in existing pavements.
- B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/4 inch.
 - 1. Clean cracks and joints in existing hot-mix asphalt pavement.
 - 2. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.

3.4 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.5 HOT-MIX ASPHALT PLACING

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 - 1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
 - 2. Spread mix at minimum temperature of 250 deg F.
 - 3. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
 - 4. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.6 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1. Clean contact surfaces and apply tack coat to joints.
 - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
 - 3. Offset transverse joints, in successive courses, a minimum of 24 inches.
 - 4. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 - 5. Compact asphalt at joints to a density within 2 percent of specified course density.

3.7 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
 - 1. Complete compaction before mix temperature cools to 185 deg F.
- B. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- C. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- D. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- E. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- F. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.8 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 - 1. Base Course: Plus or minus 1/2 inch.
 - 2. Surface Course: Plus 1/4 inch, no minus.

- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

- 1. Base Course: 1/4 inch.
- 2. Surface Course: 1/8 inch.

3.9 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow paving to age for 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979.
 - 1. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
 - a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than 3 cores taken.
 - b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
- E. Replace and compact hot-mix asphalt where core tests were taken.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.11 DISPOSAL

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

END OF SECTION 32 12 16

SECTION 32 13 14

CONCRETE CURBING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Construct City of Philadelphia Type B concrete curb in accordance with City of Philadelphia, Department of Streets Drawing No. L-779R, depressed, curved, or straight, at locations indicated on the drawings or as directed by the Engineer.
- B. Construct 6" mountable curb in accordance with PennDOT 408 as indicated on the drawings.

1.2 REFERENCES

- A. PennDOT Specifications Publication 408 (latest revision).

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Concrete: 4000 psi in accordance with Section 704, PennDOT 408.
- B. Expansion Joint Material: Section 705.1, PennDOT 408.
- C. Curing Compound: Section 711.2(a), PennDOT 408.

PART 3 - EXECUTION

3.1 PROCEDURE

- A. Section 630.3, PennDOT 408, with the following additions:
 - 1. Concrete may be placed in the forms in one lift provided there are sufficient personnel and equipment on the project to thoroughly consolidate the concrete.
 - 2. Curing compound shall be applied to the top of the curb before any marked dehydration of the concrete surface occurs. The forms shall be removed within 24 hours and all exposed concrete surfaces cured.

3. When directed, the Contractor shall provide additional protection by covering the curb with salt hay at his expense.

END OF SECTION 321314

SECTION 321316 – DECORATIVE CONCRETE FINISHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Installation of architectural grade integrally colored concrete with sparkle grain finishing system

1.3 RELATED REQUIREMENTS

- A. Division 2 Existing Conditions
- B. Division 3 Concrete

1.4 REFERENCE STANDARDS

- A. ASTM: Specifications of the American Society for Testing and Materials latest editions. Modifications specified herein shall govern where conflicts with ASTM standards occur.
- B. ACI: American Concrete Institute, current published standards.

1.5 SUBMITTALS

- A. Submit prior to delivery of materials to site.
- B. Product data: Submit product literature or tear sheets with name of product and manufacturer. Indicate color selection for approval.
 - 1. Formwork
 - 2. Cementitious materials
 - 3. Joint filler
 - 4. Accessories
 - 5. Curing compounds
 - 6. Color Pigment
 - 7. Sparkle Grain
- C. Samples for Verification:
 - 1. Color pigment
 - 2. Sparkle Grain Finish Aggregate

3. Concrete sample for color and texture determination. 12"x12"x2", cast vertical, using specified form material. Finish with specified finish treatment:
 - i) Architectural grade finish with integral color with sparkle grain finish

D. Action Submittals:

1. Design Mixtures: For each concrete mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
2. Source of supply: Submit in writing all proposed sources. Obtain concrete from one source.

1.6 QUALITY ASSURANCE

- A. Contractor shall have had experience with at least two (2) other projects of similar scope and complexity and shall perform work with personnel totally familiar with integrally colored concrete installation and under the supervision of an experienced foreperson.
- B. Mockups for Landscape Architect Acceptance:
 1. Locations of mockups to be submitted for approval by Landscape Architect and Owner.
 2. Provide sample for each color and architectural finish of concrete including, but not limited to:
 - a. Seat Wall: Build wall section of full thickness and height to demonstrate typical joints, edges, surface finish, color, and curing. Mockup shall not be less than (3) feet in length.
 - b. Cast-In-Place Curb: Build curb section of full thickness and height to demonstrate typical joints, surface finish, color, and curing. Mockup shall not be less than (3) feet in length. Build adjacent to seat wall mockup to demonstrate relationship and joints.
 3. Accepted mockup establishes minimum standard of quality and workmanship for work.
 4. Timing: Construct at least one month before review to allow concrete to cure before final inspection.
 5. If initial mockup is rejected, build additional mockups to arrive at desired features. Retain all mockups until acceptable mock-up is selected by Landscape Architect. Retain and protect acceptable mockup during construction as standard for judging work. Do not alter, move, damage or destroy mockup until work is complete.
 6. Approval of mockups does not constitute approval of deviations from the Construction Documents contained in mockups unless Landscape Architect specifically approves such deviations in writing.

1.7 REGULATORY REQUIREMENTS

- A. Comply with all rules, regulations, laws and ordinances of local, state and federal authorities having jurisdiction. Provide labor, materials, equipment and services necessary to make work comply with such requirements without additional cost to Owner.
- B. Investigate the conditions of public thoroughfares and roads as to availability, clearances, loads, limits, restrictions and other limitations affecting transportation to and ingress and egress at the site.

1. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.
- C. Conform to applicable code for disposal of debris.
- D. Procure and pay for permits and licenses required for work.

1.8 DELIVERY STORAGE AND HANDLING

- A. Deliver, store, handle and protect all materials from damage.

1.9 PROJECT CONDITIONS

- A. Existing conditions:
 1. Verify all existing conditions in the field.
 - a. Should any work performed under this Section expose previously unknown conditions, immediately report the discovery to Owner and Landscape Architect. However, during this time use any measures necessary to maintain adequate safety conditions.
 - b. Should Contractor, in the course of work, find any discrepancies between Drawings and physical conditions or any omissions or errors in Drawings, inform Landscape Architect immediately in writing for clarification. Work done after such discovery, unless authorized by Owner, shall be at Contractor's risk.
- B. Protection of existing conditions adjacent to and within construction zone:
 1. All necessary precautions for safety including barricades and other protection measures shall be taken during all work.
 2. All heavy equipment shall be driven or parked on the site only where approved by Owner.
 3. Existing pavements, structures, walls, etc. damaged, disturbed or soiled during construction shall be repaired or replaced to the satisfaction of the Owner at no additional cost.
 4. Repair and replace all active utility lines, above and below grade, damaged in the course of construction operations at no additional cost to Owner.
 5. Avoid damaging existing trees. Damage includes but is not limited to: cutting, breaking, skinning or compacting of roots, skinning and bruising of bark and breaking of branches and limbs.
 - a. Contractor shall not park or store equipment and supplies within four (4) feet of trunk of existing trees to remain.
 - b. Contractor shall be responsible for replacing any tree which the Landscape Architect determines to be irreparably damaged.
 - i) Replacement species shall be determined by Landscape Architect.
 - ii) Replacements shall be trees of identical caliper or the number of trees of a smaller caliper, (not less than 3 inch caliper per individual tree), to equal the caliper of the damaged tree. For example, if a tree with a caliper of nine (9) inches is damaged, the Contractor shall supply either one nine (9) inch tree or three three (3) inch trees.
- C. Environmental requirements:

1. Do not place concrete when the temperature of either the air or surface on which the mixture is to be placed is 40 degrees F or lower.

1.10 SEQUENCING AND SCHEDULING

- A. Coordinate work of this Section with work of all other Sections of Specification.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Substitutions: Subject to compliance with requirements, equivalent products of another acceptable manufacturer will be considered upon submission to Landscape Architect.
- B. Color Pigment: Davis Colors, 7101 Muirkirk Road, Beltsville, MD 20705, 1-800-638-4444, daviscolors.com, or approved equal.
- C. Sparkle Grain Finish System: Pacific Palette, P.O. Box 5176, Santa Cruz, CA, 831-457-4566, pacificpalette.com, or approved equal.

2.2 FORM MATERIALS

- A. Form Materials for Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practical sizes to minimize number of joints.
 1. 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.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.3 CONCRETE MATERIALS

- A. Concrete Mix: Refer to Specification 033000 for Concrete Mix.
- B. Color Pigment: Davis Colors - Silversmoke Iron Oxide, as shown on the Drawings and per approved mock-up.
- C. Sparkle Grain: Black, 50/50 Mix of 36 grit and 16 grit. Sparkle Grain Finish System to be applied to CIP seat wall and CIP curb at Fishing Pier.

2.4 RELATED MATERIALS

- A. Joint Filler: Pre-molded sponge rubber in preformed strips, color: to be selected by Landscape Architect, complying with AASHTO M 153 Type 1 and ASTM D 1752 Type 1. Material shall be virgin blown open cell sponge rubber with a minimum density rating of 30 pounds per cubic foot.
- B. Concrete admixtures and curing materials: As required and approved by Engineer and per Section 033000.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that previously installed protection measures are in place. Protect adjacent existing structures or new construction from discoloration and spillage during application of color hardeners, release agents, stains, curing compounds, and sealers.
- B. Verify that all surfaces abutting new integrally colored concrete are clean, true and free from chips, etc.
- C. Verify alignments of as-built walls and surfaces prior to locating control joints. Verify location of control joints in graphic form to Landscape Architect prior to placement of joints. Layout of control joints shall be as shown on drawings. All joint lines shall be parallel and perpendicular to curbline.
- D. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION FOR CONCRETE

- A. Place and secure forms to correct location, dimension and profile.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Proof roll prepared subbase to check for unstable areas and need for additional compaction.
- D. Moisten base to minimize absorption of water from fresh concrete.

3.3 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
 - 1. When joining existing concrete, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations and at locations where operations are stopped for more than one-half hour unless concrete terminates at isolation joints.

1. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
 1. Locate isolation joints at intervals as shown on Drawings.
 2. Extend joint fillers full width and depth of joint.
 3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
 1. Grooved Contraction Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Eliminate grooving-tool marks on concrete surfaces.
 2. Sawed Contraction Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

3.4 INSTALLATION OF CONCRETE

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.
- B. Remove snow, ice, or frost from subbase surface and steel 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. Water added to concrete during delivery or at Project site must comply with ACI 301 and ASTM C 94/C 94M requirements. Do not add water to fresh concrete after testing.
- F. 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.
- G. 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.

- H. Screed concrete surface with a straightedge and strike off.
- I. 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.
- J. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - 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 design mixtures.
- K. 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 in 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.
- L. Maintain records of concrete placement. Record date, location of pour, quantity, air temperature and test samples taken.
- M. Do not depress coarse aggregate too deeply when floating.

3.5 FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Sparkle Grain Dry-Shake Finish: Apply dry-shake materials to concrete surface according to manufacturer's written instructions, to result in concrete finish consistent with approved mockup, and as follows:
 - 1. Rate: Uniformly spread Sparkle Grain at a rate of 20 lb/100 sq. ft.
 - 2. Initial Concrete Placement: Spread, shovel, rod, vibrate as needed the initial concrete placement to eliminate voids within forms and properly consolidate the concrete. Complete surface smoothing with a wood float to ensure the surface does not close, trap bleed water below the surface, and begin surface delamination. Immediately after concrete has been leveled and floated but before bleed water has appeared, Sparkle Grain shall be applied evenly while there is still sufficient moisture in the slab to promote at least two Sparkle Grain applications.

3. First Broadcast of Sparkle Grain: Using a technique that keeps product below the knee to minimize dusting, waste, and loss of fine materials, hand or machine broadcast half of the desired dose of Sparkle Grain across the surface of the concrete. Use an underhand or side arm motion taking care to ensure even distribution. Always keep a small amount of material in reserve for touch-up application of missed spots, or unintentionally disrupted areas. Trowel the sparkle grain uniformly into the concrete surface. Use a steel trowel to leave grains at the surface covered with a thin film of cement paste.
4. Second Broadcast of Sparkle Grain: Using technique described in step 3, broadcast the remaining material from a different direction than the first to eliminate bare spots. Trowel the second coat of sparkle grain uniformly into the concrete surface.
5. Final Finishing: Follow with a light trowel to produce a smooth surface free from defects or blemishes. Finish troweling should be delayed until surface has set sufficiently to avoid burying the sparkle grain but must be accomplished before the surface has hardened. Do not wet tools or color alteration will likely result.
6. Water and a soft broom, or sponge, may be used. Allow concrete surface to set sufficiently so that light scrubbing will not cause pitting.

3.6 CONCRETE CURING AND PROTECTION

- 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. 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 lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, laced 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 occurring during installation or curing period using cover material and waterproof tape.

3.7 TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 3/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot long, unlevelled straightedge not to exceed 1/2 inch.
4. Joint Spacing: 3 inches.
5. Contraction Joint Depth: Plus 1/4 inch, no minus.
6. Joint Width: Plus 1/8 inch, no minus.

3.8 REPAIRS AND PROTECTION

- A. Remove and replace concrete that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Landscape Architect.
- B. Protect concrete from damage. Exclude traffic from concrete for at least 14 days after placement. When construction traffic is permitted, maintain concrete as clean as possible by removing surface stains and spillage of materials as they occur.
- C. Maintain concrete free of stains, discoloration, dirt, and other foreign material. Sweep & clean concrete not more than two days before date scheduled for Substantial Completion inspections.

3.9 FIELD QUALITY CONTROL

- A. Refer to Specification 033000.

3.10 CLEAN UP

- A. Maintain the site in an orderly condition during the progress of work. Promptly remove debris and trash. Leave the site in a neat, orderly condition, broom clean.

END OF SECTION 321316

SECTION 32 17 23
PAVEMENT MARKINGS

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 painted markings applied to asphalt pavement.
- B. Related Requirements:
 - 1. Section 099113 "Exterior Painting" for painting exterior concrete surfaces other than pavement.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to marking pavement including, but not limited to, the following:
 - a. Pavement aging period before application of pavement markings.
 - b. Review requirements for protecting pavement markings, including restriction of traffic during installation period.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include technical data and tested physical and performance properties.
- B. Shop Drawings: For pavement markings.
 - 1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
 - 2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

- C. Samples: For each exposed product and for each color and texture specified; on rigid backing, 8 inches square.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of Publication 408 of PENNDOT for pavement-marking work.
 - 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for alkyd materials 55 deg F for water- based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 PAVEMENT-MARKING PAINT

- A. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO M 248, Type F; colors complying with FS TT-P-1952.
 - 1. Color: White & Yellow As indicated.
- B. Pavement-Marking Paint: MPI #32, alkyd traffic-marking paint.
 - 1. Color: White & Yellow As indicated.
- C. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than 45 minutes.
 - 1. Color: White & Yellow As indicated.
- D. Pavement-Marking Paint: MPI #97, latex traffic-marking paint.
 - 1. Color: White & Yellow As indicated.
- E. Glass Beads: AASHTO M 247, Type 1 made of 100 percent recycled glass.
 - 1. Roundness: Minimum 80 percent true spheres by weight.
- F. VOC Content: Pavement markings used on building interior shall have a VOC

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content of 150 g/L or less.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.
- B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Design Engineer.
- B. Allow paving to age for a minimum of 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
 - 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond the stencil. Apply paint so that it cannot run beneath the stencil.
 - 2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal..

3.3 PROTECTING AND CLEANING

- A. Protect pavement markings from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 321723

SECTION 32 31 13
CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Chain-link fences.
2. Swing gates.

B. Related Requirements:

1. Section 033053 "Miscellaneous Cast-in-Place Concrete" for cast-in-place concrete and post footings.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Inspect and discuss electrical roughing-in, equipment bases, and other preparatory work specified elsewhere.
2. Review coordination of interlocked equipment specified in this Section and elsewhere.
3. Review required testing, inspecting, and certifying procedures.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 - a. Fence and gate posts, rails, and fittings.
 - b. Chain-link fabric, reinforcements, and attachments.
 - c. Gates and hardware.

