DELAWARE RIVER TRAIL PENN TREATY PARK TO THE BATTERY – SPECIAL PROVISIONS

December 23, 2025

The work to be completed under the scheduled items shall comply with the requirements of the corresponding numerical Sections of the most current edition including all addenda of the following Standard Specifications or as per specific requirements shown on the plans or special provisions:

- Pennsylvania Department of Transportation Standard Highway Specifications (Pub 408/2020), Change 10, April 2025
- Pennsylvania Department of Transportation Publications listed in the General Notes of the plans.
- Philadelphia Streets Department Standard Details and Specifications, available at https://www.phila.gov/departments/department-of-streets/design-construction/standards-and-guidelines

Within Publication 408, wherever references are made to the Commonwealth, the Department or its employees, for the purpose of this contract it shall mean the Delaware River Waterfront Corporation and its corresponding employees, unless otherwise superseded by Law.

PENNDOT AND PHILADELPHIA STREETS DEPARTMENT STANDARD ITEMS

ITEM 0201-0001 CLEARING AND GRUBBING, LUMP SUM

A. This item shall comply with Section 201 of the PennDOT Standard Highway Specifications.
B. This item includes demolition all items noted to be removed in the Protection and Removals Plan sheets, unless otherwise noted as a separate bid item herein.

ITEM 0203-0001 CLASS 1 EXCAVATION, CUBIC YARD

A. This item shall comply with Section 203 of the PennDOT Standard Highway Specifications.
B. Class 1 Excavation includes all earthwork excavation beyond the existing pavement.
C. Class 1 Excavation includes removal of the existing pavement .

ITEM 0203-0006 SAW CUTTING , LINEAR FOOT

A. This item shall comply with Section 203 of the PennDOT Standard Highway Specifications.

ITEM 0212-0014 GEOTEXTILE, CLASS 4, TYPE A, SQUARE YARD

A. These items shall comply with Section 212 of the PennDOT Standard Highway Specifications.

ITEM 0350-0104 SUBBASE 4” DEPTH (NO.2A), SQUARE YARD

A. This item shall comply with Section 350 of the PennDOT Standard Highway Specifications.

ITEM 0413-0195 SUPERPAVE ASPHALT MIXTURE DESIGN, WEARING COURSE, PG 64S-22, < 0.3 MILLION ESALS, 9.5 MM MIX, 1 1/2" DEPTH, SRL-L, SQUARE YARD

ITEM 0413-6032 SUPERPAVE ASPHALT MIXTURE DESIGN, BINDER COURSE, PG 64S-22, < 0.3 MILLION ESALS, 25.0 MM MIX, 4" DEPTH, SQUARE YARD

A. These items shall comply with Section 413 of the PennDOT Standard Highway Specifications.
B. Section 110.04 Price Adjustments shall be in effect for these bid items.

ITEM 0460-0002 ASPHALT TACK COAT, GALLON

A. This item shall comply with Section 460 of the PennDOT Standard Highway Specifications.
B. Section 110.04 Price Adjustments shall be in effect for this bid item.

ITEM 0491-0012 MILLING OF ASHPALT PAVEMENT SURFACE, 1 1/2" DEPTH, MILLED MATERIAL RETAINED BY CONTRACTOR, SQUARE YARD

A. This item shall comply with Section 491 of the PennDOT Standard Highway Specifications.
B. Areas of milling under 1 ½" depth shall be quantified under this item.

ITEM 0606-0162 GRADE ADJUSTMENT OF EXISTING ELECTRIC BOX, SET

A. These items shall comply with Section 606 of the PennDOT Standard Highway Specifications, as well as the specifications and requirements of the applicable utility provider.

ITEM 0608-0001 MOBILIZATION, LUMP SUM

A. This item shall comply with Section 608 of the PennDOT Standard Highway Specifications.

ITEM 0641-0005 PLAIN CEMENT CONCRETE CURB and GUTTER, SQUARE YARD

A. This item shall comply with Section 641 of the PennDOT Standard Highway Specifications.
B. This item shall have a 6" curb height with chamfer on the curb to the dimensions as shown on the plans.
C. The gutter portion encompasses the concrete area surrounding the collapsible bollard.

ITEM 0686-0010 CONSTRUCTION SURVEYING, TYPE A, LUMP SUM

A. This item shall comply with Section 686 of the PennDOT Standard Highway Specifications, with the following exception:
   Remove Section 686.3(a)(3).
B. All horizontal and vertical datum shall comply with those listed in the plans.

ITEM 0810-0023 TREE TRIMMING TO A MAX HEIGHT OF 20'

A. This item shall comply with Section 810 of the PennDOT Standard Highway Specifications.

ITEM 0810-0052 SELECTIVE TREE REMOVAL, EACH

A. This item shall comply with Section 810 of the PennDOT Standard Highway Specifications.

ITEM 0811-0003 TEMPORARY PROTECTIVE FENCE, LINEAR FOOT

A. This item shall comply with Section 811 of the PennDOT Standard Highway Specifications.
B. This item shall be used as temporary tree protective fence and include posts and railings as depicted in the plans.
C. Refer to Item "Temporary 8' Perimeter Chain Link Fence" for perimeter control fence.

ITEM 0855-0003 PUMPED WATER FILTER BAG, EACH

A. This item shall comply with Section 855 of the PennDOT Standard Highway Specifications.

ITEM 0860-0000 INLET FILTER BAG FOR TYPE M INLET, EACH

A. This item shall comply with Section 860 of the PennDOT Standard Highway Specifications.

ITEM 0867-0012 COMPOST FILTER SOCK, 12" DIAMETER, LINEAR FOOT

B. This item shall comply with Section 867 of the PennDOT Standard Highway Specifications.

ITEM 0901-0001 MAINTENANCE AND PROTECTION OF TRAFFIC DURING CONSTRUCTION, LUMP SUM

A. This item shall comply with Section 901 of the PennDOT Standard Highway Specifications.
B. This item shall consist of all signage and barricades for bicycle detours on the project, posted both within the park and along public right of ways.

ITEM 0931-0003 POST MOUNTED SIGNS, TYPE B, STEEL SQUARE POST, SQUARE FOOT

A. This item shall comply with Section 931 of the PennDOT Standard Highway Specifications.
B. Posts used for signs shall be square steel posts per PennDOT Standard Detail TC-8702B. Sign locations and heights for signs located adjacent to the trail shall conform to the detail in the plans.

ITEM 0954-0012 2 INCH CONDUIT, LINEAR FOOT

A. This item shall comply with Section 954 of the PennDOT Standard Highway Specifications.

ITEM 0954-0151 TRENCH AND BACKFILL, TYPE I, LINEAR FOOT

A. This item shall comply with Section 954 of the PennDOT Standard Highway Specifications.

ITEM 0964-0002 4" YELLOW EPOXY PAVEMENT MARKINGS, LINEAR FOOT

B. This item shall comply with Section 964 of the PennDOT Standard Highway Specifications.

ITEM 0970-0001 REMOVE POST MOUNTED SIGNS, TYPE A, EACH

A. These items shall comply with Section 970 of the PennDOT Standard Highway Specifications.

CUSTOM ITEMS

ITEM 9000-0001 6" WHITE HOT THERMOPLASTIC PAVEMENT MARKING, RUMBLE STRIP ON TRAIL, LINEAR FOOT

A. These items shall comply with Section 960 of the PennDOT Standard Highway Specifications.

ITEM 9000-0002 WHITE PREFORMED THERMOPLASTIC LEGEND, "BICYCLE WITH RIDER", 6'-0" X 3'-0", EACH

ITEM 9000-0003 WHITE PREFORMED THERMOPLASTIC LEGEND, "BICYCLE WITH RIDER (4'-0" X 2'-0"), PEDESTRIAN (4'-0" X 2'-0"), AND STRAIGHT ARROW (2'-0" X 1'-0"), EACH

ITEM 9000-0004 WHITE PREFORMED THERMOPLASTIC LEGEND, "BIKEWAYTURN ARROW" (4'-0" X 2'-0"), EACH

ITEM 9000-0005 WHITE PREFORMED THERMOPLASTIC LEGEND,"STRAIGHT ARROW" (1'-6" X 6'-0"), EACH

ITEM 9000-0006 WHITE PREFORMED THERMOPLASTIC LEGEND, TYPICAL YIELD LINE LAYOUT ON TRAIL, EACH

A. These items shall comply with Section 962 of the PennDOT Standard Highway Specifications.

B. 9000-series items listed shall match the dimensions in the item title. Unless otherwise noted in the plan details, these pavement markings shall be of the same proportion and shape as those standard items shown on PennDOT Standard Drawing TC-8600 Sheet 8 of 13.

SECTION 9000–0007, AGGREGATE BED BENEATH BOARDWALK, CUBIC YARDS

1 DESCRIPTION

This work is the furnishing and placement of an aggregate bed beneath the Precast Concrete Boardwalk System to the length, width, and depth as shown on the plans.

2 MATERIAL

Delaware River Stone, also known as River Jack Stone and Delaware Blend Stone – a grey to multi-colored earth stone, from the Delaware River. Stone size varies from three inches (3”) to five inches (5”). Delaware River Stone is rounded, smooth-faced stone, washed free of loam, sand, clay and other foreign substances.

3 QUALITY CONTROL

Submit bag sample to Representative for approval prior to installation.

4 CONSTRUCTION

Install geotextile on prepared subgrade according to manufacturer’s written instructions, overlapping sides and ends at least 12 inches.

Excavate areas for stone as required and place stone as indicated on contract drawings at a uniform depth. Finish level with adjacent finished grades. Stone shall be placed after placement of the Helical Piles and abutment cap, but prior to the installation of the Precast Concrete Boardwalk System panels.

5 MEASUREMENT AND PAYMENT – Cubic Yard

Payment for Aggregate Beneath Boardwalk includes all excavation and materials necessary to install the aggregate to the dimensions and location shown on the plans.

SECTION 9000–0008, ARBORIST SERVICES, DOLLARS

1 DESCRIPTION

The Contractor shall engage the services of an arborist who shall serve as an advisor to the Engineer and to direct the Contractor's work around existing trees during all stages of work.

a) The Tree Consultant shall be an arborist approved by the Engineer, who shall advise the Engineer on which trees shall be pruned and which trees shall be removed. He shall be a person independent of and not associated with those persons performing the tree pruning and tree removal operations under this contract; and, he shall be certified by the Commonwealth of Pennsylvania. The Contractor shall furnish to the Engineer the Tree Consultant's professional credentials for evaluation. Additional minimum qualifications for the Tree Consultant shall be:

1. Associate degree in forestry, arboriculture, horticulture, or related plant science field, and three (3) years of full-time professional experience in arboriculture, specifically in the field supervision of techniques to mitigate damage to existing trees from the negative impacts of construction and International Society of Arboriculture (ISA) Certification; or
2. B.S. in forestry, arboriculture, horticulture, or related plant science field, and two (2) years of full-time professional experience in field supervision of techniques to mitigate damage to existing trees from the negative impacts of construction and ISA Certification; or
3. M.S. in forestry, arboriculture, horticulture, or related plant science field, and one (1) year of full-time professional experience and the field supervision of techniques to mitigate damage to existing trees from the negative impacts of construction and ISA Certification; or
4. Arborist certification by the International Society of Arboriculture (ISA) and four (4) years of full-time professional experience in arboriculture, specifically in the field supervision of techniques to mitigate damage to existing trees from the negative impacts of construction.

