THE SCHOOL DISTRICT OF PHILADELPHIA

THE SCHOOL DISTRICT OF PHILADELPHIA
Office of Capital Programs
440 North Broad Street, 3rd Floor – Suite 371
Philadelphia, PA 19130

TELEPHONE: (215) 400-4730

Addendum No. 01

Subject: Morton McMichael School Schoolyard Improvements
SDP Contract No. B-030C of 2020/21

Location: Morton McMichael School, 3543 Fairmount Avenue, Philadelphia, PA 19104

This Addendum dated October 21, 2021, shall modify and become part of the Contract Documents for the work of this project. Any items not mentioned herein shall be performed strictly in accordance with the original documents, unless modified by prior addenda, if any

1. NOTICE:

MBE/WBE Participation Goals have been modified to a COMBINED 15-20% GOAL FOR MBE/WBE Participation.

CHANGE TO SPECIFICATIONS:

DELETE Sections 02 4119 through 32 9200 of the Technical Specifications, 70 pages

REPLACE with the attached Corrected Technical Specification Sections 11 6813 through 32 9200, 107 pages

End of Addendum 01

SECTION 116813 - PLAYGROUND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following playground equipment from KOMPAN:
   1. Asterion II, Model GXY948
   2. Spica 1, Model GXY8014
   3. Supernova, Model GXY916

1.03 REFERENCES

A. The following apply to work in this Section:
   1. ASTM: Specifications of the American Society for Testing and Materials latest editions: Consumer Safety Performance Specification for Playground Equipment for Public Use.
   2. F 1487 - 93. Modifications specified herein shall govern where conflicts with ASTM standards occur.
   3. CPSC: "A Handbook for Public Playground Safety", latest edition, published by the U.S. Consumer Product Safety Commission.
   4. ADA: Americans with Disabilities Act, latest edition published by the U.S. Department of Justice, Civil Rights Division.

1.04 DEFINITIONS

A. Fall Height: According to ASTM F 1487, "the vertical distance between a designated play surface and the protective surfacing beneath it."

B. HDPE: High-density polyethylene.

C. IPEMA: International Play Equipment Manufacturers Association.

D. LLDPE: Linear low-density polyethylene.

E. MDPE: Medium-density polyethylene.

F. Use Zone: According to ASTM F 1487, the "area beneath and immediately adjacent to a play structure or equipment that is designated for unrestricted circulation around the equipment and on whose surface it is predicted that a user would land when falling from or exiting the equipment."

1.05 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, including finish and color information.

B. Shop Drawings: For playground equipment and structures. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Initial Selection: For each type of playground equipment and structure indicated.

1. Manufacturer's color charts.
2. Include similar Samples of playground equipment and accessories involving color selection.

D. Samples for Verification: As requested for each type of exposed finish, minimum 6 inches long.

1.06 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Extent of surface systems and use zones for equipment.
2. Critical heights for playground surfaces and fall heights for equipment.

B. Qualification Data: For qualified installer, testing agency and manufacturer.

C. Product Certificates: For each type of playground equipment, from manufacturer, including IPEMA certificates for all play equipment.

D. Material Certificates: For the following items, signed by manufacturers:

1. Shop finishes.
2. Wood-Preservative Treatment: Include certification by treating plant that states type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
3. Recycled plastic.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of playground equipment.

F. Field quality-control reports.

G. Warranty: Sample of special warranty.

1.07 CLOSEOUT SUBMITTALS

A. Comply with local jurisdiction to obtain applicable permits.

B. Maintenance Data: For playground equipment and finishes to include in maintenance manuals.

1.08 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm whose playground equipment components have been certified by IPEMA's third-party product certification service.

1. Provide the following playground equipment and play structure components bearing the IPEMA Certification seal.

a. Asterion II, Model GXY948
b. Spica 1, Model GXY8014
c. Supernova, Model GXY916

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1. Contractor shall have had experience with at least five (5) other projects of similar scope and complexity and shall perform work with personnel totally familiar with play equipment installation and construction techniques under the supervision of an experienced foreperson.