B. Shop Drawings: For each type of fence and gate assembly.

1. Include plans, elevations, sections, details, and attachments to other work.
 2. Include accessories, hardware, gate operation, and operational clearances.
- B. Samples for Initial Selection: For each type of factory-applied finish.
- C. Samples for Verification: For each type of component with factory-applied finish, prepared on Samples of size indicated below:
1. Polymer-Coated Components: In 6-inch lengths for components and on full-sized units for accessories.
- D. Delegated-Design Submittal: For structural performance of chain-link fence and gate frameworks, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer factory-authorized service representative.
- B. Product Certificates: For each type of chain-link fence, operator, and gate.
- C. Product Test Reports: For framework strength according to ASTM F 1043, for tests performed by a qualified testing agency.
- D. Field quality-control reports.
- E. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For gate operators to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing fence grounding; member company of NETA or an NRTL.
 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.
- B. Emergency Access Requirements: According to requirements of authorities having jurisdiction for gates with automatic gate operators serving as a required means of access.
- C. Mockups: Build mockups to set quality standards for fabrication and installation.
 1. Build mockup for typical chain-link fence and gate, including accessories.
 - a. Size: 10-foot length of fence.

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1.8 FIELD CONDITIONS

- A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees Installer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to comply with performance requirements.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - c. Faulty operation of gate operators and controls.
 - 2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design chain-link fence and gate frameworks.
- B. Structural Performance: Chain-link fence and gate frameworks shall withstand the design wind loads and stresses for fence height(s) and under exposure conditions indicated according to ASCE/SEI 7.
 - 1. Design Wind Load: As indicated on Drawings 30,000 psi yield.
 - a. Minimum Post Size: Determine according to ASTM F 1043 for post spacing not to exceed 10 feet for Material Group IA, ASTM F 1043, Schedule 40 steel pipe.
 - b. Minimum Post Size and Maximum Spacing: Determine according to CLFMI WLG 2445, based on mesh size and pattern specified.

2.2 CHAIN-LINK FENCE FABRIC

- A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist according to "CLFMI Product Manual" and requirements indicated below:
 - 1. Fabric Height: As indicated on Drawings.
 - 2. Steel Wire for Fabric: Wire diameter of 0.148 inch.

- a. Mesh Size: 1 inch.
 - b. Vinyl-Coated Fabric: ASTM F-668, Class 24, 0.35 oz./sq. ft..
 - 1) Color: Black, according to ASTM F 934.
 - c. Coat selvage ends of metallic-coated fabric before the weaving process with manufacturer's standard clear protective coating.
3. Selvage: Knuckled at both selvages.

2.3 FENCE FRAMEWORK

- A. Posts and Rails Sheet 28: ASTM F 1043 for framework, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 or ASTM F 1083 based on the following:
- 1. Fence Height: 72 inches As indicated on Drawings .
 - 2. Heavy-Industrial-Strength Material: Group IA, round steel pipe, Schedule 40.
 - a. Line Post: 2.0 inches in diameter.
 - b. End, Corner, and Pull Posts: 2.5 inches in diameter .
 - 3. Horizontal Framework Members: Intermediate top and bottom rails according to ASTM F 1043.
 - a. Top Rail: 1.5 inches.
 - 4. Brace Rails: ASTM F 1043.
 - 5. Polymer coating over metallic coating.
 - a. Color: Black, according to ASTM F 934.

2.4 TENSION WIRE

- A. Metallic-Coated Steel Wire: 0.177-inch- diameter, marcelled tension wire according to ASTM A 817 or ASTM A 824, with the following metallic coating:
- 1. Type I: Aluminum coated (aluminized).
 - 2. Type II: Zinc coated (galvanized) by electrolytic] process, with the following minimum coating weight:
 - a. Class 3: Not less than 0.8 oz./sq. ft. of uncoated wire surface.
 - b. Class 4: Not less than 1.2 oz./sq. ft. of uncoated wire surface.
 - c. Class 5: Not less than 2 oz./sq. ft. of uncoated wire surface.
 - d. Matching chain-link fabric coating weight.
 - 3. Type III: Zn-5-Al-MM alloy with the following minimum coating weight:

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- a. Class 60: Not less than 0.6 oz./sq. ft. of uncoated wire surface.
 - b. Class 100: Not less than 1 oz./sq. ft. of uncoated wire surface.
 - c. Matching chain-link fabric coating weight.
- B. Polymer-Coated Steel Wire: 0.177-inch diameter, tension wire according to ASTM F 1664, Class 2a over aluminum-coated steel wire.
 - 1. Color: Black, according to ASTM F 934.
- C. Aluminum Wire: 0.192-inch- diameter tension wire, mill finished, according to ASTM B 211, Alloy 6061-T94 with 50,000-psi minimum tensile strength.

2.5 SWING GATES

- A. General: ASTM F 900 for gate posts and double swing gate types.
 - 1. Gate Leaf Width: 36 inches.
 - 2. Framework Member Sizes and Strength: Based on gate fabric height of 72 inches or less.
- B. Pipe and Tubing:
 - 1. Zinc-Coated Steel: ASTM F 1043 and ASTM F 1083; protective coating and finish to match fence framework.
 - 2. Aluminum: ASTM B 429/B 429M; manufacturer's standard finish.
 - 3. Gate Posts: Round tubular steel.
 - 4. Gate Frames and Bracing: Round tubular steel.
- C. Frame Corner Construction: Welded.

SECTION 32 32 15

PRECAST MODULAR BLOCK GRAVITY RETAINING WALL

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes furnishing all materials and labor required for the design and construction of a precast concrete modular block (PMB) retaining wall without geosynthetic reinforcement. Precast modular block retaining wall blocks under this section shall be cast utilizing a wet-cast concrete mix and exhibit a final handling weight in excess of 1,000 pounds (450 kg) per unit.
- B. Scope of Work:
 - 1. Furnishing labor, equipment and supervision for the construction of a precast modular block (PMB) retaining wall structure in accordance with the requirements of this section and in acceptable conformity with the lines, grades, design and dimensions shown in the project site plans and Contractor provided structural wall drawings sealed by a professional engineer licensed in the State where work is being performed.
- C. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 31, Division 32 and Division 33 also apply to this Section.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Allowances. No allowance shall be made in the price of the retaining wall for excavation beyond the limits required for retaining wall construction as shown on the project plans. The cost of excavation for the purposes of site access shall be the responsibility of the General Contractor. Removal of unsuitable soils and replacement with select fill shall be as directed and approved in writing by the Owner or Owner's representative and shall be paid under separate pay items.
- B. Unit Prices. In addition to a lump sum price pursuant to completion of the scope of work described in Part 1.01 of this Section, the General Contractor shall provide a unit price per square foot of vertical wall face that shall be the basis of compensation for up to a ten (10) percent increase or reduction in the overall scope of the retaining wall work.
- C. Measurement and Payment.
 - 1. The unit of measurement for furnishing the precast modular block retaining wall system shall be the vertical area of the wall face surface as measured from the top of the leveling pad to the top of the wall including coping. The final measured quantity shall include supply of all material components and the installation of the precast modular block retaining wall system.

2. The final accepted quantities of the precast modular block retaining wall system will be compensated per the vertical face area as described above. The quantities of the precast modular block retaining wall as shown on the plans and as approved by the Owner shall be the basis for determination of the final payment quantity. Payment shall be made per square foot of vertical wall face.

1.03 REFERENCES

A. Where the specification and reference documents conflict, the Owner's designated representative will make the final determination of the applicable document.

B. Definitions:

1. Precast Modular Block (PMB) Unit – machine-placed, “wet cast” concrete modular block retaining wall facing unit.
2. Geotextile – a geosynthetic fabric manufactured for use as a separation and filtration medium between dissimilar soil materials.
3. Drainage Aggregate – clean, crushed stone placed within and immediately behind the precast modular block units to facilitate drainage and reduce compaction requirements immediately adjacent to and behind the precast modular block units.
4. Unit Core Fill – clean, crushed stone placed within the hollow vertical core of a precast modular block unit. Typically, the same material used for drainage aggregate as defined above.
5. Foundation Zone – soil zone immediately beneath the leveling pad.
6. Retained Zone – soil zone immediately behind the drainage aggregate and wall infill for wall sections designed as modular gravity structures.
7. Leveling Pad – hard, flat surface upon which the bottom course of precast modular blocks are placed. The leveling pad may be constructed with crushed stone or cast-in-place concrete. A leveling pad is not a structural footing.
8. Wall Infill – the fill material placed and compacted between the drainage aggregate and the excavated soil face in retaining wall sections designed as modular gravity structures.

C. Reference Standards

1. Design
 - a. AASHTO LRFD Bridge Design Specifications, 7th Edition, 2014.
 - b. Minimum Design Loads for Buildings and Other Structures – ASCE/SEI 7-10.
 - c. International Building Code, 2012 Edition.
 - d. Design Manual for Segmental Retaining Walls, National Concrete Masonry Association, 3rd Edition, 2010
2. Precast Modular Block Units
 - a. ACI 201 – Guide to Durable Concrete
 - b. ACI 318 – Building Code Requirements for Structural Concrete
 - c. ASTM C33 – Standard Specification for Concrete Aggregates

- d. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
- e. ASTM C94 – Standard Specification for Ready-Mixed Concrete.
- f. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- g. ASTM C143 – Standard Test Method for Slump of Hydraulic-Cement Concrete.
- h. ASTM C150 – Standard Specification for Portland Cement
 - a. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - b. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
 - c. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.
 - d. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
 - e. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 - f. ASTM C666 – Standard Test Method for Concrete Resistance to Rapid Freezing and Thawing.
 - g. ASTM C845 - Standard Specification for Expansive Hydraulic Cement.
 - h. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
 - i. ASTM C989 - Standard Specification for Slag Cement for Use in Concrete and Mortars.
 - j. ASTM C1116 – Standard Specification for Fiber-Reinforced Concrete.
 - k. ASTM C1157 - Standard Performance Specification for Hydraulic Cement.
 - l. ASTM C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
 - m. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
 - n. ASTM C1611 – Standard Test Method for Slump Flow of Self-Consolidating Concrete.
 - o. ASTM C1776 – Standard Specification for Wet-Cast Precast Modular Retaining Wall Units.
 - p. ASTM D6638 – Standard Test Method for Determining Connection Strength Between Geosynthetic Reinforcement and Segmental Concrete Units (Modular Concrete Blocks).
 - q. ASTM D6916 – Standard Test Method for Determining Shear Strength Between Segmental Concrete Units (Modular Concrete Blocks).
- 3. Geosynthetics
 - a. AASHTO M 288 – Geotextile Specification for Highway Applications.
 - b. ASTM D3786 – Standard Test Method for Bursting Strength of Textile Fabrics Diaphragm Bursting Strength Tester Method.
 - c. ASTM D4354 – Standard Practice for Sampling of Geosynthetics for Testing.
 - d. ASTM D4355 – Standard Test Method for Deterioration of Geotextiles

- e. ASTM D4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
- f. ASTM D4533 – Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
- g. ASTM D4595 – Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
- h. ASTM D4632 – Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
- i. ASTM D4751 – Standard Test Method for Determining Apparent Opening Size of a Geotextile.
- j. ASTM D4759 – Standard Practice for Determining Specification Conformance of Geosynthetics.
- k. ASTM D4833 – Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.
- l. ASTM D4873 – Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.
- m. ASTM D6241 – Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.

4. Soils

- a. AASHTO M 145 – AASHTO Soil Classification System.
- b. AASHTO T 104 – Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.
- c. AASHTO T 267 – Standard Method of Test for Determination of Organic Content in Soils by Loss of Ignition.
- d. ASTM C33 – Standard Specification for Concrete Aggregates.
- e. ASTM D422 – Standard Test Method for Particle-Size Analysis of Soils.
- f. ASTM D448 – Standard Classification for Sizes of Aggregates for Road and Bridge Construction.
- g. ASTM D698 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort. (12,400 ft-lbf/ft (2,700 kN-m/m)).
- h. ASTM D1241 – Standard Specification for Materials for Soil-Aggregate Subbase, Base and Surface Courses.
- i. ASTM D1556 – Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.
- j. ASTM D1557 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort. (56,000 ft-lbf/ft (2,700 kN-m/m)).
- k. ASTM D2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
- l. ASTM D2488 – Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).

- m. ASTM D3080 – Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions.
 - n. ASTM D4254 – Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
 - o. ASTM D4318 – Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - p. ASTM D4767- Test Method for Consolidated-Undrained Triaxial Compression Test for Cohesive Soils.
 - q. ASTM D4972 – Standard Test Method for pH of Soils.
 - r. ASTM D6938 – Standard Test Method for In-Place Density and Water Content of Soil and Aggregate by Nuclear Methods (Shallow Depth).
 - s. ASTM G51 – Standard Test Method for Measuring pH of Soil for Use in Corrosion Testing.
 - t. ASTM G57 – Standard Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method.
5. Drainage Pipe
- a. ASTM D3034 – Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - b. ASTM F2648 – Standard Specification for 2 to 60 inch [50 to 1500 mm] Annular Corrugated Profile Wall Polyethylene (PE) Pipe and Fittings for Land Drainage Applications.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preconstruction Meeting. As directed by the Owner, the General Contractor shall schedule a preconstruction meeting at the project site prior to commencement of retaining wall construction. Participation in the preconstruction meeting shall be required of the General Contractor, Retaining Wall Design Engineer, Retaining Wall Installation Contractor, Grading Contractor and Inspection Engineer. The General Contractor shall provide notification to all parties at least 10 calendar days prior to the meeting.
1. Preconstruction Meeting Agenda:
- a. The Retaining Wall Design Engineer shall explain all aspects of the retaining wall construction drawings.
 - b. The Retaining Wall Design Engineer shall explain the required bearing capacity of soil below the retaining wall structure and the shear strength of in-situ soils assumed in the retaining wall design to the Inspection Engineer.
 - c. The Retaining Wall Design Engineer shall explain the required shear strength of fill soil in the retained and foundation zones of the retaining wall to the Inspection Engineer.
 - d. The Retaining Wall Design Engineer shall explain any measures required for coordination of the installation of utilities or other obstructions in the retained fill zones of the retaining wall.

- e. The Retaining Wall Installation Contractor shall explain all excavation needs, site access and material staging area requirements to the General Contractor and Grading Contractor.1.05

1.05 SUBMITTALS

- A. Product Data. At least 14 days prior to construction, the General Contractor shall submit a minimum of six (6) copies of the retaining wall product submittal package to the Owner's Representative for review and approval. The submittal package shall include technical specifications and product data from the manufacturer for the following:
 - 1. Precast Modular Block System brochure
 - 2. Precast Modular Block concrete test results specified in paragraph 2.01, subparagraph B of this section as follows:
 - a. 28-day compressive strength
 - b. Air content
 - c. Slump or Slump Flow (as applicable)
 - 3. Drainage Pipe
 - 4. Geotextile
- B. Installer Qualification Data. At least 14 days prior to construction, the General Contractor shall submit the qualifications of the business entity responsible for installation of the retaining wall, the Retaining Wall Installation Contractor, per paragraph 1.07, subparagraph A of this section.
- C. Retaining Wall Design Calculations and Construction Shop Drawings. At least 14 days prior to construction, the General Contractor shall furnish six (6) sets of construction shop drawings and six (6) copies of the supporting structural calculations report to the Owner and Owner's representative for review and approval. This submittal shall include the following:
 - 1. Signed, sealed and dated drawings and engineering calculations prepared in accordance with these specifications.
 - 2. Qualifications Statement of Experience of the Retaining Wall Design Engineer as specified in paragraph 1.07, subparagraph B of this section.
 - 3. Certificate of Insurance of the Retaining Wall Design Engineer as specified in paragraph 1.06, subparagraph B of this section.