The Tree Consultant shall be required to appear on the work site when directed by the Engineer. He shall be required to advise the Engineer on tree pruning operations and the removal of trees where necessary; he shall personally witness and direct all excavation work around trees, approving both the Contractor's choice of hand tools for excavation and his manner of work around existing trees; he shall assess any damage caused by the Contractor's equipment, etc.; and, he shall identify trees, recommend construction alternatives to the Engineer in order to save existing trees from damage due caused by the Contractor's equipment, etc.; and, he shall identify trees, recommend construction alternatives to the Engineer in order to save existing trees from damage due to construction, recommend new tree planting locations, and evaluate an appropriate species mix.

2 MATERIAL (not used)

3 CONSTRUCTION (not used)

4 MEASUREMENT AND PAYMENT – Dollar

The proposal will include an item and a predetermined amount of money for Arborist Services. The contract item will have a unit of measure of Dollar, a unit price of $1.00, and a quantity equal to the predetermined amount.

The contract price bid for Arborist Services shall cover the cost of all labor, material, reports, plant, equipment, inspection, insurance, and incidentals required to complete the work, all in accordance with the Contract Drawings, the specifications and the directions of the Engineer.

SECTION 9000–0009, VEHICLE WASHDOWN AREA, EACH

1 DESCRIPTION

This work is the placement, maintenance and removal of the Vehicle Washdown Area.

2 MATERIAL

- Heavy Gauge Impervious Plastic Material – 10 mil minimum thickness.
- Compost Filter Sock – Section 867.2.
- AASHTO No. 1 Course Aggregate – Section 703.2

3 CONSTRUCTION

Install temporary truck wash at the location shown on the plans Construct in accordance with the Contract Special Provisions, PENNDOT Standard Drawings and Specifications; the PADEP "Erosion And Sediment Pollution Control Program Manual"; as shown on the Erosion And Sediment Pollution Control Plan. Comply with the requirements of PADEP Rules and Regulations Identified in Title 25, Chapter 102, "Erosion Control". In the event of conflict among these requirements and pollution control laws, rules or regulations of other federal, state, or local agencies, the more restrictive laws, rules, or regulations will apply.

Locate in level area (less than 2% grade) more than 50' from storm drains, open ditches or surface waters. Under no circumstances is truck wash water permitted to enter any surface waters.

Construct and maintain temporary Vehicle Washdown Area in sufficient quantity and size to contain all liquid and sediment generated by wash operations.

For added height, place 18" compost filter sock stacked on top of double 24" compost filter sock in pyramidal configuration.

Maintain continuous contact between geotextile and sock at all locations. Inspect vehicle wash daily.

Immediately deactivate and repair or replace damaged or leaking wash.

Remove accumulated materials when wash reaches 75 percent capacity. Washing of trucks must be performed in designated areas only.

Remove facility when no longer required.

4 MEASUREMENT AND PAYMENT – Each

ITEM 9000-0010 – PLAIN CEMENT 6” CONCRETE HEADER, LINEAR FOOT

1 DESCRIPTION

Work includes all labor, materials, equipment, services and maintenance necessary to install concrete headers as shown on the drawings and/or specified herein.

2 MATERIAL

A. Class A Cement Concrete—Section 704
B. Premolded Expansion Joint Filler—Section 705.1
C. Covers for Curing and Protection—Section 711.1
D. Curing Compound—Section 711.2(a)

3 CONSTRUCTION

As shown on the plans and details and as follows:

A. Excavation - Excavate as required. Remove existing curb, pavement, and sidewalk to neat lines when indicated, then compact the material, upon which the header is to be constructed, to a firm even surface.

B. Formwork - In accordance with Section 630.3 (b)

C. Placing, Finishing, and Curing Concrete - In accordance with Section 630.3 (c)

D. Joints - Form or saw contraction joints to uniform spacing (no more than 20’ and no less than 4’) and as specified in Section 501.3(i)2. Place 3/4-inch premolded expansion joint material conforming to the cross-sectional area of the header where indicated and at the end of the workday. Prepare and caulk joints according to caulking manufacturer’s recommendations.

E. Removal of Forms - In accordance with Section 630.3 (f)

F. Backfilling and Embankment - As soon as possible after the removal of forms, backfill the voids in front and back of the header, using acceptable embankment material, as specified in Section 206.3(b)4. Complete paver work as indicated in the plans.

G. Installation
   a) Subgrade: Ground surface underneath header shall be compacted to 95% Standard Proctor. Thoroughly clean subbase of all debris, loose dirt and other extraneous materials before pouring header. Do not install header when subbase is wet or muddy. Compact subgrade to 95% Standard Procter density, minimum.
   b) Protection: Protect the completed header against traffic, injury or defacement, or damage by rain during curing period and subsequent construction operations until Final Acceptance. Keep all areas of work clean, neat and orderly at all times. Keep all adjacent planting areas clean during paving operations. After completion do not allow any traffic

of any kind on the finished surface course until it is completely dried through, and adjacent pavement has been completed.

4 MEASUREMENT AND PAYMENT – Linear Foot

Formwork and compacted subgrade shall be considered incidental to this work. Concrete Header will be paid on a linear foot basis and include all materials and labor necessary to construct the header at the locations in the plans.

ITEM 9000-0011, HELICAL PILES, Vertical Lenear Foot (VLF)

1. DESCRIPTION

This work includes furnishing and installing helical piles shaft connections, and bracket assemblies.

2. MATERIAL

A. **Production Piles.** Solid steel bars meeting dimensional and workmanship requirements of ASTM A29 or Structural steel tube or pipe, welded or seamless, in compliance with ASTM A500 or A618, as manufactured by Ideal Piles (Webster NY) or an engineering equivalent.

(a) **Pile Shaft:** 4 ½" O.D. x 0.290" W.T., 80 KSI Min. Yield

(b) **Helix Configuration:** Double Helix, 10-12 x ½"

(c) **Plate Steel:** Minimum requirements of ASTM A572, Grade 50 Steel

(d) **Pile Cutoff Elevation (PCOE):** 1-ft Above Grade

(e) **Estimate Pile Length (from PCOE):** 45-ft

(f) **Minimum Installation Torque:** 6,700 ft-lbs.

(g) **Specified Drive Head:** 31,489 ft-lbs. (30ADT) or Equal

B. **Corrosion Protection.** Hot-dipped galvanized all helical pile shafts, helices, and bracket assemblies in accordance with ASTM A153 after fabrication. Design capacity will consider corrosion over a 75-year design lifespan.

C. **Hardware.** Use zinc coated or galvanized bolts to join helical anchor and helical pile sections at the shaft connections. Use the grade and size of bolts specified by the helical anchor and helical pile manufacturer. Fit helical piles with a manufactured bracket assembly rated for the design loads shown on the Plans and the strength of the concrete or other structure they support.

D. **Submittals.** Helical design, helical install plan, material specifications, capacity calculations and connection design.

3. CONSTRUCTION

A. **Design**.

1. Contractor to verify pile count and PCOE.
2. Design the helical piles (i.e., shaft properties, number and size of helices, top bracket, etc.,) to achieve a minimum allowable axial compressive capacity of 25 kips/pile and a minimum allowable flexural capacity (ASD) of 2.5 ft.-kips. Use a minimum factor of safety of 2.0 to determine the required compressive capacity of helical piles with regard to their interaction with soil and bedrock. The torque

applied during installation provides an indirect verification of axial capacity. Follow manufacturer's recommendations regarding the torque and the tensile/bearing capacity relationship for the particular helical anchor and helical piles selected. Contractor to determine the number and size of blades so as to achieve the required torque and tensile/bearing capacity for the soil conditions at the site.

B. Installation

1. Prior to installation a surveyor or other licensed professional shall lay out all lines and grades as required by the contractor documents and approved submittals, and determine the presence of underground utilities in the area. The contractor shall also coordinate with the Pennsylvania One-Call system before any excavation or pile installation work commences.
2. Utilize a torque motor capable of continuous adjustment to number of revolutions per minute (RPM) during installation, a torque capacity at least 20 percent greater than the torsional strength rating of the central steel shaft to be installed, a minimum torque capacity of 15 percent greater than the design installation torque, and be provided with an in-line pressure relief valve or other means to prevent installation torques greater than the rated capacity of the pile. Do not use percussion drilling equipment.
    a. The pile shall be engaged into the soil in a smooth, continuous manner with enough down pressure or crowd for uniform advancement at a rotation rate of 5 to 20 revolutions per minute (RPM's). The amount of crowd shall be varied to maintain a downward advancement of approximately 2-3-inches per revolution.
    b. The minimum installation torque and minimum installed length shall be satisfied prior to terminating the installation. The minimum installation torque shall be taken as the average torque over the last three feet of penetration (the last three readings recorded at one-foot intervals). Install additional extension sections as necessary to maintain these requirements.
    c. The torsional strength rating of the central steel shaft shall not be exceeded at any time during the installation.
    d. If the torsional strength rating of the central steel shaft and/or installation equipment has been reached prior to achieving the minimum overall length, the Contractor shall do one of the following:

i. Terminate the installation at the depth obtained subject to the review and acceptance of the Engineer.
ii. Remove the existing helical pier and install a new one with fewer and/or smaller diameter helix plates. The new helix configuration shall be subject to review and acceptance of the Engineer. If re-installing in the same location, the top-most helix of the new helical pier shall be terminated at least 3-feet beyond the terminating depth of the original helical pier.