C. Independent Certified Playground Safety Inspector (CPSI)

D. Safety Standards: Provide playground equipment complying with or exceeding requirements in ASTM F 1487 and CPSC No. 325

E. Preinstallation Conference: Conduct conference at Morton McMichael School.

1.09 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of playground equipment that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Five (5) years from date of Substantial Completion.

1.010 REGULATORY REQUIREMENTS

A. Comply with all rules, regulations, laws and ordinances of local, state and federal authorities having jurisdiction. Provide labor, materials, equipment and services necessary to make work comply with such requirements without additional cost to Owner.

B. Coordinate work with utility companies. Notify PA One Call System not less than three working days prior to beginning work.

C. Investigate the conditions of public thoroughfares and roads as to availability, clearances, loads, limits, restrictions and other limitations affecting transportation to and ingress and egress at the site.

D. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.

E. Conform to applicable code for disposal of debris.

F. Procure and pay for permits and licenses required for work.

1.011 DELIVERY, STORAGE, AND HANDLING

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

1.012 SEQUENCING AND SCHEDULING

A. Coordinate work of this section with all other Sections of Specifications.

PART 2 - PRODUCTS

2.01 PLAYGROUND EQUIPMENT AND STRUCTURES

A. Subject to compliance with requirements, provide playground equipment as manufactured by KOMPAN Playgrounds or approved equal. This Section includes the following playground equipment from KOMPAN:

1. Asterion II, Model GXY948
2. Spica 1, Model GXY8014
3. Supernova, Model GXY916

B. Color as offered by the manufacturer and confirmed by the Owner/Engineer.

2.02 CONCRETE

A. Concrete Materials and Properties: Comply with requirements in Section 321613 "Cast-in-Place Concrete" to produce normal-weight concrete with a minimum 28-day compressive strength of 3000 psi (20.7 MPa), 3-inch (75-mm) slump, and 1-inch- (25-mm-) maximum-size aggregate.

2.03 FABRICATION

A. Provide sizes, strengths, thicknesses, wall thicknesses and weights of components as required to comply with requirements in ASTM F 1487. Factory drill components for field assembly. Unnecessary holes in components, not required for field assembly, are not permitted. Provide complete play structures, including supporting members and connections, means of access and egress, designated play surfaces, handholds, and other components indicated or required for equipment indicated.

B. Metal Frame: Fabricate main-frame upright support posts from metal pipe or tubing with cross-section profile and dimensions as required. Unless otherwise indicated, provide each pipe or tubing main-frame member with manufacturer’s standard drainable bottom plate or support flange. Fabricate secondary frame members, bracing, and connections from either steel or aluminum.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions, with Owner/Authorized Representative and Installer present, for compliance with requirements for site clearing, earthwork, site surface and subgrade drainage, and other conditions affecting performance of the Work.

1. Do not begin installation before final grading required for placing protective surfacing is completed unless otherwise permitted by Owner/Authorized Representative.

B. Examine areas for presence of overhead and subsurface utilities. Do not proceed if utilities present installation conflict.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Verify locations of playground perimeter and pathways with Owner/Engineer. Verify that playground layout and equipment locations comply with requirements for each type and component of equipment.

3.03 INSTALLATION, GENERAL – PLAYGROUND EQUIPMENT AND STRUCTURES

A. General: Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Anchor playground equipment securely, positioned at locations and elevations indicated in accordance with manufacturers specifications.

1. Maximum Equipment Height: Coordinate installed heights of equipment and components with finished elevations of protective surfacing. Set equipment so fall heights and elevation requirements for age group use and accessibility are within required limits. Verify that playground equipment elevations comply with requirements for each type and component of equipment.

B. Post and Footing Excavation: Excavate holes for posts and footings as indicated in firm, undisturbed or compacted subgrade soil.

C. Post Set on Subgrade: Level bearing surfaces with drainage fill to required elevation.

D. Post Set with Concrete Footing: Comply with Section 321613 "Cast-in-Place Concrete" for measuring, batching, mixing, transporting, forming, and placing concrete.

1. Set equipment posts in concrete footing. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at the correct angle, alignment, height, and spacing.

a. Place concrete around posts and vibrate or tamp for consolidation. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

2. Embedded Items: Use setting drawings and manufacturer's written instructions to ensure correct installation of anchorages for equipment.
3. Concrete Footings: Smooth top, and shape to shed water.