1.06 CONSTRUCTION SHOP DRAWING PREPARATION

- A. The Retaining Wall Design Engineer shall coordinate the retaining wall construction shop drawing preparation with the project Civil Engineer, project Geotechnical Engineer and Owner's Representatives. The General Contractor shall furnish the Retaining Wall Design Engineer the following project information required to prepare the construction shop drawings. This information shall include, but is not limited to, the following:

1. Current versions of the site, grading, drainage, utility, erosion control, landscape, and irrigation plans;
 2. Electronic CAD file of the civil site plans listed in (1);
 3. Report of geotechnical investigation and all addenda and supplemental reports;
 4. Recommendations of the project Geotechnical Engineer regarding effective stress shear strength and total stress shear strength (when applicable) parameters for in-situ soils in the vicinity of the proposed retaining wall(s) and for any fill soil that may potentially be used as backfill in retained and/or foundation zones of the retaining wall.
- B. The Retaining Wall Design Engineer shall provide the Owner with a certificate of professional liability insurance verifying the minimum coverage limits of \$1 million per claim and \$1 million aggregate.
- C. Design of the precast modular block retaining wall shall satisfy the requirements of this section. Where local design or building code requirements exceed these specifications, the local requirements shall also be satisfied.
- D. The Retaining Wall Design Engineer shall note any exceptions to the requirements of this section by listing them at the bottom right corner of the first page of the construction shop drawings.
- E. Approval or rejection of the exceptions taken by the Retaining Wall Engineer will be made in writing as directed by the Owner and/ or their representatives.
- F. The precast modular block design, except as noted herein, shall be based upon:
1. AASHTO Load and Resistance Factor Design (LRFD) methodology as referenced in paragraph 1.03, subparagraph C.1., or
 2. NCMA, Design of Segmental Retaining Walls, referenced in Section 1.03.C.1
- G. In the event that a conflict is discovered between these specifications and a reasonable interpretation of the design specifications and methods referenced in paragraph F above, these specifications shall prevail. If a reasonable interpretation is not possible, the conflict shall be resolved per the requirements in paragraph 1.03, subparagraph A of this section.
- H. Soil Shear Parameters. The Retaining Wall Design Engineer shall prepare the construction shop drawings based upon soil shear strength parameters from the available project data and the recommendations of the project Geotechnical Engineer. If insufficient data exists to develop the retaining wall design, the Retaining Wall Design Engineer shall communicate the specific deficiency of the project information or data to the Owner in writing.
- I. Allowable bearing pressure requirements for each retaining wall shall be clearly shown on the construction drawings.

- J. Global Stability. Overall (global) stability shall be evaluated in accordance with the principals of limit equilibrium analysis as set forth approved standards as referenced in paragraph 1.03, subparagraph C.1.

The minimum factors of safety shall be as follows:

Normal Service (Static)	1.4
Seismic	1.1
Rapid Drawdown (if applicable)	1.2

- K. Seismic Stability. Seismic loading shall be evaluated in accordance with AASHTO Load and Resistance Factor Design (LRFD) methodology as referenced in paragraph 1.03, subparagraph C.1.

1.07 QUALITY ASSURANCE

- A. Retaining Wall Installation Contractor Qualifications. In order to demonstrate basic competence in the construction of precast modular block walls, the Retaining Wall Installation Contractor shall document compliance with the following:

1. Experience.
 - a. Construction experience with a minimum of 30,000 square feet of the proposed precast modular block retaining wall system.
 - b. Construction of at least five (5) precast modular block (large block) retaining wall structures within the past three (3) years.
 - c. Construction of at least 50,000 square feet (4,650 square meters) of precast modular block (large block) retaining walls within the past three (3) years.
2. In lieu of the requirements set forth above, the Retaining Wall Installation Contractor must be a certified Precast Modular Block Retaining Wall Installation Contractor as demonstrated by satisfactory completion of a certified precast modular block retaining wall installation training program administered by the precast modular block manufacturer.

- B. Retaining Wall Design Engineer Qualifications and Statement of Experience. The Retaining Wall Design Engineer shall submit a written statement affirming that he or she has the following minimum qualifications and experience.

1. The Retaining Wall Design Engineer shall be licensed to practice in the jurisdiction of the project location.
2. The Retaining Wall Design Engineer shall be independently capable of performing all internal and external stability analyses, including those for seismic loading, compound stability, rapid draw-down and deep-seated, global modes of failure.

3. The Retaining Wall Design Engineer shall affirm in writing that he or she has personally supervised the design of the retaining walls for the project, that the design considers all the requirements listed in paragraph 1.06 and that he or she accepts responsibility as the design engineer of record for the retaining walls constructed on the project.
 4. The Retaining Wall Design Engineer shall affirm in writing that he or she has personally designed in excess of 100,000 face square feet (9,000 face square meters) of modular block earth retaining walls within the previous three (3) years.
 5. In lieu of these specific requirements, the engineer may submit alternate documentation demonstrating competency in Precast Modular Block retaining wall design.
- C. The Owner reserves the right to reject the design services of any engineer or engineering firm who, in the sole opinion of the Owner, does not possess the requisite experience or qualifications.

1.08 QUALITY CONTROL

- A. The Owner's Representative shall review all submittals for materials, design, Retaining Wall Design Engineer qualifications and the Retaining Wall Installation Contractor qualifications.
- B. The Owner's Representative shall retain the services of an Inspection Engineer who is experienced with the construction of precast modular block retaining wall structures to perform inspection and testing. The cost of inspection shall be the responsibility of the Owner. Inspection shall be continuous throughout the construction of the retaining walls.
- C. The Inspection Engineer shall perform the following duties:
1. Inspect the construction of the precast modular block structure for conformance with construction shop drawings and the requirements of this specification.
 2. Verify that soil or aggregate fill placed and compacted in the retained and foundation zones of the retaining wall conforms with paragraphs 2.04 and 2.05 of this section and exhibits the shear strength parameters specified by the Retaining Wall Design Engineer.
 3. Verify that the shear strength of the in-situ soil assumed by the Retaining Wall Design Engineer is appropriate.
 4. Inspect and document soil compaction in accordance with these specifications:
 - a. Required dry unit weight
 - b. Actual dry unit weight
 - c. Allowable moisture content
 - d. Actual moisture content
 - e. Pass/fail assessment
 - f. Test location – wall station number
 - g. Test elevation
 - h. Distance of test location behind the wall face

5. Verify that all excavated slopes in the vicinity of the retaining wall are bench-cut as directed by the project Geotechnical Engineer.
 6. Notify the Retaining Wall Installation Contractor of any deficiencies in the retaining wall construction and provide the Retaining Wall Installation Contractor a reasonable opportunity to correct the deficiency.
 7. Notify the General Contractor, Owner and Retaining Wall Design Engineer of any construction deficiencies that have not been corrected timely.
 8. Document all inspection results.
 9. Test compacted density and moisture content of the retained backfill with the following frequency:
 - a. At least once every 1,000 square feet (90 square meters) (in plan) per 9-inch (230 mm) vertical lift, and
 - b. At least once per every 18 inches (460 mm) of vertical wall construction.
- D. The Owner's engagement of the Inspection Engineer does not relieve the Retaining Wall Installation Contractor of responsibility to construct the proposed retaining wall in accordance with the approved construction shop drawings and these specifications.
- E. The Retaining Wall Installation Contractor shall inspect the on-site grades and excavations prior to construction and notify the Retaining Wall Design Engineer and General Contractor if on-site conditions differ from the elevations and grading conditions depicted in the retaining wall construction shop drawings.

1.09 DELIVERY, STORAGE AND HANDLING

- A. The Retaining Wall Installation Contractor shall inspect the materials upon delivery to ensure that the proper type, grade and color of materials have been delivered.
- B. The Retaining Wall Installation Contractor shall store and handle all materials in accordance with the manufacturer's recommendations as specified herein and in a manner that prevents deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, UV exposure or other causes. Damaged materials shall not be incorporated into the work.
- C. Geosynthetics
1. All geosynthetic materials shall be handled in accordance with ASTM D4873. The materials should be stored off the ground and protected from precipitation, sunlight, dirt and physical damage.
- D. Precast Modular Blocks

1. Precast modular blocks shall be stored in an area with positive drainage away from the blocks. Be careful to protect the block from mud and excessive chipping and breakage. Precast modular blocks shall not be stacked more than three (3) units high in the storage area.

E. Drainage Aggregate and Backfill Stockpiles

1. Drainage aggregate or backfill material shall not be piled over unstable slopes or areas of the project site with buried utilities.
2. Drainage aggregate material shall not be staged where it may become mixed with or contaminated by poor draining fine-grained soils such as clay or silt.

PART 2 – MATERIALS

2.01 PRECAST MODULAR BLOCK RETAINING WALL UNITS

- A. All units shall be wet-cast precast modular retaining wall units conforming to ASTM C1776.
- B. All units for the project shall be obtained from the same manufacturer. The manufacturer shall be licensed and authorized to produce the retaining wall units by the precast modular block system patent holder/licensor and shall document compliance with the published quality control standards of the proprietary precast modular block system licensor for the previous three (3) years, or the total time the manufacturer has been licensed, whichever is less.
- C. Concrete used in the production of the precast modular block units shall be first-purpose, fresh concrete. It shall not consist of returned, reconstituted, surplus or waste concrete. It shall be an original production mix meeting the requirements of ASTM C94 and exhibit the properties as shown in the following table:

Concrete Mix Properties

Freeze Thaw Exposure Class ⁽¹⁾	Minimum 28-Day Compressive Strength ⁽²⁾	Maximum Water Cement Ratio	Nominal Maximum Aggregate Size	Aggregate Class Designation ⁽³⁾	Air Content ⁽⁴⁾
Moderate	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3M	4.5% +/- 1.5%
Severe	4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3S	6.0% +/- 1.5%
Very Severe	4,500 psi (30.0 MPa)	0.40	1 inch (25 mm)	4S	6.0% +/- 1.5%
Maximum Water-Soluble Chloride Ion (Cl ⁻) Content in Concrete, Percent by Weight of Cement ^(5,6)					0.15
Maximum Chloride as Cl ⁻ Concentration in Mixing Water, Parts Per Million					1000
Maximum Percentage of Total Cementitious Materials By Weight ^(7,9) (Very Severe Exposure Class Only):					

Fly Ash or Other Pozzolans Conforming to ASTM C618	25
Slag Conforming to ASTM C989	50
Silica Fume Conforming to ASTM C1240	10
Total of Fly Ash or Other Pozzolans, Slag, and Silica Fume ⁽⁸⁾	50
Total of Fly Ash or Other Pozzolans and Silica Fume ⁽⁸⁾	35
Alkali-Aggregate Reactivity Mitigation per ACI 201	
Slump (Conventional Concrete) per ASTM C143⁽¹⁰⁾	5 inches +/- 1½ inches (125 mm +/- 40 mm)
Slump Flow (Self-Consolidating Concrete) per ASTM C1611	18 inches – 32 inches (450 mm – 800 mm)

⁽¹⁾Exposure class is as described in ACI 318. “Moderate” describes concrete that is exposed to freezing and thawing cycles and occasional exposure to moisture. “Severe” describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture. “Very Severe” describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture and exposed to deicing chemicals. Exposure class should be specified by owner/purchaser prior to order placement.

⁽²⁾Test method ASTM C39.

⁽³⁾Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregates for Concrete*.

⁽⁴⁾Test method ASTM C231.

⁽⁵⁾Test method ASTM C1218 at age between 28 and 42 days.

⁽⁶⁾Where used in high sulfate environments or where alkali-silica reactivity is an issue, water soluble chloride shall be limited to no more than trace amounts (from impurities in concrete-making components, not intended constituents.)

⁽⁷⁾The total cementitious material also includes ASTM C150, C595, C845, C1157 cement. The maximum percentages shall include:

(a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.

(b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.

(c) Silica fume, ASTM C1240, present in a blended cement.

⁽⁸⁾Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.

⁽⁹⁾Prescriptive limits shown may be waived for concrete mixes that demonstrate excellent freeze/thaw durability in a detailed and current testing program.

⁽¹⁰⁾Slump may be increased by a high-range water-reducing admixture.

D. Each concrete block shall be cast in a single continuous pour without cold joints. With the exception of half-block units, corner units and other special application units, the precast modular block units shall conform to the nominal dimensions listed in the table below and be produced to the dimensional tolerances shown.

Block Type	Dimension	Nominal Value	Tolerance
28” (710 mm) Block	Height	18” (457 mm)	+/- 3/16” (5 mm)
	Length	46-1/8” (1172 mm)	+/- 1/2” (13 mm)

	Width*	28" (710 mm)	+/- 1/2" (13 mm)
41" (1030 mm) Block	Height	18" (457 mm)	+/- 3/16" (5 mm)
	Length	46-1/8" (1172 mm)	+/- 1/2" (13 mm)
	Width*	40-1/2" (1030 mm)	+/- 1/2" (13 mm)
60" (1520 mm) Block	Height	18" (457 mm)	+/- 3/16" (5 mm)
	Length	46-1/8" (1172 mm)	+/- 1/2" (13 mm)
	Width*	60" (1520 mm)	+/- 1/2" (13 mm)

* Block tolerance measurements shall exclude variable face texture

- E. Individual block units shall have a nominal height of 18 inches (457 mm).
- F. With the exception of half-block units, corner units and other special application units, the precast modular block units shall have two (2), circular dome shear knobs that are 10 inches (254 mm), 7.5 inches (190 mm), or 6.75 inches (171 mm) in diameter and 4 inches (102 mm) or 2 inches (51 mm) in height. The shear knobs shall fully index into a continuous semi-cylindrical shear channel in the bottom of the block course above. The peak interlock shear between any two (2) vertically stacked precast modular block units, with 10 inch (254 mm) diameter shear knobs, measured in accordance with ASTM D6916 shall exceed 6,500 lb/ft (95 kN/m) at a minimum normal load of 500 lb/ft (7kN/m). as well as an ultimate peak interface shear capacity in excess of 11,000 lb/ft (160 kN/m). The peak interlock shear between any two (2) vertically stacked precast modular block units, with 7.5 inch (190 mm) or 6.75 inch (171 mm) diameter shear knobs, measured in accordance with ASTM D6916 shall exceed 1,850 lb/ft (27 kN/m) at a minimum normal load of 500 lb/ft (7kN/m) as well as an ultimate peak interface shear capacity in excess of 10,000 lb/ft (146 kN/m). Test specimen blocks tested under ASTM D6916 shall be actual, full-scale production blocks of known compressive strength. The interface shear capacity reported shall be corrected for a 4,000 psi (27.6 MPa) concrete compressive strength. Regardless of precast modular block configuration, interface shear testing shall be completed without the inclusion of unit core infill aggregate.
- G. The 28" (710 mm) and 41" (1030 mm) precast modular block units may be cast with a 13" (330 mm) wide, continuous vertical core slot completely through the block, or solid concrete.
- H. Without field cutting or special modification, the precast modular block units shall be capable of achieving a minimum radius of 14 ft 6 in (4.42 m).
- I. The precast modular block units shall be manufactured with an integrally cast shear knobs that establishes a standard horizontal set-back for subsequent block courses. The precast modular block system shall be available in the four (4) standard horizontal set-back facing batter options listed below:

<u>Horizontal Set-Back/Blk. Course</u>	<u>Max. Facing Batter</u>
3/8" (10 mm)	1.2°
1-5/8" (41 mm)	5.2°

9-3/8" (238 mm)	27.5°
16-5/8" (422 mm)	42.7°

The precast modular block units shall be furnished with the required shear knobs that provide the facing batter required in the construction shop drawings.