3. Advance each helical anchor and helical pile into the ground by application of rotational force using a hydraulic torque converter. Include installation equipment that provides a direct means of determining the installation torque being applied to the helical anchor and helical pile. Provide current evidence of calibration of Contractor's torque monitoring equipment upon request of the Representative.
4. Predrill holes if helical piles will not advance through the fill materials or subsurface conditions encountered on site. Where pre-drilling is required to install the helical piles, the auger diameter shall be at least 2 inches less than the shaft diameter. Larger pre-drill diameters shall be backfilled with a non-compressible material, as determined by the Contractor's design professional engineer and approved by the Engineer. Pre-drilling shall be limited in depth such that no reduction in capacity occurs, or piles deepened to compensate for any reduction, as determined by the Contractor's design professional engineer.
5. Install each helical pile, shaft connection, and bracket assembly for all crossings at the location and to the elevation, minimum length, and installation torque indicative of the design allowable capacities shown on the Plans or as established.
6. Advance helical piles into the ground until the required torque is achieved to accommodate the ultimate tensile and bearing capacity plus an additional distance to ensure proper embedment. The minimum installation torque shall be taken as the average torque over the last three feet of penetration (the last three readings recorded at one-foot intervals).
7. Piles may need to be installed beyond the estimate length to achieve required torque.
8. All drive pins must be inserted at the drive adapter-to-pile connection, prior to applying any torque to the pile sections.
9. For the helical piles on bedrock, embed piles to achieve practical refusal.

10. Install the helical anchor and helical pile shaft connections to be in-line, straight and rigid and have a maximum tolerable slack of 1/16-inch or as acceptable to the Representative. Securely tighten all helical anchor and helical pile bolts.
11. Apply constant normal pressure while screwing helical anchors and helical piles into the ground. Apply sufficient pressure to ensure that, during each revolution, the helical anchor and helical pile progress into the ground a distance equal to at least 80% of the blade pitch. Do not exceed a rate of 20 revolutions per minute for helical pile rotation during installation.
12. Provide a minimum depth of helical anchors below ground surface that is 5 times the largest helix diameter.
13. Install helical piles as close to the specified installation angle as possible. The tolerance for departure from installation angle is 5 degrees unless noted otherwise on the Plans.
14. Once the helical pier has satisfied the minimum installation torque and the minimum installation depth the pier top can be trimmed to the required elevation at 90-degress to the central steel shaft.
15. Install helical piles and bracket assemblies at the locations shown on the Plans. The tolerances for bracket assembly placement are 1" in both directions perpendicular to the anchor shaft and ¼" in a direction parallel with the anchor shaft unless otherwise specified.
16. Isolate all helical anchor and helical pile components including the shaft and bracket assembly from making direct electrical contact with any concrete reinforcing bars or other non-galvanized metal objects since these contacts may alter corrosion rates
17. Field weld, if required, in accordance with the "Code for Welding in Building Construction" of the American Welding Society. Welding galvanized steel can produce toxic gases. Therefore, provide adequate ventilation and with appropriate gas detection, breathing gear, and other safety equipment per OSHA regulations when welding galvanized steel. Do not modify manufactured helical anchor and helical pile shaft, helical blades, bracket assemblies, and shaft connections without approval of product manufacturing company and acceptance by the Representative.

IV. MEASUREMENT AND PAYMENT – Vertical Linear Foot (VLF)

All items and work which are required to completely construct a helical pile foundations as indicated on the Plans are considered incidental to this item.

ITEM 9000-0012, TOPSOIL FURNISHED AND PLACED, CUBIC YARD

1 DESCRIPTION

This item shall comply with Section 802 of the PennDOT Standard Highway Specifications, with the following exceptions:

2 MATERIAL

a. Planting Soil Mix and Topsoil:

i. 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. The soil shall be free of construction and trash debris, rocks, hydrocarbons, petroleum materials, herbicides, or other harmful contaminants that would impact plant growth.

ii. 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.

iii. Provide Planting Soil at the locations indicated on the Drawings complying with the following parameters. Minor variations with supporting independent test results for hydraulic conductivity, cation exchange capacity, pH, soluble salt content and organic matter may be considered for approval:

1. Particle analysis must be per USDA classification for loam, sandy loam, sandy clay loam, or silt loam and is within the following parameters using ASTM D422:

Sieve Analysis	mm	Sieve No.	% Volume
Gravel	>2.0	10	≤11
Very Coarse Sand	2.0 – 1.0	18	
Coarse Sand	1.0 – 0.5	35	
Medium Sand	0.5 – 0.25	60	45-68
Fine Sand	0.25 - 0.10	140	
Very Fine Sand	0.10 - 0.07	200	
Silt	0.07 - 0.002		≤30
Clay	<0.002		≤20

2. pH (1 soil : 1 water): 6.0 - 7.2.
3. Organic matter (ASTM F1647, Method A): 3 - 7% (by dry weight).

4. Hydraulic conductivity (ASTM F1815) at 75% Proctor (ASTM D698): 1.0 - 5.0 in/hr
5. Soluble salt content (electrical conductivity, 1 soil : 2 water): maximum 1.60 mmho/cm. Sodium (Na) salinity shall not exceed 700 ppm.
6. Cation Exchange Capacity (CEC): >12 meq/100g.
7. Nutrient analysis including macronutrients and micronutrients (Mehlich-3) with soil fertility interpretation and recommendations relevant to the specified plant species.
8. Compost shall not be added at more than 20% by volume.

b. Compost:
   i. 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.
   ii. Compost shall comply with the following parameters:
      1. pH: 6.0 - 8.0.
      2. Soluble salt content (electrical conductivity, 1 soil : 2 water): maximum 5 dS/m (mmhos/cm).
      3. 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.
      4. Moisture content %, wet weight basis: 30 – 60.
      5. Organic Matter Content, % dry weight basis: 30 – 65.
      6. Particle size, dry weight basis: 98% pass through 1/2 inch screen.
      7. Stability carbon dioxide evolution rate: mg CO2-C/ g OM/ day ≤ 3.
      8. Maturity, seed emergence and seedling vigor, % relative to positive control: minimum 80%.
      9. Physical contaminants (inerts), %, dry weight basis: <0.5%.
      10. Chemical contaminants, mg/kg (ppm): meet or exceed US EPA Class A standard, 40CFR § 503.13, Tables 3 levels.

11. 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. Chemical Amendments:
   i. Lime, ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:
      1. Class: Class T, with a minimum 99 percent passing through No. 8 sieve and a minimum 75 percent passing through No. 60 sieve.
      2. Provide lime in form of dolomitic limestone.

3 CONSTRUCTION

1 Soil Installation:

a. Ensure that all debris, foreign materials, construction material, and refuse is removed from planting areas.
b. Scarify the subgrade material prior to installing soil. 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. Notify engineer or landscape architect immediately if hardpan areas are encountered and subgrade material is not draining.
c. Immediately install planting soil mix or topsoil. Protect the loosened area from traffic. DO NOT allow the loosened subgrade to become compacted.
d. Install the planting soil mix or topsoil in 12 - 18 inch lifts to the required depths. Lightly compact each lift to 65-75% Standard Proctor Method. Scarify the top of each lift prior to adding more soil by dragging the teeth of a loader bucket or backhoe across the soil surface to roughen the surface.
e. Maintain moisture conditions within the Soil during installation or modification to allow for satisfactory compaction.
   i. 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%

   ii. 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.

f. 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 Stormwater Soil or Planting Soil is installed and approved.
g. Surface roto-tilling shall not be considered adequate to reduce over compaction at levels 6 inches or greater below finished grade.
h. 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.
i. Grade the finish surface of all planted areas to meet the grades shown on the Drawings.
j. 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.
k. 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 engineer in the event that conditions make it impossible to achieve positive drainage.
l. 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.

4 MEASUREMENT AND PAYMENT

CUBIC YARD

ITEM 9000-0013, SHRUBS, #5 CONTAINER, EACH
ITEM 9000-0014, PERENNIALS, SQUARE FOOT
ITEM 9000-0015 SEEDING-TURF, SQUARE YARD

1 DESCRIPTION

In accordance with Section 808.1.

2 MATERIAL

In accordance with Section 808.2 and as follows.

Plants shall conform to the indicated botanical names and standards of size, culture and quality for the highest grades and standards as adopted by the ANSI Z60.1 - American Standard for Nursery Stock. All plants shall meet specified sizes and be provided as plugs, container grown, field potted, or field balled and burlapped materials as specified.

All container grown materials shall be grown to specified size in a container and shall be healthy, vigorous, well rooted and established in the container in which they are grow-ing. A container grown plant shall have a well-established root system reaching the sides of the containers to maintain a firm root ball, but shall not have excessive root growth encircling the inside of the container.

Measure container materials with stems, petioles, and foliage in their normal position. Plants shall be of sufficient dimensions to include most of the fibrous roots and con-forming to the standards of the AAN and ANSI Z60.1.

(a) Shrubs:

a. Meeting the requirements noted above and in Section 808.1.

(b) Perennials:

a. Approved Nurseries: Perennial plant material for this project must be supplied from the following list of approved nurseries, or others as approved by the Landscape Architect:

Cavano's Perennials
6845 Sunshine Ave.
Kingsville, MD 21087
(410) 592-8077
https://www.cavanos.com/

Pleasant Run Nursery
93 Ellisdale Road
PO Box 247

Allentown, NJ 08501
(609) 259-8585
www.pleasantrunnursery.com

Octoraro Native Plant Nursery
6126 Street Rd
Kirkwood, PA 17536
(717) 529-3160
http://www.octoraro.com/

Pinelands Nursery and Supply
323 Island Road
Columbus, NJ 08022-1358
(609) 291-9486
http://www.pinelandsnursery.com/

New Moon Nursery
975 Barretts Run Road
Bridgeton, NJ 08302
Phone 888-998-1951
Fax 888-998-1952
info@newmoonnursery.com

3 CONSTRUCTION

In accordance with Section 808.3 and as follows:

(a) Planting

1 Period of Establishment. This work shall consist of the maintenance of plant material for twelve (12) months, or the length of the warranty, whichever is later. This period starts after the completion and acceptance of the planting by the Engineer.

i. All plants shall be kept in a healthy condition by watering, spraying, fertilizing, pruning, or by any other necessary operations of care. Plants, which are, or become, unhealthy from any cause, or appear to be in badly impaired condition, shall be promptly replaced and any plants that settle below or rise above the desired finished grades shall be reset at the proper grades.

ii. All replacements shall be plants of the same kind, size, and quality as originally specified in the "Plant List" and they shall be furnished, planted, and staked at no additional cost, except those damaged by vandalism. Should vandalism occur, the

Contractor shall notify the Engineer in writing describing the quantity of plant materials affected and related damages.

iii. For final inspection and acceptance of plant materials, the Contractor shall remove all trash, rubbish, litter, wrapping, guy wires, tree protectors, and stakes at the end of the plant establishment period. Not less than thirty (30) days prior to the end of the plant establishment period, the Contractor shall notify the Engineer requesting inspection of the work to determine its degree of completion to establish the end of the plant establishment period.

iv. After inspection, the Contractor will be notified of final acceptance of the work, or any deficiencies, which must be corrected to the satisfaction of the Engineer before final acceptance.

v. If the work is accepted at time of final inspection, the maintenance work shall be considered fulfilled and terminated. Should any work need replacement at time of final inspection, the maintenance period shall be continued until such replacements are made and deemed acceptable by the Engineer.

vi. Payment for this work is incidental to planting.