E. Surface Mount: Comply with manufacturer’s installation instructions to ensure secure, plumb

connection.

3.04 FIELD QUALITY CONTROL

A. Testing Agency: Engage qualified 3rd. party CPSI testing agency to perform final tests and inspections.

B. Perform tests and inspections with the assistance of a factory-authorized service representative.

1. Perform inspection and testing for each type of installed playground equipment according to CPSC No. 325.

C. Prepare test and inspection reports to certify compliance with ASTM F 1487 and CPSC No. 325.

D. Playground equipment items will be considered defective if they do not pass tests and inspections.

E. Notify 48 hours in advance of date and time of final inspection.

3.05 CLEANING AND PROTECTION

A. After completing playground equipment installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

B. Protect finishes of playground equipment from damage during construction period with temporary protective coverings approved by equipment manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 116813

SECTION 311000 – SITE CLEARING

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This Section includes the following:

1. Clearing, grubbing and disposal
2. Removal and Storage of Existing Aluminum Fence and Gate Panels
3. Demolition of existing features, including, but not limited to inlets, pipes, fencing, and trees.

1.02 MATERIALS OWNERSHIP

A. Except for materials indicated to be stockpiled or to remain Owner's property, cleared materials shall become the Contractor's property and shall be disposed of in accordance with all applicable regulations.

1.03 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

C. Notify utility locator service for area where Project is located prior to site clearing.

D. Contractor shall verify existing grades prior to performing work under this section. If existing grades are at variance with the drawings, notify the Owner and engineer to receive instructions prior to proceeding. No additional compensation will be considered resulting from grade variances once site clearing has commenced.

E. All benchmarks and monuments shall be protected during construction. If disturbed or destroyed, they shall be replaced in original position by a licensed surveyor at the Contractor's expense.

F. Protect areas outside limits of disturbance from encroachment by construction personnel or equipment, regardless of property Ownership. Access shall be by specific, written permission or easement only.

PART 2 - PRODUCTS

A. Contractor shall provide and use all necessary equipment and materials to perform work.

PART 3 - EXECUTION

3.01 PREPARATION

A. Provide erosion control measures in accordance with Section 312500, Soil Erosion and Sediment Control, prior to any construction activity.

B. Locate and clearly flag trees and vegetation to remain or to be relocated. All trees and vegetation to remain shall be barricaded and protected during the construction process in accordance with Section 015639 – Tree Protection.

C. Limit of clearing is to be staked and verified by Owner or engineer prior to removal of any trees.

D. All trees and shrubs not designated to remain within the area to be graded, whether shown or not on the drawings, shall be cut and the stumps shall be completely dug out. Burning on site is not permitted.

3.02 CLEARING AND GRUBBING

A. Clear the ground of existing organic matter within excavation areas to a depth of eight (8) inches below the existing ground. Remove remaining topsoil over 8 inches in depth, when directed. Stockpile removed topsoil as specified in Section 312500 – Soil Erosion & Sediment Control. Utilize stockpiled topsoil as needed throughout the project. Dispose of unused topsoil in accordance with section 3.03 below.

B. Remove obstructions, objectionable material, rubbish, junk, trees, shrubs, grass, and other vegetation within the limit of disturbance to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots, unless otherwise specified.

C. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers and compact each layer to a density equal to adjacent original ground as in accordance with Section 312000 - Earth Moving.

3.03 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable or excess topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off Owner’s property.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The work under this Section shall include all labor, material, equipment and all else necessary for cutting, proof rolling, filling and grading to required lines, dimensions, contours and elevations for proposed improvements as hereinafter specified and/or as otherwise required for the proper and timely completion of this Contract. Work under this Section includes, but is not limited to, subgrade preparation, excavating, backfilling, and compaction for structures and foundations, pavements, sidewalks, landscaping areas, and utilities. The contractor shall pay for and coordinate the services of a geotechnical engineer and testing agency to perform quality control of the earthwork.

B. Scarifying, compaction, moisture content conditioning and control, and removal of unsuitable material to ensure proper preparation of areas for the proposed improvements.