- J. The precast modular block unit face texture shall be **COBBLESTONE**. Each textured block facing unit shall be a minimum of 5.76 square feet (0.54 square meters) with a unique texture pattern that repeats with a maximum frequency of once in any 15 square feet (1.4 square meters) of wall face.
- K. The block color shall be selected by the Owner from the available range of colors available from the precast modular block manufacturer.
- L. All precast modular block units shall be sound and free of cracks or other defects that would interfere with the proper installation of the unit, impair the strength or performance of the constructed wall. PMB units to be used in exposed wall construction shall not exhibit chips or cracks in the exposed face or faces of the unit that are not otherwise permitted. Chips smaller than 1.5" (38 mm) in its largest dimension and cracks not wider than 0.012" (0.3 mm) and not longer than 25% of the nominal height of the PMB unit shall be permitted. PMB units with bug holes in the exposed architectural face smaller than 0.75" (19 mm) in its largest dimension shall be permitted. Bug holes, water marks, and color variation on non-architectural faces are acceptable. PMB units that exhibit cracks that are continuous through any solid element of the PMB unit shall not be incorporated in the work regardless of the width or length of the crack.
- M. Preapproved Manufacturers.
Manufacturers of Redi-Rock Retaining Wall Systems as licensed by Redi-Rock International, LLC, 05481 US 31 South, Charlevoix, MI 49720 USA; telephone (866) 222-8400; website www.redi-rock.com. **OR APPROVED EQUIVALENT**.
- N. Substitutions. Technical information demonstrating conformance with the requirements of this specification for an alternative precast modular block retaining wall system must be submitted for preapproval at least 10 calendar days prior to the bid date. Acceptable alternative PMB retaining wall systems, otherwise found to be in conformance with this specification, shall be approved in writing by the owner 7 days prior to the bid date. The Owner's Representative reserves the right to provide no response to submissions made out of the time requirements of this section or to submissions of block retaining wall systems that are determined to be unacceptable to the owner.

2.02 GEOTEXTILE

- A. Nonwoven geotextile fabric shall be placed as indicated on the retaining wall construction shop drawings. Additionally, the nonwoven geotextile fabric shall be placed in the v-shaped joint between ad-

jacent block units on the same course. The nonwoven geotextile fabric shall meet the requirements Class 3 construction survivability in accordance with AASHTO M 288.

B. Preapproved Nonwoven Geotextile Products

1. Mirafi 140N
2. Propex Geotex 451
3. Skaps GT-142
4. Thrace-Linq 140EX
5. Carthage Mills FX-40HS
6. Stratatex ST 142

2.03 DRAINAGE AGGREGATE AND WALL INFILL

- A. Drainage aggregate (and wall infill for retaining walls designed as modular gravity structures) shall be a durable crushed stone conforming to No. 57 size per ASTM C33 with the following particle-size distribution requirements per ASTM D422:

U.S. Standard	
<u>Sieve Size</u>	<u>% Passing</u>
1-½" (38 mm)	100
1" (25 mm)	95-100
½" (13 mm)	25-60
No. 4 (4.76 mm)	0-10
No. 8 (2.38 mm)	0-5

2.04 LEVELING PAD

- A. The precast modular block units shall be placed on a leveling pad constructed from crushed stone or unreinforced concrete. The leveling pad shall be constructed to the dimensions and limits shown on the retaining wall design drawings prepared by the Retaining Wall Design Engineer.
- B. Crushed stone used for construction of a granular leveling pad shall meet the requirements of the drainage aggregate and wall infill in section 2.04 or a preapproved alternate material.
- C. Concrete used for construction of an unreinforced concrete leveling pad shall satisfy the criteria for AASHTO Class B. The concrete should be cured a minimum of 12 hours prior to placement of the precast modular block wall retaining units and exhibit a minimum 28-day compressive strength of 2,500 psi (17.2 MPa).

2.05 DRAINAGE

- A. Drainage Pipe

1. Drainage collection pipe shall be a 4" (100 mm) diameter, 3-hole perforated, HDPE pipe with a minimum pipe stiffness of 22 psi (152 kPa) per ASTM D2412.
2. The drainage pipe shall be manufactured in accordance with ASTM D1248 for HDPE pipe and fittings.

B. Preapproved Drainage Pipe Products

1. ADS 3000 Triple Wall pipe as manufactured by Advanced Drainage Systems.

PART 3 – EXECUTION

3.01 GENERAL

- A. All work shall be performed in accordance with OSHA safety standards, state and local building codes and manufacturer's requirements.
- B. The General Contractor is responsible for the location and protection of all existing underground utilities. Any new utilities proposed for installation in the vicinity of the retaining wall, shall be installed concurrent with retaining wall construction. The General Contractor shall coordinate the work of subcontractors affected by this requirement.
- C. New utilities installed below the retaining wall shall be backfilled and compacted to a minimum of 98% maximum dry density per ASTM D698 standard proctor.
- D. The General Contractor is responsible to ensure that safe excavations and embankments are maintained throughout the course of the project.
- E. All work shall be inspected by the Inspection Engineer as directed by the Owner.

3.02 EXAMINATION

- A. Prior to construction, the General Contractor, Grading Contractor, Retaining Wall Installation Contractor and Inspection Engineer shall examine the areas in which the retaining wall will be constructed to evaluate compliance with the requirements for installation tolerances, worker safety and any site conditions affecting performance of the completed structure. Installation shall proceed only after unsatisfactory conditions have been corrected.

3.03 PREPARATION

- A. Fill Soil.

1. The Inspection Engineer shall verify that retained backfill material placed within a horizontal distance of one (1.0) times the wall height behind the wall blocks satisfies the criteria of this section.
2. The Inspection Engineer shall verify that any fill soil installed in the foundation and retained soil zones of the retaining wall satisfies the specification of the Retaining Wall Design Engineer as shown on the construction drawings.

B. Excavation.

1. The Grading Contractor shall excavate to the lines and grades required for construction of the precast modular block retaining wall as shown on the construction drawings. The Grading Contractor shall minimize over-excavation. Excavation support, if required, shall be the responsibility of the Grading Contractor.
2. Over-excavated soil shall be replaced with compacted fill in conformance with the specifications of the Retaining Wall Design Engineer and "Division 31, Section 31 20 00 – Earthmoving" of these project specifications.
3. Embankment excavations shall be bench cut as directed by the project Geotechnical Engineer and inspected by the Inspection Engineer for compliance.

C. Foundation Preparation.

1. Prior to construction of the precast modular block retaining wall, the leveling pad area and undercut zone (if applicable) shall be cleared and grubbed. All topsoil, brush, frozen soil and organic material shall be removed. Additional foundation soils found to be unsatisfactory beyond the specified undercut limits shall be undercut and replaced with approved fill as directed by the project Geotechnical Engineer. The Inspection Engineer shall ensure that the undercut limits are consistent with the requirements of the project Geotechnical Engineer and that all soil fill material is properly compacted according project specifications. The Inspection Engineer shall document the volume of undercut and replacement.
2. Following excavation for the leveling pad and undercut zone (if applicable), the Inspection Engineer shall evaluate the in-situ soil in the foundation and retained soil zones.
 - a. The Inspection Engineer shall verify that the shear strength of the in-situ soil assumed by the Retaining Wall Design Engineer is appropriate. The Inspection Engineer shall immediately stop work and notify the Owner if the in-situ shear strength is found to be inconsistent with the retaining wall design assumptions.
 - b. The Inspection Engineer shall verify that the foundation soil exhibits sufficient ultimate bearing capacity to satisfy the requirements indicated on the retaining wall construction shop drawings per paragraph 1.06 I of this section.

D. Leveling Pad.

1. The leveling pad shall be constructed to provide a level, hard surface on which to place the first course of precast modular block units. The leveling pad shall be placed in the dimensions shown on the retaining wall construction drawings and extend to the limits indicated.

2. Crushed Stone Leveling Pad. Crushed stone shall be placed in uniform maximum lifts of 6" (150 mm). The crushed stone shall be compacted by a minimum of 3 passes of a vibratory compactor capable of exerting 2,000 lb (8.9 kN) of centrifugal force and to the satisfaction of the Inspection Engineer.
3. Unreinforced Concrete Leveling Pad (if required). The concrete shall be placed in the same dimensions as those required for the crushed stone leveling pad. The Retaining Wall Installation Contractor shall erect proper forms as required to ensure the accurate placement of the concrete leveling pad according to the retaining wall construction drawings.

3.04 PRECAST MODULAR BLOCK WALL SYSTEM INSTALLATION

- A. The precast modular block structure shall be constructed in accordance with the construction drawings, these specifications and the recommendations of the retaining wall system component manufacturers. Where conflicts exist between the manufacturer's recommendations and these specifications, these specifications shall prevail.
- B. Drainage components. Pipe, geotextile and drainage aggregate shall be installed as shown on the construction shop drawings.
- C. Precast Modular Block Installation
 1. The first course of block units shall be placed with the front face edges tightly abutted together on adjacent blocks, on the prepared leveling pad at the locations and elevations shown on the construction drawings. The Retaining Wall Installation Contractor shall take special care to ensure that the bottom course of block units are in full contact with the leveling pad, are set level and true and are properly aligned according to the locations shown on the construction drawings.
 2. Backfill shall be placed in front of the bottom course of blocks prior to placement of subsequent block courses. Nonwoven geotextile fabric shall be placed in the V-shaped joints between adjacent blocks. Drainage aggregate shall be placed in the V-shaped joints between adjacent blocks, and extend to a minimum distance of 12" (300 mm) behind the block unit.
 3. Drainage aggregate shall be placed in 9 inch maximum lifts and compacted by a minimum of three (3) passes of a vibratory plate compactor capable exerting a minimum of 2,000 lb (8.9 kN) of centrifugal force.
 4. Unit core fill shall be placed in the precast modular block unit vertical core slot. The core fill shall completely fill the slot to the level of the top of the block unit. The top of the block unit shall be broom-cleaned prior to placement of subsequent block courses. No additional courses of precast modular blocks may be stacked before the unit core fill is installed in the blocks on the course below.
 5. Base course blocks for gravity wall designs (without geosynthetic soil reinforcement) may be furnished without vertical core slots. If so, disregard item 4 above, for the base course blocks in this application.

6. Nonwoven geotextile fabric shall be placed between the drainage aggregate and the retained soil (gravity wall design) if required on the retaining wall construction drawings.
 7. Subsequent courses of block units shall be installed with a running bond (half block horizontal course-to-course offset). With the exception of 90 degree corner units, the shear channel of the upper block shall be fully engaged with the shear knobs of the block course below. The upper block course shall be pushed forward to fully engage the interface shear key between the blocks and to ensure consistent face batter and wall alignment. Drainage aggregate, unit core fill, geotextile and properly compacted backfill shall be complete and in-place for each course of block units before the next course of blocks is stacked.
 8. The elevation of retained soil fill shall not be less than 1 block course (18" (457 mm)) below the elevation of the retained backfill throughout the construction of the retaining wall.
 9. If included as part of the precast modular block wall design, cap units shall be secured with an adhesive in accordance with the precast modular block manufacturer's recommendation.
- D. Construction Tolerance. Allowable construction tolerance of the retaining wall shall be as follows:
1. Deviation from the design batter and horizontal alignment, when measured along a 10' (3 m) straight wall section, shall not exceed 3/4" (19 mm).
 2. Deviation from the overall design batter shall not exceed 1/2" (13 mm) per 10' (3 m) of wall height.
 3. The maximum allowable offset (horizontal bulge) of the face in any precast modular block joint shall be 1/2" (13 mm).
 4. The base of the precast modular block wall excavation shall be within 2" (50 mm) of the staked elevations, unless otherwise approved by the Inspection Engineer.
 5. Differential vertical settlement of the face shall not exceed 1' (300 mm) along any 200' (61 m) of wall length.
 6. The maximum allowable vertical displacement of the face in any precast modular block joint shall be 1/2" (13 mm).
 7. The wall face shall be placed within 2" (50 mm) of the horizontal location staked.

3.05 WALL INFILL AND BACKFILL PLACEMENT

- A. Backfill material placed immediately behind the drainage aggregate shall be compacted as follows:
1. 98% of maximum dry density at $\pm 2\%$ optimum moisture content per ASTM D698 standard proctor or 85% relative density per ASTM D4254.
- B. Compactive effort within 3' (0.9 m) of the back of the precast modular blocks should be accomplished with walk-behind compactors. Compaction in this zone shall be within 95% of maximum dry density as measured in accordance with ASTM D698 standard proctor or 80% relative density per ASTM D 4254. Heavy equipment should not be operated within 3' (0.9 m) of the back of the precast modular blocks.

- C. Backfill material shall be installed in lifts that do not exceed a compacted thickness of 9" (230 mm).
- D. At the end of each work day, the Retaining Wall Installation Contractor shall grade the surface of the last lift of the granular wall infill to a $3\% \pm 1\%$ slope away from the precast modular block wall face and compact it.
- E. The General Contractor shall direct the Grading Contractor to protect the precast modular block wall structure against surface water runoff at all times through the use of berms, diversion ditches, silt fence, temporary drains and/or any other necessary measures to prevent soil staining of the wall face, scour of the retaining wall foundation or erosion of the reinforced backfill or wall infill.

3.06 OBSTRUCTIONS IN THE INFILL ZONE

- A. The Retaining Wall Installation Contractor shall make all required allowances for obstructions behind and through the wall face in accordance with the approved construction shop drawings.
- B. Should unplanned obstructions become apparent for which the approved construction shop drawings do not account, the affected portion of the wall shall not be constructed until the Retaining Wall Design Engineer can appropriately address the required procedures for construction of the wall section in question.

3.07 COMPLETION

- A. For walls supporting unpaved areas, a minimum of 12" (300 mm) of compacted, low-permeability fill shall be placed over the granular wall infill zone of the precast modular block retaining wall structure. The adjacent retained soil shall be graded to prevent ponding of water behind the completed retaining wall.
- B. For retaining walls with crest slopes of 5H:1V or steeper, silt fence shall be installed along the wall crest immediately following construction. The silt fence shall be located 3' to 4' (0.9 m to 1.2 m) behind the uppermost precast modular block unit. The crest slope above the wall shall be immediately seeded to establish vegetation. The General Contractor shall ensure that the seeded slope receives adequate irrigation and erosion protection to support germination and growth.
- C. The General Contractor shall confirm that the as-built precast modular block wall geometries conform to the requirements of this section. The General Contractor shall notify the Owner of any deviations.

END OF SECTION 32 32 15

SECTION 329100 – PLANTING SOIL

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 SCOPE OF WORK

- A. The scope of work includes all labor, materials, tools, supplies, equipment, facilities, transportation and services necessary for, and incidental to performing all operations in connection with furnishing, delivery, and installation of Planting Soils. Scope of work includes, but is not limited to, sourcing, purchase, delivery and installation of Planting Soil and soil amendments and clean up and disposal of all excess and surplus material.

1.3 SECTION INCLUDES:

- A. Planting Soil – TYPE A
- B. Erosion Control Blanket and Straw Mulch

1.4 RELATED SECTIONS

- A. Division 31 – Earthwork
- B. Section 329200 – Turf and Grasses
- C. Section 329250 – Meadow
- D. Section 329300 – Plants

1.5 REFERENCE STANDARDS

- A. In the event that the requirements of any of the referenced standards and specifications herein conflict with each other the more stringent requirement shall prevail. Where reference is made to one of the standards, the revision in effect at the time of bid opening shall apply.
- B. American Society for Testing Materials (ASTM):
 - 1. ASTM C33 – Gradation Requirements for Coarse Aggregates.
 - 2. ASTM C602 Standard Specification for Agricultural Liming Materials.
 - 3. ASTM D422 – Standard Test Method for Particle Size Analysis of Soils.
 - 4. ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
 - 5. ASTM D3385 – Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer.
 - 6. ASTM D4972 – Standard Test Method for pH of Soils.

7. ASTM D5298 – Standard Specification for Topsoil Used for Landscaping Purposes.
8. ASTM D7481 – Standard Test Methods for Determining Loose and Tapped Bulk Densities of Powders using a Graduated Cylinder.
9. ASTM F1632 – Standard Test Method for Particle Size Analysis and Sand Shape Grading of Golf Course Putting Green and Sports Field Rootzone Mixes.
10. ASTM F1647 – Standard Test Methods for Organic Matter Content of Athletic Field Rootzone Mixes.
11. ASTM F1815 – Standard Test Methods for Saturated Hydraulic Conductivity, Water Retention, Porosity, and Bulk Density of Athletic Field Rootzones.