2. Mulching. Use approved double shredded hardwood bark mulch in all planting areas at a depth of 3-inches for tree and shrub planting beds and 2-inch depth at all groundcover mass planting beds.

2 MEASUREMENT AND PAYMENT

1 Shrubs, Each

2 Perennials and turf seeding, Square Foot

Watering done at the time of planting and during the period of establishment (as described in 808.3(g)7) will be incidental to the planting of each plant or tree. All mulching will be incidental to the planting of each plant or tree.

ITEM 9000-0016, PRECAST CONCRETE BOARDWALK, Lump Sum

1. DESCRIPTION

These specifications are for a precast concrete boardwalk and shall be regarded as minimum standards for this project. These specifications are based upon products designed and supplied by:

PermaTrak North America LLC
Ph: 956-229-1848
www.permatrak.com
Contact: Mr. Jonathan Dove
jdove@permatrak.com

This item shall also include the design, specification, and construction of a railing and foundation system that is attached to the proposed boardwalk system.

ALTERNATE REQUIREMENTS: Alternates are allowed provided that the following minimum standards and these "Precast Concrete Boardwalk System" specifications are met. A change in boardwalk material (treads and beams) will not be considered an alternate.

A. "MINIMUM STANDARDS" as outlined in section 2 below must be met.
B. A fully engineered drawing of the precast boardwalk system (including tread layout, structural details designed for the design loads shown on the contract documents, foundation design, full elevation view and layout) must be signed and sealed by a Professional Engineer licensed in Pennsylvania.
C. Submission of complete design calculations that are signed and sealed by a licensed Professional Engineer in Pennsylvania. The design computations shall include references to all applicable AASHTO code references, documentation of computer programs (including design parameters), and a clearly detailed reinforcement rebar submittal (including sketches of all precast concrete components.
D. Submittal must meet the requirements set forth in section 3B.

2. MATERIAL

1. MINIMUM STANDARDS: The selected boardwalk shall have the following minimum characteristics:
    a. The precast system shall be designed as a modular flexible system allowing a prescribed settlement at pier locations. Joints shall be designed for such movement to occur without damage to the structural integrity of the system.

b. Boardwalk system (beams, treads, and curbs if applicable) must be reinforced precast concrete. A material change, including cast-in-place concrete, is not considered an equal to the design shown on the bid documents.

c. Walking surface (treads) shall be made of reinforced precast concrete, and supported by reinforced precast concrete beams. Where applicable, edges of treads will receive precast concrete curbs. The color of the walking surface (treads) shall be "Adelaide Gray."

d. Walking surface (finish) of top surface of treads shall have a formliner finish with one of PermaTrak's standard textures. Texture must be integral with the concrete and shall not be an applied post pour wearing surface. The texture of the walking surface (finish) shall be "Beachwood."

e. Precast concrete treads shall be structural load bearing elements and shall interlock with one another via a "tongue and groove" connection.

f. All precast shall consist of integrally colored concrete in a color selected by the owner from one of PermaTrak's "standard colors". All color pigment shall meet ASTM C979 Standard Specification for Pigments for Integrally Colored Concrete.

g. DESIGN LOADS: Designed for the following live loads:
    i. Pedestrian live load of 90 psf.
    ii. 5000 lb. Maintenance Vehicle with two axles spaced 96 inches apart and equally distributed.

h. Treads shall maintain a "boardwalk appearance", specifically meaning each tread shall have a width: length ratio ranging from a minimum of 3:1 to a maximum of 14:1. Width is defined as the tread dimension perpendicular to the normal direction of travel. Length is defined as the tread dimension measured in the direction of travel.

i. Tread width shall be as noted on the contract drawings. Alignment should follow the horizontal and vertical alignment shown on the contract plans.

j. Connectors for curbs (if applicable) to treads shall not be visible to boardwalk users while viewed from the top of the walkway.

k. All tread-to-beam connectors shall be non-corrosive, and hidden from view. Metallic tread-to-beam connectors are not acceptable for this project.

l. Boardwalk supplier shall provide a field representative on site for a minimum of 2 days. Field representative shall be knowledgeable in the installation of precast concrete boardwalks.

2. PRECAST CONCRETE: shall conform to the following:
    a. The minimum compressive strength of the concrete shall be 4000 psi measured at 28 days.
    b. All precast concrete shall contain fiber reinforcing as well as structural steel reinforcement as designed by the Engineer of record.
    c. All precast concrete components shall be air entrained composed of Portland cement, fine and course aggregates, admixtures and water. The air-entraining feature may be obtained by the use of either an air entraining Portland cement or an air entraining admixture. The entrained air-content shall be not less than four percent or more than seven percent.
    d. All reinforcing steel shall be standard uncoated steel conforming to ASTM A615 unless noted otherwise.

3. DELIVERY, STORAGE, AND HANDLING
    a. Store products in manufacturer's unopened packaging until ready for installation.
    b. Field Measurements: Where handrails and railings are indicated to fit to other construction, check actual dimensions of other construction by accurate field measurements before fabrication; show recorded measurements on final shop drawings:
        i. Where field measurements cannot be made without delaying the railing fabrication and delivery, obtain guaranteed dimensions in writing by the Contractor and proceed with fabrication of products so as not to delay fabrication, delivery and installation.
    c. Coordinate fabrication and delivery schedule of handrails with construction progress and sequence to avoid delay of railing installation.

4. WARRANTY
    a. Contractor will be responsible for installation defects associated with the boardwalk and abutment components, foundation system, and railings for a period of 12 calendar months from the date of final acceptance by the Owner.
    b. Boardwalk manufacturer shall warranty all precast concrete components against defects in material and workmanship for a period of 10 years.

5. QUALITY ASSURANCE
    a. Manufacturer Qualifications: Not less than 10 years experience in the actual production of precast products as described below.
        i. Components shall be factory fabricated and engineered by single entity. This entity shall be registered to do business in the state of the above named project.
        ii. Boardwalk supplier (Precaster) for the boardwalk shall have in-house color mixing facilities for color pigmentation.
        iii. Boardwalk supplier (Precaster) shall have either a minimum experience of 5 years or 20 boardwalk projects in design, production, and field consultation.
        iv. Boardwalk supplier (Precaster) must be certified by PCI or NPCA.
        v. Precast components must be manufactured with the use of hot rolled steel skin in reinforced steel forms. Temporary (i.e., Timber) and/or single use forms are unacceptable unless approved in writing by the Engineer.

    b. Acceptability Criteria for Treads and Curbs (if applicable): The finished visible (in the final installed position) surface shall have no obvious imperfections other than minimal color or texture variations from the approved samples or evidence of repairs when viewed in good typical daylight illumination with the unaided naked eye at a 20 ft. viewing distance. Appearance of the surface shall not be evaluated when light is illuminating the surface from an extreme angle as it tends to accentuate the minor surface irregularities. The following is a list of finish defects that shall be properly repaired, if obvious when viewed at a 20 ft. distance. Patching (by a trained skilled concrete repair person) is an acceptable repair method.
        i. Ragged or irregular surfaces.
        ii. Excessive air voids (commonly called bug holes) larger than ¼ in. evident on the top surface of the tread or curbs (if applicable).
        iii. Adjacent flat and return surfaces with greater texture and/or color differences than the approved samples or mockups.
        iv. Casting and/or aggregate segregation lines evident from different concrete placement lifts and consolidation.
        v. Visible mold joints or irregular surfaces.
        vi. Rust stains on exposed surfaces.
        vii. Units with excessive variation in texture and/or color from the approved samples, within the unit or compared with adjacent units.
        viii. Blocking stains evident on exposed surfaces.

ix. Areas of backup concrete bleeding through the facing concrete.
x. Foreign material embedded in the surface.
xi. Visible repairs at a 20 ft. viewing distance.
xii. Reinforcement shadow lines.
xiii. Cracks visible at a 20 ft. viewing distance.

c. Installer Qualifications: Firm with 3 years experience in installation of systems similar in complexity to those required for this Project.

3. CONSTRUCTION

A. **Design**.

a. DESIGN CRITERIA: The design of the boardwalk and railing system shall comply with the following guidelines:
i. AASHTO LRFD Guide Specifications for The Design of Pedestrian Bridges, 2nd Edition.
ii. AASHTO LRFD Bridge Design Specifications, 8th Edition.
iii. American Concrete Institute Building Code and Commentary, ACI 318-19 and ACI 318R-19.
iv. In addition to the dead loads of the system, the structure shall be designed for the live loads defined in Section 1.3.G above.

B. SUBMISSIONS

a. FOR APPROVAL SUBMISSIONS: Prior to the start of fabrication, the Contractor shall submit to the Engineer a design package, which shall include but not limited to the following:
i. DETAILED PLANS:
1. REGISTRATION / SEAL: Sealed by a licensed Professional Engineer in Pennsylvania.
2. PLAN VIEW: Full plan view of the boardwalk, foundation and railing system drawn to scale. The plan view must reflect the proposed horizontal alignment as shown on the design plans.

3. ELEVATION VIEW: Partial elevation view of the boardwalk, railing and foundation system drawn to scale which reflect the actual vertical alignment. Elevation or plan view shall indicate the elevation at the top and bottom of the boardwalk and foundation system components, horizontal and vertical break points, and location of the finished grade.
4. DETAILS: Details of all boardwalk and railing system connections such as the length, size and where changes occur.
5. CODE REFERENCE: Design parameters used along with AASHTO references.

ii. DESIGN COMPUTATIONS (IF REQUIRED): computations shall:
1. Be stamped by a licensed Professional Engineer in Pennsylvania.
2. Clearly refer to the applicable AASHTO provisions.
3. Include documentation of computer programs including all design parameters.
4. Clearly show that all reinforced precast treads and beams meet AASHTO requirements for the loading per Section 1.3.G.
5. Include sketches of reinforcement in treads and beams, shear and moment diagrams, and all equations used shall be referenced to applicable code.

iii. CONSTRUCTION SPECIFICATIONS:
1. Construction methods specific to the boardwalk vendor chosen. Submittal requirements such as certification, quality and acceptance/rejection criteria shall be included. Details on connection of boardwalk units and foundation system such that assurance of uniform load transfer shall be checked.

b. FINAL SUBMISSION: Once a boardwalk system design has been reviewed and accepted by the Owner, the Contractor shall submit the final plans. The designer of the boardwalk, foundation and railing system is responsible for the review of any drawings prepared for fabrication. One set of all approved shop drawings shall be submitted to the Engineer's permanent records.

c. SUBMITTALS: Product Data: Submit Manufacturer's technical product data for railing components and accessories. Manufacturer to supply submittal drawings for approval to include the following:
i. Section-thru details.

ii. Mounting methods.
iii. Typical Elevations.
iv. Key plan layout.

d. SHOP DRAWINGS: Shop drawings shall:
    i. Be stamped by a licensed Professional Engineer in Pennsylvania.
    ii. Show actual field conditions and true elevation and location supplied after field verification.
    iii. Clearly detail reinforcement in beams, treads and curbs including clear dimension from concrete edge, size and amount of rebar.
    iv. Clearly state concrete compressive strength, steel type and strength, and a listing of all component weights including lifting locations.