C. Undertake any special construction procedures for the project as shown in the drawings and described by these specifications for preparation of pavement areas.

1.02 RELATED DOCUMENTS

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

1.03 REFERENCE STANDARDS

B. American Society for Testing and Materials (ASTM) - latest edition
1. C33 Concrete Aggregates
2. D 422 Method for Particle Size Analysis of Soils
3. D 698 Test for Moisture - Density Relations of Soils - Standard Proctor Method
4. D 2216 Laboratory Determination of Moisture content of Soil
5. D 2487 Classification of Soils for Engineering Purposes
6. D 2922 Tests for Density of Soil and Soil- Aggregate in Place by Nuclear Methods (Shallow Depth)
7. D 3017 Test for Water Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
8. D 4318 Test for Plastic Limit, Liquid Limit, and Plasticity Index of Soils

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

D. Associated General Contractors of America
1. Manual of Accident Prevention in Construction

1.04 QUALITY ASSURANCE

A. A geotechnical engineer familiar with the project requirements, selected and paid by the Contractor, may be retained to perform construction inspection on site based on density testing,

visual observation, and judgement. This inspection will not relieve the Contractor from his responsibility to complete the work in accordance with the drawings and specifications.

B. Visual field confirmation and density testing of subgrade preparation and fill placement procedures shall be performed by the field geotechnical engineer as part of the construction testing requirements. The Contractor shall be informed as soon as possible of the test results.

C. The geotechnical engineer shall prepare field reports that indicate compaction test location, elevation data, testing results and acceptability. The Owner, engineer, and Contractor shall be provided with written copies of the results within 24 hours of time test was performed.

D. All costs related to reinspection due to failures shall be paid for by the Contractor at no additional expense to Owner. The Owner reserves the right to direct any inspection that is deemed necessary. Contractor shall provide free access to site for inspection activities.

1.05 SUBMITTALS

A. Material Test Reports: Shall be provided from the trsting agenct indication and interpreting test results for compliance on the following:
   1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
   2. Laboratory compaction curve according to ASTM D 698 for each on-site or borrow soil material proposed for fill and backfill; provide for each material type and for every 5,000 cubic yards of each material.
   3. Material Gradation Tests.
   4. Electrical Resistivity and pH tests for sand used for water pipe bedding and backfill

B. Within 30 days after award of the contract, the Contractor shall submit to the Owner and engineer a schedule detailing the sequence, and time of completion of all phases of work under this section.

C. At least two weeks in advance of imported fill use, the Contractor shall submit the following laboratory test data to the geotechnical engineer for each type of imported soil/gravel material to be used as compacted fill.
   1. Moisture and Density Relationship: ASTM D698;
   2. Mechanical Particle-Size Analysis: ASTM D422; and,
   3. Plasticity Index: ASTM D 4318.

D. Together with the above test data, the Contractor shall submit a 25-pound sample of each type of off-site fill material in an air tight container for the approval of the geotechnical engineer.

E. Submit the name of each material supplier and specific type and source of each material. Any change in source or soil type throughout the job requires approval of the Owner and the engineer.

1.06 DEFINITIONS

A. Backfill: Soil materials used to fill an excavation.

B. Base Course: Layer placed between the subgrade and paving.

C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow: Approved soil materials imported from off-site for use as fill or backfill.

E. Classification: No consideration will be given to the nature of earthen materials, and all excavation required for this Project will be designated as unclassified.

F. Degree of Compaction: Degree of compaction required is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 698 abbreviated hereinafter as percent laboratory maximum density. For granular material, relative density is determined in accordance with ASTM D 4254.

G. Excavation: Removal of material encountered down to subgrade elevations:

1. Bulk Excavation: Excavation more than 10 feet in width.
2. Overexcavation: Excavation of existing unsuitable material beyond limits shown on the Drawings for replacement with structural fill as directed by the Owner.
3. Unauthorized Excavation: Excavation below subgrade elevations or beyond limits shown on the Drawings without direction by the Owner.