C. Other Standards:

1. U.S. Department of Agriculture (USDA), Natural Resources Conservation Service, Soil Texture Calculator.
2. USDA, Natural Resources Conservation Service, 2003. National Soil Survey Handbook, title 430-VI, current edition.
3. USDA Soil Survey Laboratory Methods Manual, Soil Survey Investigations Report, current edition.
4. Environmental Protection Agency (EPA) Section 503 Regulations.
5. Department of Environmental Protection (DEP), Pennsylvania Bulletin, Management of Fill, Clean Fill Policy, current edition.
6. U.S. Composting Council (USCC), Test Methods for the Examination of Composting and Compost (TMECC), current edition.
7. USCC, Landscape Architecture / Design Specifications for Compost Use, Planting Bed Establishment with Compost.
8. Association of Official Analytical Chemists (AOAC), Official Methods of Analysis, current edition.
9. Soil Science Society of America (SSSA), Methods of Soil Analysis, current edition.

1.6 DEFINITIONS

- A. Amendment: material added to Topsoil to produce Planting Soil Mix. Amendments are classified as general soil amendments, fertilizers, biological, and pH amendments.
- B. Bulk Density: is an indicator of soil compaction calculated as the dry weight of soil by its volume typically expressed in g/cm³.
- C. Coarse Sand: sharp natural or manufactured fine aggregate and further defined in this specification.
- D. Compacted soil: soil where the density of the soil is greater than the threshold for root limiting, and further defined in this specification.
- E. Compost: Well decomposed stable organic material as defined by the US Composting Council and further defined in this specification.
- F. Debris: Elements including, but not limited to, concrete, concrete masonry, wood, excavated rock and rock fragments, rubble, overburden soils, abandoned utility structures, trash, refuse and litter.

- G. Drainage: The process of water moving through the soil, transitioning the soil from dry to saturated to field capacity, the rate of which may be expressed as the saturated hydraulic conductivity rate (Ksat; units are inches per hour).
- H. Existing Soil: Mineral soil existing at the locations of proposed planting after the majority of the construction within and around the planting site is completed and just prior to the start of work to prepare the planting area for soil modification and/or planting, and further defined in this specification.
- I. Fertilizer: amendment used for the purpose of adjusting soil nutrient composition and balance.
- J. Fine grading: The final grading of the soil to achieve exact contours and positive drainage, often accomplished by hand rakes or drag rakes other suitable devices, and further defined in this specification, and further defined in this specification.
- K. Finished grade: surface or elevation of Soil after final grading and 12 months of settlement of the soil, and further defined in this specification.
- L. Planting Soil: Planting soil shall be harvested from fields or development sites or manufactured uniformly mixed individual soil components (Topsoil, Sand, Compost) or existing mineral soil at the locations of proposed planting meeting the criteria specified herein.
- M. Salvaged Topsoil: Stripped native loam removed within the limits of work, but outside of the “Tree Protection Areas”, to its entire natural depth.
- N. Scarify: Loosening and roughening the surface of soil and sub soil prior to adding additional soil on top, and further defined in this specification.
- O. Soil Horizons: as defined in the USDA National Soil Survey Handbook (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242)
- P. Soil Tilling: Loosening the surface of the soil to the depths specified with a rotary tilling machine, roto tiller, (or spade tiller), and further defined in this specification.
- Q. Subgrade: Surface or elevation of subsoil remaining after completing excavation or backfill immediately beneath Planting Soil.
- R. Topsoil: Topsoil shall be harvested from fields or development sites and shall be loose, friable mineral particles resulting from natural soil formation from the A, E and upper B horizons, or solum where most plant roots grow and as defined further herein.

1.7 SUBMITTALS

- A. Submit references of past projects and employee training certifications that support that the Contractors meet all of the installer qualifications and applicable licensures specified herein.
- B. Submit a list of materials to be provided for work under this Section including the name and address of the materials producer and the location from which the materials are to be obtained.
- C. Submit dated certificates or letters, signed by the materials producer, stating that materials meet or exceed the specified requirements.

- D. For each type of manufactured product, submit data and certificates that the product meets the specification requirements, signed by the product manufacturer, and complying with testing requirements and referenced standards and specific requested testing.
- E. Erosion control products: Provide product data for each product indicated, including, but not limited to:
 - a. Straw Blanket and Accessories
 - b. Straw Mulch
- F. Laboratory soil testing requirements:
 - 1. Samples of soil(s) to be submitted to an approved soil testing laboratory for testing in accordance with specifications herein. Submit the soil testing laboratory for review and approval prior to commencing with any soil testing.
 - 2. Test results shall be submitted to the Landscape Architect for approval in conjunction with soil amendment products in accordance with soil testing laboratory recommendations.
 - 3. Submit soil test reports including test results for each criteria listed within the Products section herein for:
 - a. Individual Components for Soil Mixes: Topsoil, Compost and Sand.
 - b. Soil Mixes Using Individual Components.
 - c. Test reports for Individual Components and Soil Mixes must be submitted concurrently.
 - d. The source of supply for Individual Components for Soil Mixes and Soil Mixes Using Individual Components must be indicated on the test report submittals.
 - 4. Test reports must be the same material to be supplied and must be current within the period of time defined as follows unless approved otherwise by the Landscape Architect:
 - a. Topsoil: no more than 6 months old.
 - b. Compost: no more than 3 months old.
 - c. Sand: no more than 6 months old.
 - d. Planting Soil: test data must be no more than 1 month old.
 - e. Sample test results shall be considered valid until the time of construction and for the material supplied.
 - 5. If tests fail to meet the specifications, obtain other sources of material, retest and resubmit until accepted by the Landscape Architect.
 - 6. Soils shall not contain any traces of hydrocarbons, petroleum products, chemically prohibited substances, or any other elements considered to be toxic to any vegetation that is used. Clean fill certification shall be submitted by the manufacturer.
 - 7. All soil testing will be at the expense of the Contractor.
- G. Physical samples:
 - 1. All samples must be submitted simultaneously with the laboratory test reports. Samples are required for the following:
 - a. Planting soil
 - 2. Provide one (1) one-gallon sample in a resealable plastic bag to the Landscape Architect.

1.8 IN-SITU (WORKSITE) VERIFICATION SOIL TESTING REQUIREMENTS:

- A. Compaction Testing:
 - 1. Maintain an up-to-date written report of compaction test results. Test compaction every 12-inch lift of soil for every 300 square feet of soil installed for each planting area designated on the Drawings. The Landscape Architect may review the written report at any time to confirm conformance with the specification. Submit final report at the completion of soil installation.
 - 2. Maintain at the site at all times a soil cone penetrometer with pressure dial and a soil moisture meter to check soil compaction and soil moisture.
 - a. Penetrometer shall be AgraTronix Soil Compaction Meter or approved equal.
 - b. Moisture meter shall be “general digital soil moisture meter”.
- B. Should any verification test results indicate soil material is not consistent with the approved submittals or requirements specified herein, the Contractor shall remove the installed soil and re-install soil at the Contractors expense until the Contract Document requirements are met.

1.9 QUALITY ASSURANCE

- A. All materials, methods of construction, and workmanship shall conform to applicable requirements of ASTM, PTM, PennDOT Standard Specifications and AASHTO Standards, PADEP Clean Fill Guidance, unless otherwise specified.
- B. Soil Testing Laboratory Qualifications: The laboratory shall be an independent laboratory, recognized by the State Department of Agriculture. The testing laboratory must have experience in performing agronomic testing including physical and chemical properties of soil. Tests shall be made in strict compliance with the standards of the Association of Official Analytical Chemists and follow standards from the NRCS Soils Manual and ASTM testing methods applicable to the specific tests requested. Laboratory shall have staff fully qualified to review test results, and to make recommendations to amend samples based on what is planned to grow in the soil. American Association for Laboratory Accreditation (A2LA) certification is preferred.
 - 1. Compost that participates in the US Composting Council’s Seal of Testing Assurance (STA) Program and tested through an STA program lab, using appropriate test methods from the TMECC (Test Methods for the Examination of Compost and Composting) is preferred. Test data shall be presented on a Compost Technical Data Sheet.
- C. Any fill or topsoil sources, disposal areas, or temporary offsite storage locations shall be subject to review and approval by the Landscape Architect.
- D. Installer Qualifications: The installer shall be a firm having at least five (5) years of experience of a scope similar to that required for the work.
 - 1. Installer Field Supervision: When any soil work is in progress, installer shall maintain, on-site, an experienced full-time supervisor.
 - 2. Installer’s field supervisor shall have a minimum of five (5) years experience as a field supervisor installing soil, shall be trained and proficient in the use of field surveying equipment to establish grades.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Preparation, amendment, and mixing of soils shall be performed at the soil supplier location.
- B. Weather: Do not mix, deliver, place or grade soils when frozen or with moisture above field capacity. Soils shall not be handled, hauled, placed, or compacted when wet or frozen. Soil shall only be handled when the moisture content is between the specified ranges in percent water by volume.
- C. Protect soil and soil stockpiles, including the stockpiles at the soil blender's yard, from wind, rain and washing that can erode soil or separate fines and coarse material, and contamination by chemicals, dust and debris that may be detrimental to plants or soil drainage. Once spread, soils shall be protected with staked erosion control blankets.
- D. All manufactured packaged products and material shall be delivered to the site in unopened containers and stored in a dry enclosed space suitable for the material and meeting all environmental regulations. Biological additives shall be protected from extreme cold and heat. All products shall be freshly manufactured and dated for the year in which the products are to be used.
- E. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
- F. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
- G. None of the soil materials shall be delivered to the site until sample certifications are approved by the Landscape Architect, however, such approval does not constitute final acceptance. Certification submittal shall include recommended soil amendment products if proposed to modify the soils. Any approval of soils made conditional upon utilizing one or more amendments shall be understood to afford to the Landscape Architect the right for further testing and refusal of materials that do not meet these Specifications.

PART 2 - PRODUCTS

2.1 INDIVIDUAL COMPONENTS FOR SOIL MIXES

- A. Topsoil
 - 1. Topsoil definition: Topsoil shall be a harvested from fields or development sites and shall be loose, friable mineral particles resulting from natural soil formation from the A, E and upper B horizons, or "solum" where most plant roots grow. Manufactured soils where sand, composted organic material, chemical additives or similar elements has been blended to meet the requirements of Topsoil is not acceptable. The soil shall be free of construction and trash debris, rocks, hydrocarbons, petroleum materials, herbicides, or other harmful contaminants that would impact plant growth.
 - a. Topsoil shall comply with the following parameters:
 - i) Organic matter (ASTM F1647, Method A): 1.5% minimum (by dry weight).
 - ii) pH (1 soil : 1 water): 5.0 - 7.0.

- b. Stockpiled Existing Topsoil at the site meeting the above criteria may be acceptable.
- c. Include particle analysis per USDA soil classifications in lab test report.

B. Organic Amendment / Compost

- 1. Compost is as defined by the “US Composting Council Landscape Architecture / Design Specifications for Compost Use, Planting Bed Establishment with Compost”. Compost shall be a well decomposed, stable, weed free organic matter source. It shall be derived from: agricultural, food, or industrial residuals; leaf litter and yard trimmings; or source-separated waste. The product shall contain no substances toxic to plants and shall be reasonably free (< 1% by dry weight) of man-made foreign matter. The compost will possess no objectionable odors and shall not resemble the raw material from which it was derived.
- 2. Compost shall comply with the following parameters:
 - a. pH: 6.0 - 8.0.
 - b. Soluble salt content (electrical conductivity, 1 soil : 2 water): maximum 5 dS/m (mmhos/cm).
 - c. Compost derived from stabilized mushroom soil compost may possess a maximum EC of 10 dS/m (1:2), if the maturity testing is a minimum of 95% and ammonia (NH₄) content is a maximum of 250 ppm.
 - d. Moisture content %, wet weight basis: 30 – 60.
 - e. Organic Matter Content, % dry weight basis: 30 – 65.
 - f. Particle size, dry weight basis: 98% pass through 1/2 inch screen.
 - g. Stability carbon dioxide evolution rate: mg CO₂-C/ g OM/ day ≤ 3.
 - h. Maturity, seed emergence and seedling vigor, % relative to positive control: minimum 80%.
 - i. Physical contaminants (inerts), %, dry weight basis: <0.5%.
 - j. Chemical contaminants, mg/kg (ppm): meet or exceed US EPA Class A standard, 40CFR § 503.13, Tables 3 levels.
 - k. Biological contaminants select pathogens fecal coliform bacteria, or salmonella, meet or exceed US EPA Class A standard, 40 CFR § 503.32(a) level requirements.

C. Coarse Sand

- 1. Sharp natural or manufactured fine aggregate shall be hard and durable and free of limestone (calcareous sand), shale and slate particles and free of harmful contaminants that would impact plant growth complying with the following parameters:
 - a. pH shall be lower than 7.0.
 - b. Sieve analysis:

<u>Sieve</u>	<u>Percent passing (by mass)</u>
3/8 inch (9.5 mm)	100
No 4 (4.75 mm)	95-100
No 8 (2.36 mm)	80-100
No 16 (1.18 mm)	50-85
No 30 (.60 mm)	25-75
No 50 (.30 mm)	5-40
No 100 (.15 mm)	2-20
No 200 (0.75 mm)	2-15
 - c. Particle analysis must be per USDA classification, Sand.

Sand (2 - 0.05 mm): ≥88%
Silt (0.05 - 0.002 mm): ≤9%
Clay (< 0.002 mm): ≤3%

D. Chemical Amendments

1. Lime, ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:
 - a. Class: Class T, with a minimum 99 percent passing through No. 8 sieve and a minimum 75 percent passing through No. 60 sieve.
 - b. Provide lime in form of dolomitic limestone.

2.2 SOIL MIXES USING INDIVIDUAL COMPONENTS

A. Definition

1. Manufactured uniformly mixed individual soil components (Topsoil, Sand, Compost) meeting the criteria specified herein. Provide Soils at the locations indicated on the Drawings complying with the following parameters.

B. Planting Soil, Lawn - Type A

1. Planting soil shall be harvested from fields or development sites or manufactured uniformly mixed individual soil components (Topsoil, Sand, Compost) or existing mineral soil at the locations of proposed planting meeting the criteria specified herein.
2. Provide Planting Soil at the locations indicated on the Drawings complying with the following parameters:
 - a. Particle analysis must be per USDA classification for loam, sandy loam, sandy clay loam, or silt loam within the following parameters using ASTM D422:
 - b. Sand: 50 - 60%
 - c. Silt: no more than 30%
 - d. Clay: no more than 15%
 - e. Gravel content larger than 2mm shall be less than 12%.
 - f. pH (1 soil : 1 water): 6.0 - 7.2.
 - g. Organic matter (ASTM F1647, Method A): 3 - 5% (by dry weight).
 - h. Hydraulic conductivity (ASTM F1815) at 85% Proctor (ASTM D698): 1.0 - 3.0 in/hr
 - i. Soluble salt content (electrical conductivity, 1 soil : 2 water): maximum 1.60 mmho/cm. Sodium (Na) salinity shall not exceed 700 ppm.
 - j. Cation Exchange Capacity (CEC): >15 meq/100g.
 - k. Nutrient analysis including macronutrients and micronutrients (Mehlich-3) with soil fertility interpretation and recommendations relevant to the specified plant species.
 - l. Compost shall not be added at more than 20% by volume.

C. Amendments

1. At the time of final grading, add fertilizer if required to the Planting Soil at rates recommended by the testing results for the species of plants to be grown.

2.3 MULCHES & EROSION CONTROL

A. Straw Blanket:

1. Erosion Control Straw Blanket shall be installed on slopes greater (steeper) than 6:1.
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include the following short-term 100% degradable products, or approved comparable product:
 - i) Erosion Control Blanket: For slopes between 2:1 and 6:1: Futerra EnviroNet as manufactured by PROFILE Products LLC, 750 Lake Cook Road, Suite 440, Buffalo Grove, IL 60089, 800-654-8793. Do not install netting on slopes steeper than 2:1. Consult project Engineer.
 - ii) Fasteners for securing Erosion Control Blanket: Round Top Bio-Pin as manufactured by PROFILE Products LLC, 750 Lake Cook Road, Suite 440, Buffalo Grove, IL 60089, 800-654-8793.