C. Installation
    a. PRECAST CONCRETE BOARDWALK
        i. Installation of the precast concrete boardwalk system and railings, if applicable, shall be performed in accordance to the approved plans and manufacturers installation instructions. Boardwalk manufacturer shall provide a field representative to review installation instructions with the Contractor and Engineer and to certify that the installation has been performed according to the approved drawings and manufacturer's instructions.

IV. MEASUREMENT AND PAYMENT – Lump Sum

A. Precast concrete boardwalk shall be paid for at the contract lump sum price as listed in the bid proposal for "Precast Concrete Boardwalk". This price shall include all materials, equipment, labor and work necessary for and incidental to the design, construction, delivery, unloading, assembly, and placement of the boardwalk as shown in the contract plans.
B. Boardwalk foundation (helical piles) will be paid under a separate item.

ITEM 9000-0017, ORNAMENTAL FENCE SALAVAGE AND REPAIR, FENCE POST SALVAGED AND REPAIRED, NEW FENCE POST, AND INSTALLATION, LUMP SUM

1 DESCRIPTION

This work is for the salvage, repair and refurbishment of one existing ornamental fence post, constructing a similar/matching second ornamental fence post, and installing of each ornamental fence post at the locations indicated. Salvaging existing fence panels to be modified, repaired and refurbished for reinstallation.

2 MATERIAL,

Steel/Iron ornamental fence post fabrication:

A. Fence – Welded and mechanical connected ornamental steel fence. The system shall include all components (i.e., panels, posts, and hardware) required to attach the post to the proposed retaining wall.
B. Manufacturers –
    a. Custom fabrication
C. Description – Match materials, appearance, dimensions, finish and connection system similar to the existing ornamental fence post in Penn Treaty Park. Note, the Contractor is to determine the appropriate and recommended steel material for use in producing the new ornamental fence post.

3 CONSTRUCTION

A. Existing ornamental fence post shall be carefully removed from the existing retaining wall prior to wall demolition. Retain all post hardware and salvage as appropriate.
B. Utilize existing ornamental fence post to create duplicate version to match dimensions and look.
C. Shop drawings to include plans, elevations, component details for installation into concrete foundation. Indicate materials and profiles of each decorative metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.
D. Fabricator Qualifications: A firm experienced in producing decorative metal similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
E. All welds to be ground smooth. All materials to be free of burrs and snags. Location and alignment will be approved by Representative.
F. The Contractor shall provide a written description of the proposed repairs required, refurbishment process for the existing ornamental fence post and fence panels to be modified and the reinstallation methods proposed for each component.

G. Clean surfaces thoroughly prior to installation. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions. Install according to the fabricator's instructions.
H. The Shop Drawings shall include the Contractor's proposed recommendation for finishing the refurbished and new fence components that are to match the existing fence system's finish.
I. Install fence components plumb and square and align with the existing fence panel system on new Cast-In-Place Concrete foundation as shown in the Drawings. Protect installed products until completion of project. Touch-up, repair or replace damaged products before Substantial Completion. Embedded Foundation and Alignment to be approved by Owner.

IV. MEASUREMENT AND PAYMENT – Linear Foot

Includes all necessary labor, equipment, backfill and materials to complete the work.

ITEM 9000-0018, STEEL FIXED BOLLARD, EACH

1 DESCRIPTION

This work consists of installing bollards as indicated on the drawings or as directed by the Engineer.

2 MATERIAL

All materials shall be in accordance with the contract specifications.

- **A.** Steel:
    a) Steel tubing, ASTM A36
- **B.** Concrete:
    a) Class A Cement Concrete – Section 1001-0010
- **C.** Mounting Hardware:
    a) As shown on the drawings.
- **D.** Paint:
    a) Powder coated per owner's selected color.

3 QUALITY CONTROL

A. Contractor shall submit powder coating color options to owner prior to fabrication.

4 CONSTRUCTION

A. Contractor shall install bollard as shown on the drawings.

5 MEASUREMENT & PAYMENT

A. Installation of the bollard shall be paid per each and shall include all concrete for footings, tube filling, painting, and reflective tape.

ITEM 9000-0019 – DIRECTIONAL INDICATOR PAVER BLOCK, SQUARE FOOT

1 DESCRIPTION

This work is for the placement of directional indicator paver modules on a sand setting bed on concrete slab as shown in detail on plans.

2 MATERIAL

A. Directional Indicator Pavers shall be: 12”x12”x2”. Existing pavers shall carefully be removed from project prior to demolition and stored until reinstallation. Replacing damaged pavers will be at the contractor’s cost. The installed paver block shall be free of cracks, seams, or starts which may impair their structural integrity.

B. Substrate Slab:
   a) 4” concrete slab shall be constructed as base for the paver block as shown on the plans. The 4” slab will be considered incidental to the installation of the directional indicator paver block.

C. Sand:
   a) Setting Bed and Jointing Sand
      - The setting bed and joint sand shall be clean, non-plastic, and free from deleterious or foreign matter. It can be natural or manufactured from crushed rock. Do not use limestone screenings or stone dust that do not conform to the grading requirements in Table 1. When concrete pavers are subject to vehicular traffic, the sands shall be as hard as practically available.

   b) The joint sand shall conform to the grading requirements of ASTM C 144 as shown in the following Table:

Table 1		
	Natural Sand	**Manufactured Sand**
Sieve Size	**Percent Passing**	**Percent Passing**
No. 4 (4.75 mm)	100	100
No. 8 (2.36 mm)	95 - 100	95 to 100
No. 16 (1.18 mm)	70 - 100	70 to 100
No. 30 (600 µm)	40 - 75	40 to 75
No. 50 (300 µm)	10 - 35	20 to 40
No. 100 (150 µm)	2 - 15	10 to 25
No. 200 (75 µm)	0	0 to 10

c) The setting bed sand shall conform to the grading requirements of ASTM C 33 as shown in Table 2.

Table 2	
Sieve Size	**Percent Passing**
3/8 in. (9.5 mm)	100
No. 4 (4.75 mm)	95 to 100
No. 8 (2.36 mm)	85 to 100
No. 16 (1.18 mm)	50 to 85
No. 30 (600 µm)	25 to 60
No. 50 (300 µm)	10 to 30
No. 100 (150 µm)	2 to 10

3 CONSTRUCTION

Quality Assurance - Paving Installer Qualifications

d) The contractor shall have three years' experience with at least 10,000 square feet of pavers installed. Successful completion of 3 paver installations similar in design, material and extent indicated on this project.

Examination - Verify Site Conditions. General contractor shall inspect and certify in writing to installer that site conditions meet the following prior to installation of granite cobble pavers.

- Remove organic, unstable or unconsolidated material from the site.
- Verify conformance of sub grade preparation and elevations to specified requirements
- Verify sub base and base conformance to specified requirements. Do not use setting bed material to correct deficiencies in base course surface.
- Verify written density test results for soil sub grade and sub base course.
- Verify type, location and elevations of edge restraints, utility structures and drainage inlets.
- Verify that the concrete subbase course is ready to support bedding material, pavers and imposed loads.
- Do not proceed with bedding course or paver installation until satisfactory sub grade soils are verified by contractor.
- Verify that the area is free from standing water and certified by general contractor as meeting material, installation and grade specifications.

Field measurements -

- Determine actual paver dimensions (including tolerances) and coordinate with dimensions for pavement areas indicated on contract drawings prior to any pavement installation.
- The first and last ten pavers in any given continuous row shall not be cut. Pavers to be cut to fit shall be done with a masonry saw. To close gaps that are more or less than 12" in a row, cut two pavers and align such that the cut edges are abutting each other and make it appear that the cut pavers are one longer paver.

Installation –

- The sand shall be spread evenly over the base course and screeded to a nominal 1 inch thickness. The screeded sand should not be disturbed. Sufficient sand shall be placed in order to stay ahead of the laid pavers. Setting bed sand shall not be used to fill depressions exceeding 1 ½ in. thickness in the base surface.

- Tamp or beat each paver with a wooden block or rubber mallet to obtain full contact with sand bed and to bring finished surfaces within indicated tolerances.

- Install pavers as indicated on drawings. Maintain straight pattern lines. Directional bars shall run parallel to the bicycle and pedestrian travel pattern.

- Successive modules shall be butted tightly against each other in such a way that the space between the modules in minimized and that the perception is that the area was hand-set without modular definition.

Placement Tolerance -

- Maximum of 1/16-inch height variation between adjacent pressed pavers.
- Individual pressed pavers shall not vary more than 1/16 inch from level across width of the pressed paver.
- Paved areas shall not vary more than 1/4 inch from level in a distance of 10 feet (3 m) measured at any location and in any direction.
- Joints between pavers to be greater than 1/16 inch but less than 1/8 inch.

Cleaning and Protection -

- Remove and replace pressed pavers which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in same manner as original units with same joint treatment to eliminate evidence of replacement.
- Wash entire surface with phosphate free neutral cleaner, rinse with clean water and allow to dry thoroughly.

- Apply sealer in accordance with manufacturer's directions. Penetrating or topical type sealer designed especially for pressed concrete pavers.

Field Quality Control -

- Sweep surface clean and verify conformance with drawings.
- Verify that the final paver surface conforms with Americans with Disability Act (ADA) requirements.
- Verify final elevation of pavement to adjacent drainage inlets.
- Verify straightness of bond lines.

Protection -

- After work in this section is complete, General Contractor shall protect work from damage due to subsequent construction activity on site.

4 MEASUREMENT AND PAYMENT – Square Foot
The square foot unit cost of the directional indicator block shall include all labor and materials needed to remove existing pavers, store pavers during construction, reinstall the pavers, including sand for the paver bed, and concrete base.

ITEM 9000-0020, SALVAGE AND REINSTALL EXISTING PAVERS, LUMP SUM

1 DESCRIPTION

This work is the salvaging and reinstallation of existing pervious concrete unit pavers as shown on plans.