H. Hard Material: Weathered rock, dense consolidated deposits, or buried construction debris (i.e., demolished brick walls, concrete, etc.) which are not included in the definition of “rock” but which usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

I. Rock:

1. General Excavation - Any material that cannot be excavated with a single-toothed ripper drawn by a crawler tractor having a minimum draw bar pull rated at not less than 71,000 lbs. (Caterpillar D9N or equivalent), and occupying an original volume of at least 2 cubic yards or more; and,
2. Trench Excavation - Any material that cannot be excavated with a backhoe having a break out force rated at not less than 44,000 lbs. (Caterpillar 235D or equivalent), and occupying an original volume of at least 2 cubic yards.

J. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below base or topsoil materials.

K. Subbase: Material shown on the Drawings between the pavement base and subgrade.

L. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.07 REGULATORY COMPLIANCE

A. Codes and Standards: Perform earthwork complying with federal, state, and local regulations including the Occupational Safety and Health Act of 1970 as amended. Excavation and trenching are regulated by OSHA. The Contractor shall perform all excavation and trenching work in accordance with 29 CFR 1926 Subpart P.

B. Conform with Pennsylvania Act 287 and all amendments and other applicable regulations regarding notification of utility companies.

C. Any pumped water shall be discharged from the Site in accordance with federal, state and local codes and regulations. Comply with all Philadelphia Water Department permit requirements.

1.08 PROJECT CONDITIONS

A. Utility Identification: Notify PA One-Call System at 1-800-242-1776 at least 3 days prior to excavation.

B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify the Owner not less than 72 hours in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without the Owner's written permission.

C. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

D. Existing improvements, adjacent property, and other facilities and trees and plants that are not to be removed shall be protected from injury or damage, which may result from Contractor's operation.

1.09 GEOTECHNICAL ENGINEERING STUDY

A. The Owner employed a geotechnical engineer to investigate sub-surface soil conditions and make recommendations regarding site work construction procedures. Copies of the report are on file with the Owner and engineer. Perform all work in accordance with any recommendations and requirements therein. If conflicts exist between the geotechnical engineering study and the construction drawings and specifications, the more stringent requirements shall apply.

PART 2 - PRODUCTS

2.01 MATERIALS

A. On-site fill
1. On-site excavated materials may be used as backfill provided they meet the following criteria:
   a. Suitable backfill materials include soil that complies with ASTM D2487 soil classifications GW, GP, GM, SW, SP, and SM and having a maximum particle size of six (6) inches in any one dimension.
   b. Unsuitable backfill materials include any material having an excess of wood, timber, metal, rebar, organics, debris, or any other deleterious materials.
2. Excavated materials unsuitable for fill in their as-is state may be processed on-site to comply with suitable backfill requirements. Concrete, brick, asphalt debris may be broken or crushed on site to meet the above particle size requirement;
3. All processed (broken, crushed, etc.) debris shall be thoroughly mixed with suitable gravel/sand/silt sized particles to disperse evenly the large-sized particles within the soil matrix. The soil-debris mixture must be mixed, placed, and compacted such that voids will not exist;
4. The Contractor shall use the on-site soil judiciously to facilitate the construction schedule.
5. Excess topsoil may be re-used as fill on-site in accordance with the recommendations contained in the geotechnical engineering study. In general, topsoil shall be used first as fill in landscape areas and secondarily in parking areas at least 5 feet below finished grade. Topsoil shall never be used in building areas; and,
6. Prior to placement, on-site material to be used as fill shall not contain:
   a. Debris other than crushed concrete and brick meeting the above requirements.
   b. Timber or railroad ties.
   c. Other deleterious materials such as steel rails, rebar, trash, etc.
   d. Hazardous material - Unsuitable and deleterious materials and debris shall be disposed of off-site in accordance with all applicable regulations.

B. Off-site imported fill

1. If necessary, off-site fill shall be obtained and provided by the Contractor;
2. Fill shall be clean, well graded granular soil which is non-expansive and non-collapsible and shall have less than 20% by weight passing the #200 sieve. The portion passing the #200 shall be non-plastic. Fill with less fines (less than #200) may be required on project specific basis and as required by geotechnical engineer. Likewise, fill with more than 20% fines may be acceptable on a project specific basis or as identified in the geotechnical engineering study;
3. Imported fill shall be free of all hazardous substances. Certification of compliance and, if requested, test results substantiating compliance shall be furnished to the Owner and geotechnical engineer by the Contractor not less than one week prior to its intended use;
4. The Owner reserves the right to test off-site fill material for conformance with these specifications; and,
5. The Contractor shall be responsible for all permits and regulatory requirements associated with off-site borrow sources.