B. Straw Mulch:

1. Install straw mulch on seeded slopes less (gentler) than 6:1.
 - a. Product: Provide mildew-free and seed-free salt hay with a nonasphaltic liquid tackifier.

PART 3 - EXECUTION

3.1 SITE EXAMINATION

- A. Prior to installation of Soil, examine site to confirm that existing conditions are satisfactory for the work of this section to proceed. The Landscape Architect shall approve the condition of the subgrade and the previously installed subgrade preparation and the installation of subsurface drainage.
1. Confirm that the subgrade is at the proper elevation and compacted as required. Subgrade elevations shall slope toward the under drain lines as shown on the Drawings.
 - a. Subgrade definition: surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing Planting Soil.
 2. Confirm that all surface areas to be filled with Soil are free of construction debris, refuse, compressible or biodegradable materials, stones greater than 2 inches diameter, soil crusting films of silt or clay that reduces or stops drainage from the Soil into the subsoil; and/or standing water. Remove unsuitable material from the site.
 - a. Debris definition: Elements including, but not limited to, concrete, concrete masonry, wood, excavated rock and rock fragments, rubble, overburden soils, abandoned utility structures, trash, refuse and litter.
 3. Confirm that no adverse drainage conditions are present.
 4. Confirm that no conditions are present which are detrimental to plant growth.
- B. If unsatisfactory conditions are encountered, notify the Landscape Architect immediately to determine corrective action before proceeding.

3.2 SOIL INSTALLATION

- A. All equipment utilized to install or grade Soils shall be wide track or balloon tire machines rated with a ground pressure of 4 psi or less. All grading and soil delivery equipment shall have buckets equipped with 6 inch long teeth to scarify any soil that becomes compacted.
- B. In areas of soil installation above existing subsoil, scarify the subgrade material prior to installing Soil.
 - 1. Scarify the subsoil of the subgrade to a depth of 3 – 6 inches with the teeth of the back hoe or loader bucket, tiller or other suitable device.
 - 2. Immediately install the Planting Soil. Protect the loosened area from traffic. DO NOT allow the loosened subgrade to become compacted.
 - 3. In the event that the loosened area becomes overly compacted, loosen the area again prior to installing the Planting Soil.
- C. Install the Planting Soil in 12 - 18 inch lifts to the required depths. Apply compacting forces to each lift as required to attain the required compaction. Scarify the top of each lift prior to adding more Planting Soil by dragging the teeth of a loader bucket or backhoe across the soil surface to roughen the surface.
 - 1. Approved compaction equipment includes a smooth drum roller or plate compactor. Typically one to three passes per lift will achieve the desired compaction. Contractor to test desired compaction methodology with actual soil to be installed to confirm installation method and material properties are compatible and will achieve the specified compaction rates.
 - 2. Provide adequate equipment to achieve consistent and uniform compaction of the Soils. Use the smallest equipment that can reasonably perform the task of spreading and compaction. Use the same equipment and methods of compaction for the entire project area once soil, installation methodology, and compaction criteria have been coordinated and confirmed.
- D. Do not pass motorized equipment over previously installed and compacted soil except as authorized below.
 - 1. Light weight equipment such as trenching machines or motorized wheel barrows is permitted to pass over finished soil work.
 - 2. If work after the installation and compaction of soil compacts the soil to levels greater than the above requirements, follow the requirements of Over Compaction Reduction herein.
- E. Phase work such that equipment to deliver or grade soil does not have to operate over previously installed Planting Soil. Work in rows of lifts the width of the extension of the bucket on the loader. Install all lifts in one row before proceeding to the next. Work out from the furthest part of each bed from the soil delivery point to the edge of each bed area.
- F. Where travel over installed soil is unavoidable, limit paths of traffic to reduce the impact of compaction in Planting Soil. Each time equipment passes over the installed soil it shall reverse out of the area along the same path with the teeth of the bucket dropped to scarify the soil. Comply with Over Compaction Reduction herein in the event that soil becomes over compacted. Access over finished grade soils shall be restricted. If access is required across placed soils, Contractor shall be required to rework compacted soil areas prior to fine grading to the full depth of the placed soils as directed by the Landscape Architect.
- G. The depths and grades shown on the Drawings are the final grades after settlement and shrinkage of the compost material. The Contractor shall install the Planting Soil at a higher

level to anticipate this reduction of Soil volume. A minimum settlement of approximately 10 - 15% of the soil depth is expected. All grade increases are assumed to be as measured prior to addition of surface Compost till layer, mulch, or sod.

- H. Maintain moisture conditions within the Soil during installation or modification to allow for satisfactory compaction.

1. Volumetric soil moisture level during installation shall be above permanent wilt point and below field capacity for each type of soil texture within the following ranges.

Soil texture	Permanent wilting point	Field capacity
Sand, Loamy sand, Sandy loam	5-8%	12-18%
Loam, Sandy clay, Sandy clay loam	14-25%	27-36%
Clay loam, Silt loam	11-22%	31-36%
Silty clay, Silty clay loam	22-27%	38-41%

2. The Contractor shall confirm the soil moisture levels with a moisture meter (Digital Soil Moisture Meter, DSMM500 by General Specialty Tools and Instruments, or approved equivalent). Suspend operations if the Soil becomes wet. Apply water if the soil is overly dry.

- I. Installing Planting Soil with soil or mulch blowers or soil slingers is not permitted.

3.3 SOIL COMPACTION REQUIREMENTS

- A. The following are threshold levels of compaction as determined by each method for the subsoil surface and full profile of Planting Soil, testing each lift of Soil with a penetrometer. The same penetrometer and moisture meter shall be used to test installed soil throughout the work.

1. Acceptable Compaction
 - a. Standard Proctor Method – 75-85%.
 - b. Penetration Resistance Method – about 75-250 psi.
 - c. Soil below 75 psi soil becomes increasingly unstable and will settle excessively.
2. Unacceptable Compaction
 - a. Standard Proctor Method – Above 85%.
 - b. Penetration Resistance Method – Approximately above 300 psi
3. Prior to testing the soil with the penetrometer check the soil moisture. Penetrometer readings are impacted by soil moisture and excessively wet or dry soils will read significantly lower or higher than soils at optimum moisture.
4. The penetrometer readings shall be within 20% plus or minus of the specified levels.
5. Where the Standard Proctor Method is utilized, the following Bulk Density levels based on 75% minimum and 85% maximum standard Proctor indicate acceptable compaction.

Soil Texture	Bulk Density (g/cm ³)	
	Max.	Min.
Loamy Sand	1.80	1.65
Sandy Loam	1.65	1.45
Sandy Clay Loam	1.55	1.35

Loam	1.50	1.30
Silt Loam	1.45	1.25

3.4 OVER COMPACTION REDUCTION

- A. Compacted soil: soil where the density of the soil, at each lift for the full profile, is greater than the threshold for root limiting, and further defined in this specification.
- B. Any soil that becomes compacted to a density greater than the specified density shall be dug up and reinstalled. This requirement includes compaction caused by other sub-contractors after the Planting Soil is installed and approved.
- C. Surface roto tilling shall not be considered adequate to reduce over compaction at levels 6 inches or greater below finished grade.

3.5 INSTALLATION OF CHEMICAL ADDITIVES

- A. Following the installation of each soil and prior to fine grading and installation of the Compost till layer, apply chemical additives as recommended by the soil test, and appropriate to the soil and specific plants to be installed.
- B. Types, application rates and methods of application shall be approved by the Landscape Architect prior to any applications.

3.6 FINE GRADING

- A. Fine grading: The final grading of the soil to achieve exact contours and positive drainage, often accomplished by hand rakes or drag rakes or other suitable devices, and further defined in this specification, and further defined in this specification.
- B. The Landscape Architect shall approve all rough grading prior to the installation of Compost, fine grading
- C. Grade the finish surface of all planted areas to meet the grades shown on the Drawings, allowing the finished grades to remain higher than the grades on the grading plan, as defined in paragraph Soil Installation, to anticipate settlement over the first year.
- D. Utilize hand equipment, small garden tractors with rakes, or small garden tractors with buckets with teeth for fine grading to keep surface rough without further compaction. Do not use the flat bottom of a loader bucket to fine grade, as it will cause the finished grade to become overly smooth and or slightly compressed.
- E. Provide for positive drainage from all areas toward the existing inlets, drainage structures and or the edges of planting beds. Adjust grades as directed to reflect actual constructed field conditions of paving, wall and inlet elevations. Notify the Landscape Architect in the event that conditions make it impossible to achieve positive drainage.
- F. Provide smooth, rounded transitions between slopes of different gradients and direction. Modify the grade so that the finish grade before adding mulch and after settlement is one or two inches below all paving surfaces or as directed by the Drawings.

3.7 INSTALLATION OF EROSION PROTECTION BLANKET

- A. At all seeded areas:

1. Install seeded Lawn and seeded Native Grass mix per Specification 329200 and 329250.
2. After seeding, install erosion control straw blankets per manufacturers recommendation.
3. Install erosion control blankets on all slopes 6:1 or steeper. Install straw mulch on all seeded slopes 6:1 or less.
4. Protect seeded areas with slopes less than 6:1 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.
5. Anchor straw mulch by crimping into soil with suitable mechanical equipment.

B. At areas of planting:

1. In areas of planting where slopes exceed 6:1, install erosion control matting per manufacturer's recommendation. After matting is installed, cut openings, as shown on the drawings, at locations of containerized plants, plugs, and bulbs. Install planting. After planting is installed, place 2" layer of mulch, as specified in section 329300 Plants, and as shown on the drawings.
2. On slopes less than 6:1, install mulch as directed in specification 329300 Plants and as shown on the drawings.

3.8 PROTECTION

- A. Protection Zone: Identify and coordinate protection zones according to Section "Tree and Plant Protection."
- B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:
 1. Storage of construction materials, debris, or excavated material.
 2. Parking vehicles or equipment.
 3. Vehicle traffic.
 4. Foot traffic.
 5. Erection of sheds or structures.
 6. Impoundment of water.
 7. Excavation or other digging unless otherwise indicated.
- C. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by the Landscape Architect and replace contaminated planting soil with new planting soil.

3.9 CLEANING

- A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.

SCHUYLKILL RIVER TRAIL – 56TH TO 61ST STREET
PHILADELPHIA, PENNSYLVANIA

SRDC1601
ISSUE FOR BID
MARCH 25, 2020

END OF SECTION 329100

SECTION 329200 – TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Seeding of lawns.
 - 2. Reseeding of lawns damaged during construction.
 - 3. Maintenance of lawn areas until acceptance.
- B. Related Sections:
 - 1. Division 31 – Earthwork
 - 2. Section 329100 – Planting Soil
 - 3. Section 329250 – Meadow
 - 4. Section 329200 – Plants

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- D. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

1.4 SUBMITTALS

- A. Product Data: For each product indicated, including:
 - 1. Pesticides & Herbicides
 - 2. Protection Materials
- B. Certification of Grass Seed from seed vendor including:
 - 1. Grass-seed mixture stating botanical and common name

2. Percentage by weight of each species and variety
3. Percentage of purity, germination, and weed seed
4. Year of production and date of packaging
5. Include identification of source and name and telephone number of supplier.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.
 1. Experience: Five (5) years' experience in turf installation in projects of similar complexity.
 2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 3. Pesticide Applicator: State licensed, commercial.
- B. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.
- B. Bulk Materials:
 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, plants, or on existing turf areas.
 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

1.7 PROJECT CONDITIONS

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion. Do not work soil when muddy or excessively wet or frozen.
 1. Seed shall be planted in the Fall between August 15 and October 15.
 2. Seed shall be planted in the Spring after the last frost, ideally between March 15 and May 15. Seeding must be completed with sufficient time to cultivate an established stand as specified herein.
 3. Established stand of grass must be Substantially Complete at least four weeks prior to first frost is predicted to allow for proper establishment.

1.8 MAINTENANCE SERVICE

- A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each

area is planted and continue until acceptable turf is established but for not less than 90 days from date of Substantial Completion.

1. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

PART 2 - PRODUCTS

2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
 1. Seed shall be Pennsylvania certified and blue tagged.
- B. Seed Species: Seed of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:
 1. Lawn Turf Type Tall Fescue Blend: 10% Kentucky Bluegrass, 45% Turf Type Tall Fescue, 45% Perennial Ryegrass
 - a. Blue Grass acceptable cultivars: Award, Avalanche, Beyond, Midnight II, Princeton 105
 - b. Tall Fescue acceptable cultivars: Silverstar, Olympic Gold, Apache III, Masterpiece, Bingo
 - c. Perennial Rye grass acceptable cultivars: Esteem, Pacesetter, Sierra, Stellar, Citation Fore
 2. Sowing Rate:
 - a. 5.0 lbs per 1,000 square feet.

2.2 EROSION CONTROL

- A. See Specification 329100 Planting Soil for Erosion Control Measures: Straw Blanket and Straw Mulch

2.3 PESTICIDES / HERBICIDES

- A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent and Post-Emergent Herbicides (Selective and Non-Selective) shall only be used with written authorization by the Owner.

2.4 PROTECTION MATERIALS

- A. Wood stakes, suitable in length so that 30" minimally is exposed above ground.

- B. Durable twine with fluorescent flagging.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Do not work soil in frozen, wet, or muddy conditions.
 - 3. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Owner and replace with new planting soil as specified in Division 32 Section "Planting Soil".

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

- A. Finish Grading: once installation of soil for lawns is complete, roll the whole surface of lawn bed with a hand roller weighing approximately 100 lbs. per 12-inches of roller width. During the rolling, fill all depressions caused by settlement with additional planting soil and then re-grade by hand raking. Lightly roll and rake until the surface presents a smooth, even, and uniform finish that is at required grade. Use care to not over-compact soil by excessive rolling. Grade to within plus or minus 1/2 inch of finish elevation. Limit finish grading to areas that can be planted in the immediate future.
- B. Moistened prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- C. Before planting, obtain Owner's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 SEEDING

- A. Seed lawn, either as seeding or hydroseeding or overseeding, shall be applied to all areas of this project that do not receive sod.
 - 1. Sow seed as soon as ground has been properly prepared.
 - 2. Distribute seed evenly over entire area by sowing equal quantity in two directions at right angles to each other.
 - a. Use suitable mechanical seeder or sow by hand for small areas.
 - b. Do not broadcast or drop seed when wind velocity exceeds 5 mph.
 - c. Do not use wet seed or seed that is moldy or otherwise damaged.
 - 3. Do not seed against existing or proposed trees or within existing or proposed plant beds. Limit extent of seed to the outside edge of planting saucer or plant bed.
 - 4. Sow seed at the supplier's recommended application rate for new lawns.
 - 5. Cover seed with a thin layer of planting soil by lightly raking into the top 1/8 inch of soil.
 - 6. Roll seed in both directions very lightly with an empty water roller.
 - 7. Water with a fine spray immediately after seeding operation is completed.
- B. After seed application, apply Erosion Control Blankets or Straw Mulch, see Specification 329100.
- C. Water all newly installed seeded areas as necessary to keep lawn healthy. Apply water in sufficient quantities so it penetrates four (4) inches into soil without puddling. Continue watering until seeded areas are accepted by the Owner.
- D. When seeding occurs after acceptable seeding dates, over winter protection shall consist of applying five bales clean straw per 1,000 sq. ft. and anchor mulch by commercial mulch netting or 20 lbs./1,000 sq. ft. cellulose fiber. Asphalt emulsion anchoring is not permitted.

3.5 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
 - 1. Mix slurry with fiber-mulch manufacturer's recommended nonasphaltic tackifier.
 - 2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.