2 MATERIAL

A. Salvaged Concrete Unit Pavers: Pervious concrete pavers shall be salvaged as indicated on the plan and reset in the locations shown. Should pavers be damaged during removal, new material to match the existing shall be supplied, after receiving Owner approval of submitted paver samples.

B. Salvaged Concrete Unit Pavers, Bedding Layer, Subbase and Infill aggregate shall be composed of:
    a. 2" depth choker/bedding layer of AASHTO #8 crushed stone.
    b. Open-graded base material (AASHTO #57 aggregate) installed in 6" lifts and compacted.
    c. Infill pavers with AASHTO #8 stone.
    d. Geotextile: Class 4, Type A

C. Edge protection: Permaloc aluminum edge restraint or approved equal.

3 QUALITY CONTROL

A. Installation shall be by a contractor and crew with at least 5 years of experience in laying pavers on projects of similar nature.

B. For any proposed new material to replace damaged existing pavers, product data and samples shall be submitted to the owner.

4 CONSTRUCTION

As shown on the contract drawings and as follows:

A. Salvaging Existing Pavers
    a) All existing pavers requiring resetting shall be carefully removed. Remove pavers without damaging the existing paver areas that are to remain. Retain the existing subbase if possible. Clean all exposed surfaces by removing soil, stains, and foreign materials before setting by thoroughly scrubbing with fiber brushes or power washing. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives. If power washing maintain a setting as to not damage pavers. Replace all damaged or misshapen pavers in kind.

B. Base Preparation
    a) Complete all underground utility work, curbing and foundation construction prior to commencement of paving installation.

b) Prevent damage to existing geotextile and existing open-graded base material if possible. If the existing geotextile and existing open-graded base material is damaged, replace materials per Section 2B.

C. Paver Installation
   a) Replacement open-graded base material to be installed in 6" lifts and compacted. There should be a minimum of four passes with no visible movement of material.
   b) Press the #8 stone into to the #57 stone with compaction equipment.
   c) Install pavers in accordance with permeable interlocking concrete pavements, 2nd edition, available through the interlocking concrete pavement institute.
   d) Mix pavers as they are placed, to produce uniform blend of colors and textures.
   e) Base materials or pavers shall not be installed during heavy rain or snowfall.
   f) base materials and pavers shall not be installed over frozen base materials.
   g) Frozen base materials shall not be installed.
   h) Pavers shall be free of foreign material before installation.
   i) Do not use unit pavers with chips, cracks, or voids. Pavers shall be inspected, and all chipped or damaged pavers shall be replaced.
   j) Joints between the pavers shall match adjacent existing-to-remain paving joints.
   k) Tolerances: Do not exceed 1/32-inch (0.8-mm) unit-to-unit offset from flush (lippage) nor 1/8 inch in 10 feet (3 mm in 3 m) from level, or indicated slope, for finished surface of paving.
   l) Gaps at the edges of the paved area shall be filled with cut pavers or edge units.
   m) Cut pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
   n) Install paver edge protection in accordance with manufacturer's specifications and instructions.
   o) The paver surface shall be swept clean of all debris before compacting, to avoid damage from point loads.
   p) A low amplitude, high frequency plate compactor shall be used to compact the pavers into the base materials with a compaction force of 5000 lbs.
   q) Excess joint infill material shall be swept off when the job is complete.

D. Repairing, Pointing and Cleaning
   a) Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

5 MEASUREMENT AND PAYMENT – Lump Sum

Salvaged pavers shall be paid as a lump sum. Bedding layer, open-graded base material, geotextile, edge protection, and jointing material shall be considered subsidiary to the installation of this item. Concrete Base, and Concrete Headers shall be paid for under the respective items.

ITEM 9000-0021, CONCRETE UNIT PAVERS, SQUARE YARDS

1 DESCRIPTION

Under this item the contractor shall install Concrete Unit Pavers as shown on plans or directed by the Engineer.

2 MATERIAL

Pavers shall be of the size and color as shown on the plans and meet the minimum material and physical properties set forth in ASTM C 936, Standard Specification for Interlocking Concrete Paving Units.

a) Unit Paver

1. Pavers shall be "Senzo", manufactured by Unilock, with a custom color blend, similar to that used on the Delaware River Trail South and North segments constructed in 2019 and 2020, and on the Penn Street Trail.

b) Base concrete

1. Shall consist of a Cement Concrete at the thickness indicated on the drawings and per Section 501 of the PennDOT Standard Highway Specifications. Aluminum oxide additive is not required for unit paver applications.

c) Bedding Sand

1. The bedding and joint sand shall be clean, non-plastic, and free from deleterious or foreign matter. It can be natural or manufactured from crushed rock. Do not use limestone screenings or stone dust that do not conform to the grading requirements in Table 3. When concrete pavers are subject to vehicular traffic, the sands shall be as hard as practically available.

2. The bedding sand shall conform to the grading requirements of ASTM C 33 as shown in Table 1.

Table 1

Sieve Size	Percent Passing
3/8 in. (9.5 mm)	100
No. 4 (4.75 mm)	95 to 100
No. 8 (2.36 mm)	85 to 100
No. 16 (1.18 mm)	50 to 85
No. 30 (600 µm)	25 to 60
No. 50 (300 µm)	10 to 30

No. 100 (150 µm)	2 to 10

d) Sand for Joints: Use Polymeric Sand for all joints, Alliance Gator Maxx, or approved equal. Color: Slate Grey. Provide product submittal for approval by Landscape Architect.

e) Sealer: apply sealer recommended by the paver manufacturer.

3 QUALITY CONTROL

a) Installation shall be by a contractor and crew with at least 5 years of experience in placing interlocking concrete pavers on projects of similar nature.

b) Shop or product drawings and product data shall be submitted to the owner.

c) Full size samples of concrete paving units shall be submitted to indicate color and shape selections.

d) Sieve analyses for grading of bedding sand shall be submitted to the engineer.

e) Test results shall be submitted from an independent testing laboratory for compliance of paving unit requirements to ASTM C 936 or other applicable requirements.

4 CONSTRUCTION

As shown on the contract drawings and as follows:

a) Base Preparation

1. Complete all underground utility work, curbing and foundation construction prior to commencement of concrete base construction.

b) Concrete Base

1. The pavers shall be laid on a 4" Cement Concrete base conforming to the requirements of Plain Cement Concrete Pavement in Section 0501 of the PennDOT Standard Highway Specifications, a 6" compacted Subbase, and a compacted subgrade.
2. Under no circumstances shall further pavement construction proceed until the Concrete Base has been inspected and approved by the Engineer.

c) Paver Installation

1. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
2. Bedding Sand or pavers shall not be installed during heavy rain or snowfall.
3. Bedding Sand and pavers shall not be installed over frozen base materials.
4. Frozen Bedding Sand shall not be installed.
5. The Bedding Sand shall be spread evenly over the base course and screeded to a nominal 1 inch thickness, not to exceed 1 ½". The screeded Bedding Sand should not be disturbed. Sufficient Bedding Sand shall be placed in order to stay ahead

of the laid pavers. Bedding Sand shall not be used to fill depressions exceeding 1 ½ in. thickness in the base surface.

6. Pavers shall be free of foreign material before installation.
7. Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work. Pavers shall be inspected for color distribution and all chipped, damaged or discolored pavers shall be replaced. Pavers shall be inspected for color distribution and all chipped, damaged or discolored pavers shall be replaced.
8. Joints between the pavers on average shall be 1/16 in. wide, hand tight.
9. Tolerances: Do not exceed 1/32-inch (0.8-mm) unit-to-unit offset from flush (lippage) nor 1/8 inch in 10 feet (3 mm in 3 m) from level, or indicated slope, for finished surface of paving.
10. Gaps at the edges of the paved area shall be filled with cut pavers or edge units.
11. Cut pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
12. The paver surface shall be swept clean of all debris before compacting, in order to avoid damage from point loads.
13. A low amplitude, high frequency plate compactor shall be used to compact the pavers into the sand with a compaction force of 5000 lbs.
14. Install polymeric jointing sand per the manufacturer's recommendations. The pavers shall be compacted and dry polymeric joint sand shall be swept into the joints until the joints are full. Leave a layer of sand on the surface to aid in the vibrating and consolidation of the jointing sand. Vibrate sand into the joints using a vibratory plate compactor with a rubber pad. This will require at least two or three passes with the compactor, in several directions. Do not compact within 3 ft. of the unrestrained edges of the paving units.
15. Sweep off excess sand from the paved surface, first with a hard-bristle broom, then a soft-bristle broom. Take care to leave the height of the polymeric sand at least 1/8 inch below the paver surface.
16. Shower with water for a minimum of 30 seconds for 30 square feet until the polymeric sand repels the water and the water starts to accumulate on the joints.
17. All work to within 3 ft. of the laying face must be left fully compacted with sand-filled joints at the completion of each day.
18. Excess joint sand shall be swept off when the job is complete.

d) Repairing, Pointing and Cleaning

1. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

5 MEASUREMENT AND PAYMENT – Square Yards

Concrete Unit Pavers shall be paid per square yard of pavers to be installed. Bedding Sand for bedding and joints, Concrete Base, and Aggregate Subbase shall be considered subsidiary to the installation of this item. Concrete Headers shall be paid for under the respective item.

ITEM 9000-0022, RESET EXISTING SOLAR LUMINAIRE, EACH

1 DESCRIPTION

This work shall consist of the relocation of pedestrian solar street lighting poles and decorative base covers, and reconstruction of concrete footings (without conduit), anchor bolts, and all hardware required by the manufacturer at the locations as indicated.

2 MATERIAL

All materials shall be in accordance with the contract specifications and with the specified sections of the Pennsylvania Department of Transportation Standard Specifications and the contract specifications.

A. Light Pole:
    1. Existing Solar Light Pole Model: "HEI Champ 4000, P200-215" manufactured by HEI Technology, Austria, Phone: +43 1 9121351 21 (Existing light pole already in park)
B. Class 4 Excavation – Section 204
C. Class A Cement Concrete per Section 1001.
D. Anchor Bolt Nuts and Washers per the light pole manufacturer's recommendations
E. Mounting hardware shall be as per manufacturer's recommendations.

3 CONSTRUCTION

A. Contractor shall mount existing light poles on new foundations as indicated and as per Manufacturer's Installation Instructions.
B. Contractor shall take special care not to damage light during removal, transport, storage, and reinstallation. Repairs and/or replacement of damaged light poles are at no additional cost to the owner.
C. The Contractor shall be responsible for the location of all subsurface structures and utilities in the construction area.
D. The foundation site shall be excavated to the required dimensions. If the presence of subsurface utilities prevents the construction of a foundation of the specified size, the Contractor shall suspend work immediately and notify the Engineer.
E. All foundations shall be completed prior to the installation of landscaping.
F. The excavation shall be securely covered after completion and remain covered when no work is in progress. The excavation shall be kept reasonably dry and free of mud until placement of the concrete.