3.6 TURF PROTECTION

- A. Rope off entire perimeter of seeded areas immediately upon completion of seeding.
- B. Install wood stakes, 30" high minimally, no further apart than 8', in consistent straight lines or curves.
- C. String durable twine with fluorescent flagging from stake to stake.

3.7 TURF RESTORATION

- A. Renovate newly installed or established turf damaged by Contractor's operations. Consult the Owner prior to restoring turf for renovation requirements. Turf shall be restored to the satisfaction of the Owner.

3.8 TURF MAINTENANCE

- A. Maintain and establish turf by watering, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
 - 1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
 - 2. Apply treatments as required to keep turf and soil free of pests and pathogens or disease as specified herein. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Watering: To be provided by temporary irrigation system.
 - 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch.
 - 2. Seed: Water seeded areas as often as required to keep the top 1-inch of soil moist until the seed germinates. Avoid excessive water that will cause the seeds to rot. Once seedlings have germinated and established reduce watering frequency and increase volume for deeper watering. Continually adjust irrigation until intervals have been stretched to the greatest extent practical.
- C. Mow turf as soon as top growth is tall enough to cut, approximately 3 to 3-1/2 inches tall, and root growth is sufficient. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet.

3.9 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Owner:
 - 1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft and bare spots not exceeding 5 by 5 inches.
- B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.10 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the

Work. Notify Owner before each application is performed. Provide notification signage as directed by Owner.

- B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.11 CLEANUP AND PROTECTION

- A. Do not allow soil and debris created by turf work onto permeable unit paving areas. Promptly clean up any soil or debris on impervious paving areas, such as concrete sidewalk or roadway paving. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Protection of newly planted lawn areas is critical to healthy establishment. Erect temporary protection fencing and warning signs to protect newly planted areas from traffic. Maintain fencing throughout initial maintenance period. Remove protection fencing only after lawn areas have become well established and are able to tolerate regular use.

END OF SECTION 329200

SECTION 329250 - MEADOW

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Preparation for and seeding of meadow.
 - 2. Establishment of meadow.
 - 3. Maintenance of meadow.
- B. Related Sections:
 - 1. Division 31 – Earthwork
 - 2. Section 329100 – Planting Soil
 - 3. Section 329200 – Turf and Grasses
 - 4. Section 329300 – Plants

1.3 SUBMITTALS

- A. Product Data for each product indicated, including:
 - 1. Pesticides & Herbicides
 - 2. Protection Materials
- B. Certification of Meadow Seed from seed vendor including:
 - 1. Meadow-seed mixture stating the botanical and common name.
 - 2. Percentage by weight of each species and variety.
 - 3. Certification from supplier stating that seed furnished has been tested by a recognized lab for seed testing within six (6) months prior to the date of installation.
 - 4. Seeding instructions including recommended installation window and application rate as recommended by seed supplier for specified seed mix(es).
 - 5. Percentage of purity, germination, and weed seed.
 - 6. Year of production and date of packaging.
 - 7. Identification of source and name and telephone number of supplier.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful meadow establishment.
 - 1. Experience: Ten (10) years' experience in meadow installation and establishment in projects of similar size and complexity.
 - 2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

- 3. Pesticide Applicator: State licensed, commercial.
- B. Pre-installation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.
- B. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, plants, or on existing turf areas.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

1.6 PROJECT CONDITIONS

- A. Planting Restrictions: Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion. Do not work soil when muddy or excessively wet or frozen.
 - 1. Timing of the work: Seeding shall be completed as soon as practical after the completion of final grading – see below. Contractor shall coordinate actual start date of seeding installation with Landscape Architect.
 - a. Seeding timeframe shall take place in accordance with seed supplier recommendations, or after the first killing frosts in the fall and prior to June 1 in the spring.
 - b. If seeding cannot take place directly after final grading, apply erosion control matting to slopes 3:1 or greater and straw mulch to areas of 3:1 or less and/or cover crop in accordance with seed mix supplier recommendations until seeding can take place. Remove erosion control matting prior to final seeding.
 - 2. Utilize a supplemental cover crop as required and recommended by seed supplier to stabilize soil and establish the meadow. Supplemental cover crop as recommended by seed mix supplier.

1.7 MAINTENANCE PERIOD

- A. Maintenance period includes one (1) year of maintenance.
- B. Establishment recommendations for first three (3) years are outlined below.
 - 1. Meadow maintenance personnel must be familiar with and able to visually identify desirable and undesirable plant species.
 - 2. Meadow maintenance procedures and scheduling must be coordinated with the Owner.

PART 2 - PRODUCTS

2.1 SEED

- A. Supplier: Ernst Conservation Seeds, 9006 Mercer Pike, Meadville, PA 800-873-3321, or approved equal.
- B. Meadow Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
 - 1. Seed quantities shall meet requirements using Pure Live Seed.
 - 2. Seed shall be treated with a fungicide and an insecticide by the supplier.
- C. All seed and seed mixes shall be furnished in bags or containers clearly labeled to show the name and address of the supplier, the common, scientific, and variety name(s) of the seed(s), the lot number, point of origin, net weight, percent of weed content, and guaranteed percentage of purity and germination.
- D. Seed Species: as identified on the Drawings, or as currently available from the indicated supplier.
- E. Rate of application: as recommended by seed supplier of seed mix.

2.2 MULCH

- A. See Specification 329100 Planting Soil for straw mulch and erosion control blanket at seeded areas.

2.3 PESTICIDES / HERBICIDES

- A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent and Post-Emergent Herbicides (Selective and Non-Selective) shall only be used with written authorization by the Owner.

2.4 PROTECTION MATERIALS

- A. Wood stakes, suitable in length so that 30" minimally is exposed above ground.
- B. Durable twine with fluorescent flagging.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a meadow area.
 - 2. Do not work soil in frozen, wet, or muddy conditions.
 - 3. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a meadow area, remove the soil and contamination as directed by Owner and replace with new planting soil as specified in Section “Planting Soil”.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by seeding operations.

3.3 MEADOW PREPARATION

- A. Finish Grading: once installation of soil and compost for the meadow is complete, roll the whole surface of meadow bed with a hand roller weighing approximately 100 lbs. per 12-inches of roller width. During the rolling, fill all depressions caused by settlement with additional soil and then re-grade by hand raking. Lightly roll and rake until the surface presents a smooth, even, and uniform finish that is at required grade. Use care to not over-compact soil by excessive rolling. Grade to within plus or minus 1/2 inch of finish elevation.
- B. Allow weed seed in the soil and compost to germinate. Apply non-selective herbicide to the entire meadow area when growth is 6-12” tall. If broadleaf weeds are present, mix broadleaf herbicide into the tank mix.
- C. Till vegetation into the soil.
- D. Allow a second round of weed seed to germinate and repeat application of non-selective herbicide when vegetation has reached 6-12”. Herbicide applications must be at least two weeks apart.
- E. Till dead vegetation into the soil.
- F. Install seed immediately.
- G. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not overwater and create muddy soil.

3.4 SEEDING

- A. Sow seed with a drill seeder using seed box as required. Do not seed when wind velocity exceeds 5 mph.
 - 1. Do not use wet seed or seed that is moldy or otherwise damaged.
- B. Sow seed at a total maximum rate per manufacturer instructions.
 - 1. Sow seed in two directions.
- C. Install required erosion control blankets or mulch.
- D. Saturate seeded areas to a depth of 6 to 8 inches immediately following installation.

3.5 MEADOW PROTECTION

- A. Rope off entire perimeter of seeded areas immediately upon completion of seeding.
- B. Install wood stakes, 30” high minimally, no further apart than 8’, in consistent straight lines or curves.
- C. String durable twine with fluorescent flagging from stake to stake.
- D. Maintain perimeter protection until meadow is established at the end of the third year of maintenance. Replace stakes and twine and flags as necessary to maintain a clean appearance and as directed by the Owner.

3.6 MEADOW MAINTENANCE

- A. General: monitor and control weeds. Hand pull problem weeds.
- B. First Year: Observe the growth of the desired and undesired (weeds) species. When undesired vegetation reaches 12” tall, mow to 6”-8” high with a flail-type mower or weed eater (do not use a rotary mower). Do not allow weeds to exceed 12” height.
 - 1. Do not mow when soil or plants are wet.
 - 2. Expect to mow three times in the first year, about once a month in the summer.
- C. Second Year: mow when weeds achieve a height of 12”.
 - 1. Biennial weeds must be mowed when in full bloom but before setting seed, usually around mid-June. Two mowings may be required at a height of 12” when the biennials are in full flower but have not set seed.
 - 2. Do not spray weeds with herbicide.
- D. Third Year: mow the meadow planting very close to the ground, in mid-Spring, usually between April 15 and May 1. Remove the mowed vegetation from the site to expose the soil to the sun.

END OF SECTION 329250

DOCUMENT 329300 - PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Plants.
 - 2. Nursery visits and plant selection.
 - 3. Tree stabilization.
 - 4. Maintenance and warranty.
 - 5. Deer protection.
- B. Related Sections:
 - 1. Section 329100 – Planting Soil
 - 2. Section 329200 – Turf and Grasses
 - 3. Section 329350 – Meadow

1.3 REFERENCES

- A. ASNS: “American Standard for Nursery Stock,” latest edition, published by the American Hort.
- B. NAA: “National Arborist Association Standards for Pruning”, latest edition, published by the National Arborist Association.
- C. ANSI: “American National Standards Institute”, latest edition.

1.4 DEFINITIONS

- A. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
- B. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

- C. Plug: A cylinder of medium in which a plant is grown. The term is generally used to describe seedlings and rooted cuttings which have been removed from the container but with the medium held intact by the roots.
- D. Finish Grade: Elevation of finished surface of planting soil.
- E. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- F. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- G. Caliper: Diameter of a trunk as measured by a diameter tape at a height 6 inches above the root flair for trees up to, and including, 4-inch size at this height; and as measured at a height of 12 inches above the root flair for trees larger than 4-inch size.
- H. Root-Ball Depth: Measured from bottom of trunk flare to the bottom of root ball.
- I. Root-Ball Width: Measured horizontally across the root ball with an approximately circular form or the least dimension for non-round root balls, not necessarily centered on the tree trunk, but within tolerance according to ANSI Z60.1.
- J. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
- K. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

1.5 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site. Review methods and procedures related to transplanting, plant installation, and coordination with the Bartram House Restoration Project including, but are not limited to, the following:
 - 1. Construction schedule. Verify availability of materials, personnel, equipment, and unimpeded access needed to make progress and avoid delays.
 - 2. Tree and plant protection.
 - 3. Tree maintenance.
 - 4. Arborist or horticulturist responsibilities.

1.6 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.

2. Plant Photographs: Include color photographs in digital format at least 4 by 6-inch of each required species and size of plant material as it will be furnished to the Project. Photographs shall be provided to the Owner prior to scheduling any nursery visits. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.
- B. Samples for Verification: For each of the following:
 1. Mulch: 1-gallon re-sealable plastic bag of each mulch type required; labeled with composition of materials and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
- C. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
- D. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
 1. Manufacturer's certified analysis of standard products.
 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- E. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods.
- F. Warranty: Sample of special warranty.
- G. Existing Conditions: Documentation of existing plants indicated to be transplanted, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.
 1. Use sufficiently detailed color photographs or video recordings. Color shall accurately depict hue condition of foliage and bark.
 2. Include drawings and notations to indicate specific wounds and damage conditions of each plant designated to be transplanted.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.
 1. Experience: Five (5) years' experience in landscape installation in project of similar complexity.
 2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 3. Pesticide Applicator: State licensed, commercial.
- B. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

1. Trees: Measure with branches and trunks in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree for height and spread. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
 2. Other Plants: Measure with stems, petioles, and foliage in their normal position.
- C. Tree Tagging and Nursery Visits: Landscape Architect and Owner, with Contractor present will select plant material at nursery. Trees must be field grown and in-the-ground at time of selection. Representative samples for shrubs and herbaceous plants will be observed and selected at the nursery and serve as the basis of review and additional plants delivered to the site. The Contractor shall source specified plants and coordinate nursery visits.
1. Plants shall be selected from a nursery supply that is at least three times the quantity specified.
 2. Tree selection shall occur at least two (2) months prior to delivery to site. Caliper size at time of planting shall meet specified size unless otherwise approved by Owner.
- D. Pre-installation Conference: Conduct conference at Project site.
- E. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees in such a manner as to destroy their natural shape.
- F. Plant Material Observation: Landscape Architect or Owner may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Owner retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
1. Notify Landscape Architect of delivery of planting materials seven (7) business days in advance of delivery to site.
- G. Completely cover foliage when transporting trees while they are in foliage.
- H. Handle plants by root ball. Do not drop plants.
- I. Move plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after moving, set plants in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
1. Heal in, ball and burlap, or pot plants as required if transplant location is not immediately available due to sequencing of construction.
- J. Compliance with Pennsylvania Department of Environmental Protection Erosion and Sediment Pollution Control Program Manual, current edition, is required.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

- B. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
- C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- D. Handle planting stock by root ball.
- E. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.
- F. Deliver plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
 - 1. Set balled stock on ground and cover ball with mulch or other acceptable material.
 - 2. Do not remove container-grown stock from containers before time of planting.
 - 3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.
- G. Immediately remove rejected plants from site.
- H. All seed shall be labeled to show compliance with requirements of governmental agencies having jurisdiction. All bag tags of seed used shall be retained and if requested, submitted to Landscape Architect.

1.9 PROJECT CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- B. Planting Restrictions: Plant during the following periods as specified on the Drawings, weather permitting. Coordinate planting periods with maintenance periods to provide required maintenance from date of Planting Completion. Do not work soil when muddy or excessively wet or frozen.
 - 1. Spring Planting: March 1 through June 15.
 - 2. Fall Planting: September 15 through October 15.
 - 3. Plant trees known to be fall hazards only in the Spring.
- C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained.

Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

- D. Coordination with Lawns: Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
 - 1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.10 WARRANTY

- A. Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period. Failures include, but are not limited to, the following:
 - 1. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
 - 2. Structural failures including plantings falling or blowing over.
 - 3. Faulty performance of tree stabilization.
 - 4. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- B. Warranty Periods from Date of Planting Completion:
 - 1. Trees: Twenty-four (24) months.
 - 2. Shrubs, Ground Covers, Perennials, Ornamental Grasses, Bulbs and Other Plants: Twelve (12) months.
 - 3. Annuals: Three (3) months.
- C. Warranty of seeded areas including seeded lawns and native grasses:
 - 1. First Growing Season: Minimum plant survival rate shall be 75%. Re-seed or plug as required to achieve minimum survival rate.
 - 2. Second and Third Growing Seasons: Minimum plant survival rate shall be 75%. Re-seed or plug as required to achieve minimum survival rate.
- D. Include the following remedial actions as a minimum:
 - 1. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
 - 2. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
 - 3. A limit of one replacement of each plant will be required, except for losses or replacements due to failure to comply with requirements.
 - 4. Provide extended warranty for period equal to original warranty period, for replaced plant material upon initial replacement. The warranty shall terminate upon successive replacement.

1.11 MAINTENANCE SERVICE

- A. Initial Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period - Trees, shrubs, ground covers, perennials, ornamental grasses, bulbs, and other plants:
 - a) Twelve (12) months from date of project completion/acceptance by owner. This does not necessarily coincide with installation date. Establish (12) month maintenance period with Owner at project acceptance.
2. Maintenance Period - Seeded areas – Native Grasses:
 - a) See specification 329250 Meadow
3. Maintenance Period - Seeded areas – Lawn:
 - a) See specification 329200 Turf and Grasses

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
 1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 1 inch in diameter; or with stem girdling roots will be rejected.
 2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
- B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Owner, with a proportionate increase in size of roots or balls.
- C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- D. Labeling: Label each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.

2.2 MULCHES

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of:
 1. Type: Triple ground hardwood bark unless noted otherwise.
 2. Size Range: 3 inches maximum, 1/2 inch minimum.
 3. Color: Natural. Dyed mulch is prohibited.