G. The concrete foundation shall be monolithic construction and shall cure for a minimum of 7 days prior to pole installation.
H. Anchor bolts shall be set by template to the proper dimensions in accordance with the light pole manufacturer's recommendations.
I. The Contractor shall construct forms to firmly hold the template and anchor bolts in place while the concrete is poured. Each anchor bolt shall extend above the finished grade of the foundation to a height required as per the manufacturer's recommendations.
J. If the anchor bolt is damaged prior to the pole installation, an acceptable method of correction must be approved by the Engineer prior to installation. Cost of correction is at no additional cost to the owner.
K. Excessive damage to the existing pavement caused by the Contractor, as determined by the Engineer, shall be corrected at no additional cost to the Department.
L. Quality Control
    a. Contractor shall replace any damaged solar light poles in kind, at no additional cost to the owner.

4 MEASUREMENT & PAYMENT – Each

Payment includes removal, protection, and reinstallation of existing Solar Light Poles and decorative base covers, installation of concrete footings, and all associated hardware. Any costs for required storage shall be incidental to the item.

ITEM 9000-0023, TEMPORARY 8 FT PERIMETER CHAIN LINK FENCE, LINEAR FOOT

1 DESCRIPTION

This item is the furnishing, installing, maintaining, resetting, and removal of temporary fence at the locations indicated to separate and protect pedestrians from the work area.

2 MATERIAL

A. Fence Panels. Provide chain-link panels that are 8 feet high and consist of the following components:

a) Fabric. Provide fence fabric that is made of No. 11.5-gauge metallic-coated carbon steel wire woven in a 2-3/8-inch mesh and coated with one of the three types of coatings listed in ASTM A 817.

b) Geotextile. In accordance with Section 735. Provide and securely attach geotextile to fence fabric to provide visual barrier between pedestrian area and work zone.

c) Frame. Provide a frame that consists of three 1 3/8-inch vertical post and three 1 3/8-inch horizontal rails. Provide posts and rails of regular strength tubular pipe meeting the requirements of ASTM F1043, Group IA and galvanized with zinc inside and outside by hot-dip process meeting the requirements of ASTM F1083.

d) Tension Bars. One piece of 3/16-inch x 3/4-inch flat merchant quality steel with a zinc coating of surface area meeting the requirements of ASTM F626. Minimum length of the tension bars is 2 inches less than the full height of the chain-link fabric. Provide one tension bar for each end post.

e) Tension Bar Bands. Fabricated from pressed steel with a 14-gauge minimum thickness, a minimum of 3/4-inches, and hot-dip galvanized with a zinc coating of surface area meeting the requirements of ASTM F626.

f) Tie Wires and Clips. Use one of the systems listed in ASTM F626 for attaching chain-link fabric to horizontal rails, intermediate posts, or tension wire.

g) Miscellaneous Fittings and Hardware. Provide commercial grade steel or malleable iron fittings and hardware for use with steel fabric. All steel fittings protected with a zinc coating applied in conformance with ASTM A153.

B. Fence Stands. Provide a stand that is 16 inches wide by 36 inches long. Construct the standout of the same 1 3/8-inch tubular pipe as the frame with two 36-inch pipes connected to three equally spaced 16-inch pipes at 90-degree angles. Attach one or two vertical pipes, with a diameter slightly smaller than the fence post, to the stand which will be used to attach the fence panels. Use 30-inch steel spikes to secure the stand for turf or dirt installations and sandbags for bituminous or concrete installations.

3 CONSTRUCTION

Place the fence stands on a flat surface and secure them to the ground using sandbags on both front and back sides of stand. Do not drill or drive spikes into bituminous or concrete surface. Once the fence stands are secured, attach the fence panels to the fence stands.

Replace damaged fence in kind within 24 hours of damage, as directed. Remove temporary protective fence when directed or after completion of project.

IV. MEASUREMENT AND PAYMENT – Linear Foot

ITEM 9000-0024 – REMOVAL OF EXISTING RETAINING WALL, LUMP SUM

1 DESCRIPTION
This work is removing the existing retaining wall, as indicated.

2 MATERIALS (NOT USED)

3 CONSTRUCTION
Prior to removal, contractor shall cut existing fence panels at the locations indicated with an appropriate means (sawcut or acetylene torch) that leaves a clean cut on both the removed piece of fence and the fence to remain. Fence panels that will not be replaced shall be returned to the owner (The Battery).

The retaining wall shall be saw cut at the locations indicated. Sawcut shall be vertical and clean.

Take precautions to ensure embankment stability during retaining wall removal operations. Temporarily excavate, and/or sheet and shore as necessary. Special attention should be paid to the small building near the retaining wall.

3 MEASUREMENT AND PAYMENT – Lump Sum
Payment shall include fence removal/salvaging operations, sawcutting, and disposal of removed wall sections, as well as any necessary shoring.

ITEM 9000-0025 – CONCRETE RETAINING WALL, LUMP SUM

1 DESCRIPTION

This work is the construction of a retaining wall as designed and as indicated on the construction plans. An alternate design retaining wall is not permitted.

2 MATERIALS

- As indicated and as specified for each respective item included in the retaining wall.

3 CONSTRUCTION

As indicated and in accordance with applicable sections of the Specifications, Publication 408, and the Special Provisions for each respective item

Excavate to the bottom of footing elevations indicated. Have the Engineer and his geotechnical representative inspect the bearing areas. If unsuitable foundation material is encountered, over-excavate and backfill as directed. Excavation beyond the limits indicated or specified and backfill material required to replace unsuitable material will be paid for in accordance with Section 110.03 (c).

4 MEASUREMENT AND PAYMENT – Lump Sum

9000–0026 – COLLAPSIBLE BOLLARD

DESCRIPTION – This work includes the furnishing and installation of collapsible bollards as indicated and as directed.

MATERIAL – As indicated and as follows:

- Pipe Bollard – Steel ASTM A500
- Class A Concrete - Section 704
- Reinforcing – Section 709
- Caulking Compound - Section 705.8
- Joint Backing Material - Section 705.9
- Washer, Nut and Bolts, Section 1105.02 (a) 1.
- Concrete Slab, Section 501

CONSTRUCTION –

As indicated and as follows:

General –

After each erection and alignment, seal openings between metal surfaces and concrete using a ½" expansion joint. After the concreting and other operations have been completed, thoroughly clean all surfaces. Remove accumulations of oil, grease, dirt or foreign materials using a solvent cleaner.

Submit shop drawings to Engineer for approval.

Fixed and collapsible bollard paint colors shall match. Submit color samples to the Engineer prior to painting. Bollard shall be powder coated yellow.

The 6" concrete slab that is between the back of curbs, and not within the 18" diameter bollard foundation, is monolithic to the foundation for a clean look.

MEASUREMENT AND PAYMENT

Installation of the collapsible bollard shall be paid per each and shall include all concrete for footings, 6" concrete slab, 6" subbase, tube filling, painting, and reflective tape.

ITEM 9000-0027, COMPOSITE JUNCTION BOX, 12"X 12"X 12"

1 DESCRIPTION

Furnish and install a composite traffic junction box of the specified size with grounding rod and mounting rack, if applicable.

2 MATERIAL

Junction Box

- Junction Box Model: QUAZITE, 12 in x 12 in x 12 in Usable Int., Cover Logo Electric, Underground Enclosure Assembly - 4AVP4|PC1212Z80217 – Grainger
- Make the junction box out of a polymer concrete, reinforced with heavy-weave fiberglass, of the nominal dimensions specified.
- Provide enclosures and lids which are cement gray in color and rated for a minimum design load of 22,500 lbs over a 10” x 20” plate with a minimum test load of 33,500 lbs.
- Use a cover for the rectangular box which has a non-skid coefficient of friction of 0.5, a thickness of 2”, and a watertight gasket.
- Keep the bottom of the box open. Provide a box with walls ½” thick and flared. Use a cover which has been imprinted with the logo “Traffic” and equipped with two (2) 4”x ½” pull slots.

Stone

- The aggregate shall be stone, gravel or slag meeting the requirements of Section 703.2, PennDOT408 for Type C, or better, Number 2A material.

Geotextile

- In accordance with PennDOT 408, Section 735 for Class 4 geotextile material.

Grounding

In accordance with TC-8804 of PennDOT Pub 148 and as follows:

- Copper clad, 10’ in length and ¾” in diameter.
- #6 AWG stranded copper wire.
- Test the resistance of the grounding rod in accordance with the National Electric Code (NEC) and ensure that the grounding rod is less than 10 ohms in accordance with Streets Department requirements. For grounding rods failing the above-mentioned test, relocate the grounding rod to a suitable location approved by the Engineer.

3 CONSTRUCTION

- Receive approval of the junction box location from the Engineer prior to installation.
- Remove the existing concrete footway to the nearest joint. The joint shall be sawed continuously and shall be of sufficient depth to allow removal of the paving without disturbing the paving that is to remain.
- Install the junction box on a minimum of 6” of 2A stone overlaid with geotextiles.
- Ensure that the elevation of the box conforms to the proposed grade of the adjacent pavement. In unpaved areas, ensure that the junction box is at the same elevation at the top of nearest curb. Fill the surrounding area in a manner which eliminates any tripping hazards.
- Ensure that the conduit extends a minimum of 3” above the bottom of the box and a maximum of 9” below the top of the box.
- Ensure that the top of the cable is a minimum of 1” below the lid.
- Mount the rack, if applicable, to the wall of the box in such a manner that does not adversely affect the integrity of the box.
- Ensure that any fiber cable mounted in the box does not come in contact with the ground.
- Install a 10’ grounding rod. Ground all conduits to the rod with a #6 AWG stranded copper wire.
- If existing conditions mandate conduit entrance through the side of the box, drill holes as per the manufacturer’s recommendation and seal with a foam or non-shrink grout.
- Restore the adjacent pavement to its original condition in accordance with the appropriate sections of PennDOT Pub 408.
- The use of expansion joint material is prohibited.
- Correct any excessive damage to the existing pavement caused by the Contractor, as determined by the Engineer, at the Contractor’s expense.

4 MEASUREMENT & PAYMENT

- Installation of the composite junction box shall be paid per each and shall include:
    - The grounding rod, 2A stone, geotextile and any necessary excavation and backfill that are incidental to this item of work.
    - The #6 AWG stranded copper wire used for grounding that is incidental to this item.
    - The mounting rack that is incidental to this item.
    - Perform the drilling and sealing of holes for conduit entrance through the side of the box at no additional cost.

9000–0028 – SECURITY CAMERAS AND POLE

1 DESCRIPTION

This work shall consist of:

- One (1) security camera pole (aka Pole Number 4) with base cover
- One (1) Concrete Footing with conduit, anchor bolts, and all hardware required by the manufacturer, or as required to feed electric and data separately to the camera, which will be mounted to the pole,
- Two (2) security cameras (pole 3 and 4),
- Two (2) security camera mounts (pole 3 and 4),
- Two (2) security camera arms (pole 3 and 4),
- Four (4) pole NEMA boxes including mounts (Poles 1, 2 , 3 and 4),
- One (1) NEMA enclosure on the fenced-in concrete pad located in the western corner of the property.
- Camera Conduit: Two (2) parallel 1" diameter conduits between the junction box associated with Existing Pole Number 3 and the NEMA box on this pole, and between the junction box associated with Proposed Pole Number 4 and the NEMA box on this pole

DRWC to provide a map of the existing pole and conduit locations with number designation of each existing and proposed pole.

See also related specification for ITEM 9000-0029 Security Camera Power and Fiber Feeds.

2 MATERIAL

- The cabling system installation shall comply fully with all local, county and state laws, ordinances, and regulations applicable to electronic and electrical installations.
- This document does not replace any code, either partially or wholly. The Contractor must be aware of local codes that may impact this project.
- The Contractor is responsible for verifying the accuracy of the system designs documented in the Specification and Drawings and for accepting responsibility. Any issues, discrepancies, substitutions, or exceptions to the contract documents by the Contractor shall be communicated to the Technology Consultant prior to the purchase of any equipment or materials by way of the Shop Drawings Submittal process. Upon approval of the Contractor's Shop Drawing Submittal by the Owner's designated representative, or if the Contractor fails to submit Shop Drawings, the Contractor shall assume all responsibility for supplying such materials and taking such actions as to satisfy the full intentions of the contract documents without claim for additional compensation. This shall include providing any incidental equipment, Installation Materials and labor needed in order to result in a complete and operable system, even if such equipment, materials or labor are not listed in this Specification. Exceptions include Owner-requested changes, unexpected field issues due to work by other trades, or schedule changes initiated by others.

- Equipment and accessories furnished under the terms of this specification shall be the standard products of manufacturers regularly engaging in the manufacture of this type of product(s) for a period of at least three years.
- The installation shall be in compliance with the requirements of the latest revisions of:
  1. All approved published instructions set forth by equipment manufacturers.
  2. All local codes and ordinances in effect and having jurisdiction.
  3. Americans with Disabilities Act (ADA)
  4. All requirements of electric and telephone utility companies
  5. BICSI Telecommunications Distribution Methods Manual (latest edition)
  6. International Building Code (IBC)
  7. Institute of Electrical and Electronic Engineers (IEEE)
  8. National Board of Fire Underwriter's (NBFU)
  9. National Electric Code (NEC)
  10. National Electrical Manufacturer's Association (NEMA)
  11. National Electric Safety Code (NESC)
  12. Occupational Safety and Health Act (OSHA)
  13. Telecommunications Industry Association (TIA)

Summary of Materials and Related Work:

A. Camera Pole: Match existing 15'-high camera pole number 3 located on site.
B. Camera Pole Footing: See Plans.
C. Camera Conduit: 1" diameter PVC.
D. Camera Pole anchor bolts, and all hardware required by the manufacturer: As per manufacturer's requirements or as required to feed electric and data separately to the camera.
E. Camera Model: Hanwah Vision PNM-C32083RVQ 32MP 360 Quad Sensor IP Camera PNM-C32083RVQ AI Dome Security Camera - Hanwha Vision
F. Camera Mount & Hardware: per the camera manufacturer's recommendations
G. Camera Arm Model: Hanwah Vision SBP-300MWM Gooseneck Arm SBP-300WMW - Hanwha Vision
H. Pole NEMA Box Model: L-Com NB141207-1HF 14x12x07 Fiberglass Reinforced Polyester FRP Weatherproof Outdoor IP24 NEMA 3R Enclosure 14x12x7 Inch 120 VAC Weatherproof Enclosure Fan/Heat Controller - NB141207-1HF
I. Concrete Pad NEMA Box Model : L-Com NB201611-1HFS 20x16x11 Inch 120VAC Weatherproof Enclosure w/Solid State Fan & Heat Controller Class A Cement Concrete per Section 1001
J. Class 4 Excavation – Section 204

Provide product submittals to the Engineer for review and approval prior to implementing work.

3 CONSTRUCTION

Work to be completed prior to final grading and paving. Provide product submittals and shop drawings to the engineer for approval prior to implementing work.

A. Contractor shall mount camera pole on new foundation as indicated on the plans and as per pole manufacturer's installation instructions.
B. The Contractor shall be responsible for the location of all subsurface structures and utilities in the construction area.
C. The foundation site shall be excavated to the required dimensions. If the presence of subsurface utilities prevents the construction of a foundation of the specified size, the Contractor shall suspend work immediately and notify the Engineer.
D. All foundations shall be completed prior to the installation of landscaping.
E. The excavation shall be securely covered after completion and remain covered when no work is in progress. The excavation shall be kept reasonably dry and free of mud until placement of the concrete.
F. The concrete foundation shall be monolithic construction and shall cure for a minimum of 7 days prior to pole installation.
G. Anchor bolts shall be set by template to the proper dimensions in accordance with the camera pole manufacturer's recommendations.
H. The Contractor shall construct forms to firmly hold the template and anchor bolts in place while the concrete is poured. Each anchor bolt shall extend above the finished grade of the foundation to a height required as per the manufacturer's recommendations.
I. If the anchor bolt is damaged prior to the pole installation, an acceptable method of correction must be approved by the Engineer prior to installation. Cost of correction is at no additional cost to the owner.
J. Excessive damage to the existing pavement caused by the Contractor, as determined by the Engineer, shall be corrected at no additional cost to the Department.
K. Install new junction box to serve the new camera pole.
L. Mount security camera, security camera mount, camera arm, and NEMA box to the new security camera pole per manufacturer(s) instructions. Mount the security camera between 12-14-ft high with the NEMA enclosure either just above.
M. Connect two (2) 1" diameter conduits from the existing junction box for existing pole Number 3 to the proposed NEMA box on Pole Number 3. Connector also two (2) 1" diameter conduits from the proposed junction box near proposed Pole Number 4 to the to the new NEMA box to be mounted on this pole.

MEASUREMENT AND PAYMENT

Installation of all work and materials described above shall be paid for as LUMP SUM.

9000–0029 – SECURITY CAMERA POWER & FIBER FEEDS

1 DESCRIPTION

This work shall consist of:

- Connecting two (2) parallel 2” diameter conduits to the junction box associated with Existing Pole Number 3 and the junction boxes between Existing Pole Number 3 and Proposed Pole Number 4.
- Run Electrical wiring from concrete pad to existing conduit and junction boxes of poles 1, 2, 3, and within new conduit and junction boxes for pole 4, as well as between said junction boxes and the NEMA boxes on each of these poles.
- Install power pole at concrete pad for aerial connection of power and telco to pad from street power pole.Fiber optic cabling from the proposed NEMA enclosure (to be installed on the existing concrete pad located at the western corner of the park) to existing conduit and junction boxes of poles 1, 2, 3, and new conduit and junction box for pole 4, as well as between said junction boxes and the NEMA boxes on each of these poles.

DRWC to provide a map of the existing pole and conduit locations with number designation of each existing and proposed pole.

See also related specification for ITEM 0954-0012 2 Inch Conduit, ITEM 0954-0151 Trench and Backfill Type I, and ITEM 9000-0028 Security Cameras and Pole.

2 MATERIAL

- The cabling system installation shall comply fully with all local, county and state laws, ordinances, and regulations applicable to electronic and electrical installations.
- This document does not replace any code, either partially or wholly. The Contractor must be aware of local codes that may impact this project.
- The Contractor is responsible for verifying the accuracy of the system designs documented in the Specification and Drawings and for accepting responsibility. Any issues, discrepancies, substitutions, or exceptions to the contract documents by the Contractor shall be communicated to the Technology Consultant prior to the purchase of any equipment or materials by way of the Shop Drawings Submittal process. Upon approval of the Contractor’s Shop Drawing Submittal by the Owner's designated representative, or if the Contractor fails to submit Shop Drawings, the Contractor shall assume all responsibility for supplying such materials and taking such actions as to satisfy the full intentions of the contract documents without claim for additional compensation. This shall include providing any incidental equipment, Installation Materials and labor needed in order to result in a complete and operable system, even if such equipment, materials or labor are not listed in this Specification. Exceptions include Owner-requested changes, unexpected field issues due to work by other trades, or schedule changes initiated by others.

- Equipment and accessories furnished under the terms of this specification shall be the standard products of manufacturers regularly engaging in the manufacture of this type of product(s) for a period of at least three years.
- The installation shall be in compliance with the requirements of the latest revisions of:
  1. All approved published instructions set forth by equipment manufacturers.
  2. All local codes and ordinances in effect and having jurisdiction.
  3. Americans with Disabilities Act (ADA)
  4. All requirements of electric and telephone utility companies
  5. BICSI Telecommunications Distribution Methods Manual (latest edition)
  6. International Building Code (IBC)
  7. Institute of Electrical and Electronic Engineers (IEEE)
  8. National Board of Fire Underwriter's (NBFU)
  9. National Electric Code (NEC)
  10. National Electrical Manufacturer's Association (NEMA)
  11. National Electric Safety Code (NESC)
  12. Occupational Safety and Health Act (OSHA)
  13. Telecommunications Industry Association (TIA)

Provide product submittals to the Engineer for review and approval prior to implementing work.

3 CONSTRUCTION

Work to be completed prior to final grading and paving. Furnish and install electric wiring and fiber optic cabling as follows:

A. Electric wiring from concrete pad to the junction boxes on sercurity poles 1, 2, 3 and Proposed Pole Number 4
B. Run electric wiring from each pole's associated junction box to each pole's NEMA box.
C. Run fiber optic cabling between the new NEMA enclosure to be located on the concrete pad located in the western corner of Penn Treaty Park, along the Beach Street sidewalk, and the NENMA boxes on security camera poles 1, 2, 3 and proposed pole number 4.
D. Or as directed by the engineer

MEASUREMENT AND PAYMENT

Installation of all work and materials described above shall be paid for as LUMP SUM. New composite junction boxes and new 2 inch conduit, and the required trenching and back fill for the 2 inch conduit, between existing pole 3 and proposed pole 4 shall be paid for under those respective items.