2.3 EROSION CONTROL

1. See Section 329100 Planting Soil.

2.4 PESTICIDES

- A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent and Post-Emergent Herbicides (Selective and Non-Selective) shall only be used with written authorization by the Owner.

2.5 TREE STABILIZATION MATERIALS

- A. Stakes and Guys:
 1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood free of knots, holes, cross grain, and other defects, at least 2-by-2-inch nominal by length indicated, pointed at one end.
 2. Guy Cables: Five-strand, 3/16-inch diameter, galvanized-steel cable.
 - a) Flags: Standard surveyor's plastic flagging tape, white, 6 inches long. Use one (1) per cable in areas that are a pedestrian hazard.
 3. Straps: Use of hose will not be permitted. Utilize Treestrap, GCS, Inc., 401 Elm Avenue, North Wales, PA 19454, or approved equal.

2.6 TREE SHELTERS

- A. Rigid 5-foot (60") tall round polyethylene tubes with pre-fitted, releasable ratchet ties used to fasten the tube to a hardwood stake.
 1. Products: 60" Miracle Tree Tube Tree Shelter with pre-inserted releasable zip ties as manufactured by Tree Pro, 3180 W 250 N, West Lafayette, IN, 47906, 1-800-875-8071, or approved equal.
- B. Hardwood stake shall be 2-inch by 2-inch with length equal to the tree shelter height with adequate embedment into the ground to firmly secure the stake and shelter against buck rub.

2.7 SEED

- A. See Specifications 329200-Turf and Grasses and 329250-Meadow for specified seed mixes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
 - 3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Owner and replace with new planting soil.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Owner's acceptance of layout before excavating or planting. Make minor adjustments as required.
- D. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.
- E. Lay out individual transplant locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Owner's acceptance of layout before transplanting. Make minor adjustments as required.
- F. Remove invasive species within limits of disturbance utilizing approved herbicides, selected for the specific ecological system.
- G. Multiple herbicide applications will be required if persistent species are not eradicated initially.
- H. Burn or turn under excess dead vegetation as conditions permit.

3.3 PLANTING AREA ESTABLISHMENT

- A. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

- B. Before planting, obtain Owner's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 EXCAVATION FOR TREES

- A. Planting Pits and Trenches: Install in accordance with the Drawings. Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Scarify sides of planting pit smeared or smoothed during excavation.
 - 1. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
 - 2. If area under the plant was initially dug too deep, add soil to raise it to the correct level and tamp the added soil to prevent settling.
 - 3. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
 - 4. Maintain supervision of excavations during working hours.
 - 5. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
- B. Obstructions: Notify Owner if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
- C. Drainage: Notify Owner if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

3.5 TREE AND SHRUB PLANTING

- A. Before planting, obtain Landscape Architect's approval of all tree and shrub locations and orientations.
- B. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.
- C. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- D. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare above adjacent finish grades per Drawings.
 - 1. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 - 2. Continue backfilling process. Water again after placing and tamping final layer of soil.
- E. Set container-grown stock plumb and in center of planting pit or trench with root flare above adjacent finish grades per Drawings.
 - 1. Carefully remove root ball from container without damaging root ball or plant.

2. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. For large shrubs, when planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 3. Continue backfilling process. Water again after placing and tamping final layer of soil.
- F. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.6 TREE AND SHRUB PRUNING

- A. Remove only dead, dying, or broken branches. Do not prune for shape.
- B. Prune, thin, and shape trees and shrubs only as directed by Owner.
- C. Do not apply pruning paint to wounds.

3.7 TREE STABILIZATION

- A. Install trunk stabilization only if tree is unstable and as follows:
 1. Upright Staking and Tying: Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation, or depth required for stability, and to extend one-third of trunk height above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
 2. Use two stakes for trees up to 12 feet high and 2-1/2 inches or less in caliper; three stakes for trees less than 14 feet high and up to 4 inches in caliper. Space stakes equally around trees.
 3. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
- B. Tree stabilization must be removed within one (1) year of installation, unless tree remains unstable. During the duration stabilization is installed, the Contractor shall make frequent adjustments and status checks to ensure stabilization is functioning and has not become over-tight. The Contractor shall be responsible for damage or harm to the tree caused by poor staking, maintenance, pre-mature removal, or neglect, except when damage is caused by Owner staff or vandalism.

3.8 TREE SHELTER

- A. Install in accordance with manufacturers recommendations.
- B. Install shelters on all trees smaller than 3.5-inch caliper.

3.9 GROUND COVER AND HERBACEOUS PLANTING

- A. Before planting, obtain Landscape Architect's approval of planting layout.

- B. Set out and space ground cover and herbaceous plants other than trees and shrubs as indicated in even rows with triangular spacing.
- C. Work soil around roots to eliminate air pockets.
- D. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

3.10 PLANTING AREA MULCHING

- A. Mulch backfilled surfaces of planting areas and other areas indicated.
 - 1. Trees in Lawn Areas: Apply organic mulch ring to thickness indicated, in radius per Drawings around trunks.
 - 2. Organic Mulch in Plant Bed Areas: Apply thickness indicated of organic mulch over whole surface of planting area, and finish level with adjacent finish grades.

3.11 SEED INSTALLATION

- A. See Specifications 329200-Turf and Grasses and 329250-Meadow for seeding installation.

3.12 MAINTENANCE

- A. Maintain plantings by watering, weeding, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.
- B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.13 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Obtain Owner approval before application is performed.
- B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.
- C. Notification signage must be posted at every entrance in a highly visible location at least five (5) days in advance of application and maintained five (5) business days following application, or as recommended by the manufacturer's instructions, whereby it is then removed from the site.

1. Notification Signage shall be brightly colored, laminated and at least 8.5” by 11” format including the following information:
 - a) Date of Notification.
 - b) Date of Application.
 - c) Name of Chemical.
 - d) Reason for Chemical Application.
 - e) Information informing as to the precautions that must be taken including humans and pets.

3.14 CLEANUP AND PROTECTION

- A. Do not allow soil and debris created by turf work onto permeable unit paving areas. Promptly clean up any soil or debris on impervious paving areas, such as concrete sidewalk or roadway paving. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- C. After installation and before Planting Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.15 DISPOSAL

- A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 329300

SECTION 33 05 00

COMMON WORK RESULTS FOR UTILITIES

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. Piping joining materials.
 - 2. Transition fittings.
 - 3. Grout.
 - 4. Piped utility demolition.
 - 5. Piping system common requirements.
 - 6. Equipment installation common requirements.

1.3 DEFINITIONS

- A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.
- B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- C. ABS: Acrylonitrile-butadiene-styrene plastic.
- D. CPVC: Chlorinated polyvinyl chloride plastic.
- E. PE: Polyethylene plastic.
- F. PVC: Polyvinyl chloride plastic.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes 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.

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- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.5 COORDINATION

- A. Coordinate size and location of concrete bases. Formwork, reinforcement, and concrete requirements are specified in Division 03.

PART 2 - PRODUCTS

2.1 PIPING JOINING MATERIALS

- A. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- B. Solvent Cements for Joining Plastic Piping:
 - 1. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

2.2 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPED UTILITY DEMOLITION

- A. Disconnect, demolish, and remove piped utility systems, equipment, and components indicated to be removed.
 - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
- B. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING INSTALLATION

- A. Install piping according to the following requirements and Division 33 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping to permit valve servicing.
- E. Install piping at indicated slopes.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Select system components with pressure rating equal to or greater than system operating pressure.
- I. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

3.3 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 33 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.4 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 - 1. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

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3.5 EQUIPMENT INSTALLATION

- A. Install equipment level and plumb, unless otherwise indicated.
- B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.
- C. Install equipment to allow right of way to piping systems installed at required slope.

3.6 GROUTING

- A. Clean surfaces that will come into contact with grout.
- B. Provide forms as required for placement of grout.
- C. Avoid air entrapment during placement of grout.
- D. Cure placed grout.

END OF SECTION 33 05 00

SECTION 33 41 00
STORM UTILITY DRAINAGE PIPING

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 gravity-flow, non-pressure storm drainage outside the building, with the following components:
 - 1. Special fittings for expansion and deflection.
 - 2. Cleanouts.
 - 3. Drains.
 - 4. Precast concrete manholes.

1.3 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. EPDM: Ethylene-propylene-diene-monomer rubber.
- C. FRP: Fiberglass-reinforced plastic.
- D. LLDPE: Linear low-density, polyethylene plastic.
- E. PE: Polyethylene plastic.
- F. PP: Polypropylene plastic.
- G. PVC: Polyvinyl chloride plastic.
- H. RTRF: Glass-fiber-reinforced, thermosetting-resin fitting.
- I. RTRP: Glass-fiber-reinforced, thermosetting-resin pipe.
- J. TPE: Thermoplastic elastomer.
- K. DIP: Ductile Iron Pipe

- L. RCP: Reinforced Concrete Pipe

1.4 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water. Pipe joints shall be at least silttight, unless otherwise indicated.

1.5 SUBMITTALS

- A. Product Data: For the following:

1. Special pipe fittings.
2. Drains.

- B. Shop Drawings: For the following:

1. Manholes: Include plans, elevations, sections, details, and frames and covers.
2. Stormwater Inlets. Include plans, elevations, sections, details, and frames, covers, and grates.
3. Stormwater Detention Structures: Include plans, elevations, sections, details, frames and covers, design calculations, and concrete design-mix report.

- C. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.

- D. Profile Drawings: Show system piping in elevation. Draw profiles at horizontal scale of not less than 1 inch equals 50 feet and vertical scale of not less than 1 inch equals 5 feet. Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.

- E. Field quality-control test reports.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.
- D. Handle stormwater inlets according to manufacturer's written rigging instructions.

1.7 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage 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 service according to requirements indicated:
 - 1. Notify Architect no fewer than two days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of service without Owner's written permission.

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. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, fitting, and joining materials.

2.3 CONCRETE PIPE AND FITTINGS

- A. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76.
 - 1. Bell-and-spigot ends and rubber gaskets sealant joints with ASTM C 990, bitumen or butyl-rubber sealant.
 - 2. Class I, Wall A.

2.4 DUCTILE-IRON, PRESSURE PIPE AND FITTINGS

- A. Push-on-Joint Piping:
 - 1. Pipe: AWWA C151, for push-on joints.
 - 2. Standard Fittings: AWWA C110, ductile or gray iron, for push-on joints.
 - 3. Gaskets: AWWA C111, rubber, of shape matching pipe and fittings.
 - 4. Pipe within the City right-of-way shall be class 56 for 12" diameter size pipe or less and class 54 for pipe sizes greater than 12" in diameter.
 - 5. Pipe located within the site property boundaries shall be a minimum class 52.

2.5 NONPRESSURE-TYPE PIPE COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:
 - 1. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
 - 2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- C. Shielded Flexible Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
 - 1. Available Manufacturers:
 - a. Cascade Waterworks Mfg.
 - b. Dallas Specialty & Mfg. Co.
 - c. Mission Rubber Company; a division of MCP Industries, Inc.

2.6 CLEANOUTS

- A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
 - 1. Available Manufacturers:
 - a. Josam Company.
 - b. MIFAB Manufacturing, Inc.
 - c. Smith, Jay R. Mfg. Co.
 - d. Wade Div.; Tyler Pipe.
 - e. Watts Industries, Inc.
 - f. Watts Industries, Inc.; Enpoco, Inc. Div.
 - g. Zurn Industries, Inc.; Zurn Specification Drainage Operation.
 - 2. Top-Loading Classification(s): Heavy duty.
 - 3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.7 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318/318R, ACI 350R, and the following:
 - 1. Cement: ASTM C 150, Type II.

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2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (420 MPa), deformed steel.

2.8 STORMWATER INLETS

- A. Curb Inlets: Made with vertical curb opening, of materials and dimensions according to utility standards.
- B. Frames and Grates: Heavy-duty frames and grates according to utility standards.
- C. Curb Inlets: Vertical curb opening, of materials and dimensions indicated.
- D. Frames and Grates: Dimensions, opening pattern, free area, and other attributes indicated.

2.9 PIPE OUTLETS

- A. Head Walls: Cast-in-place reinforced concrete, with apron and tapered sides.
- B. Energy Dissipaters: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. A-1, 3-ton (2721-kg) average weight armor stone, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 PIPING APPLICATIONS

- A. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
 1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping, unless otherwise indicated.
 - a. Shielded flexible or rigid couplings for same or minor difference OD pipes.
 - b. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

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- B. Gravity-Flow, Non-pressure Sewer Piping: Use any of the following pipe materials for each size range:
 - 1. NPS 15: Ductile Iron sewer pipe and fittings, gaskets, and gasketed joints.
 - 2. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

3.3 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. 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.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.
- F. Install gravity-flow, non-pressure drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow, at minimum slope, unless otherwise indicated.
 - 2. Install piping with 36-inch minimum cover.
 - 3. Install piping below frost line.
 - 4. Install ductile-iron piping and special fittings according to AWWA C600 or AWWA M41.
 - 5. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

3.4 PIPE JOINT CONSTRUCTION

- A. Basic pipe joint construction is specified in Division 33 Section "Common Work Results for Utilities." Where specific joint construction is not indicated, follow piping manufacturer's written instructions.
- B. Join gravity-flow, non-pressure drainage piping according to the following:

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1. Join ductile-iron piping and special fittings according to AWWA C600 or AWWA M41.
 2. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
 3. Join dissimilar pipe materials with nonpressure-type flexible couplings.
- C. Join dissimilar pipe materials with pressure-type couplings.

3.5 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
1. Use heavy-duty, top-loading classification cleanouts in vehicle-traffic service areas.
- B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding earth grade.
- C. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

3.6 STORMWATER INLET INSTALLATION

- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.

3.7 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318/318R.

3.8 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Division 22 Section "Storm Water Piping."
1. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.9 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. Submit separate reports for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.

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- 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.
- 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
- 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
 - 1. Do not enclose, cover, or put into service before inspection and approval.
 - 2. Test completed piping systems according to authorities having jurisdiction.
 - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 - 4. Submit separate report for each test.
 - 5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Option: Test concrete piping according to ASTM C 924.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.10 CLEANING

- A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

END OF SECTION 33 41 00

SPECIAL PROVISIONS FOR SIGNAGE PACKAGE

PART 1 - DESCRIPTION

- 1.1 Three signage items have been included in the bid proposal as a special provision. These items will be furnished and installed by Urban Sign (527 East Chestnut Ave, Vineland, NJ 08360; Contact: Seth Davis 856-691-8388) who have agreed to supply and install these items for the unit prices noted. The successful prime contractor must use Urban Sign to furnish and install this work and must coordinate their work within the entire project scope, arrange for site access, and pay Urban Sign for work done. Any or all of these signs may be installed at the convenience of the sign manufacturer, subject to coordination with the prime contractor.
- A. Schuylkill Banks Logo Sign (7 Signs): These signs are identical to signs previously placed on the Schuylkill Banks trail and greenway. Urban sign is familiar with all details of the signs and the installation technique. No catalogue cuts, shop drawings or samples are required.
- B. Interpretive designs (1 Sign): This sign will use PPR format and are similar to other interpretive signs installed on Schuylkill Banks. Urban Sign is familiar with the sign details and no shop drawing is required. The sign fabricator shall verify color of the sign frame with SRDC prior to fabrication. SRDC will provide print ready copy to Urban Sign and will designate the sign location at the appropriate time.
- C. Project End Point Sign: This item is for a 4'x8' RTG sign (1/2" thickness) to be installed at the end of the trail segment, near 61st Street. No shop drawings are required. The graphic will be provided by the owner.

PART 2 - MEASUREMENT AND PAYMENT

- 2.1 The Signage items have been included in the bid proposal as a pre-determined amount. The prime contractor can simultaneously include these amounts on its invoice to SRDC. SRDC will pay for work satisfactorily completed and accepted but with no additional mark-up or surcharge by the prime contractor. Should the contractor have costs associated with the sign package, these costs shall be included in the mobilization item.

END SPECIAL PROVISIONS FOR SIGNAGE PACKAGE