C. Rock is defined as follows:
1. General Excavation - Any material that cannot be excavated with a single-toothed ripper drawn by a crawler tractor having a minimum draw bar pull rated at not less than 71,000 lbs. (Caterpillar D9N or equivalent), and occupying an original volume of at least 2 cubic yards or more; and,
2. Trench Excavation - Any material that cannot be excavated with a backhoe having a break out force rated at not less than 44,000 lbs. (Caterpillar 235D or equivalent), and occupying an original volume of at least 2 cubic yards.

D. Any bituminous concrete on the site shall be milled/removed prior to placing any fill and shall be reused only onsite immediately below the pavement stone base course.

2.02 STONE BACKFILL

A. In accordance with PennDOT Publication 408, Section 703 for No. 2A Stone

EQUIPMENT

A. Compactor for mass earthwork shall be minimum 10-ton static-drum weight vibratory roller or 10-ton static-drum weight sheep foot compactor as appropriate for the type of soil material at the site or other compactor approved by the geotechnical engineer.

B. Compactor for trenches and where access or maneuverability is limited, use a double drum walk-behind roller or vibratory plate compactor or "jumping jack" tampers.

PART 3 - EXECUTION

3.01 GENERAL

A. Prior to all work of this section, the Contractor shall become thoroughly familiar with the geotechnical engineering study as well as the site, site conditions, and all portions of the work falling under this section.

B. The Contractor shall refer to the soil erosion and sediment control drawings for staging of earthwork operations and for erosion control measures to be implemented prior to commencement of earthwork.

C. Locate and identify existing utilities that are to remain and protect them from damage.

D. Notify utility companies to allow removal and/or relocation of any utilities that are in conflict with the proposed improvements.

E. Protect fences, structures, sidewalks, paving, curbs, etc. to remain from equipment and vehicular traffic.

F. Protect benchmarks, property corners and all other survey monuments from damage or displacement. If a marker needs to be removed/relocated it shall be referenced by a licensed land surveyor and replaced, as necessary, by the same at no additional cost to the Owner.

G. Remove from the site, material encountered in grading operations that, in opinion of Owner or geotechnical engineer, is unsuitable or undesirable for backfilling in pavement or building areas as per Article 2.01.

H. Identify required lines, levels, contours and datum to bring site grades to the proposed subgrade conditions inferred from the drawings.

I. Do not allow or cause any of the work performed or installed to be covered by work of this section prior to all inspections, tests and approvals.

J. Perform excavation using capable, well maintained equipment and methods acceptable to the Owner and regulatory authorities having jurisdiction.

K. When performing grading operations during periods of prolonged wet or dry weather, provide adequate measures for surface drainage and ground water control, and moisture control of soils (i.e., wetting or drying, scarify and discing) so as to place and compact the soil within the moisture content range a few percentage points of its optimum water content. Any disturbed areas should be proofrolled at the end of each day.

L. Sloping, shoring, bracing, and fencing shall be installed in accordance with Federal OSHA requirements as well as the requirements of all regulatory authorities having jurisdiction.

M. Allow no debris to accumulate on-site. Haul debris away from the site and dispose of at no cost to the Owner.

3.02 COMPACTION OF SUBGRADE SURFACES

A. In areas to receive fill, excluding areas marked for bioinfiltration, and at the final cut subgrade, proof roll and compact the exposed ground surface following clearing and grubbing and any required excavation with a minimum of 4 passes of an approved compactor and obtain at least the following density requirement:

1. 95% of Standard Proctor Density (ASTM D698).

B. The proof roll, truck and compactor equipment shall traverse the area at speed that permits the geotechnical engineer to comfortably walk alongside the equipment.

C. Any soft areas exhibiting excessive weaving or unsatisfactory material identified during excavation, fill placement, compaction and proof testing shall be removed, replaced with suitable fill, and compacted as specified above.

3.03 UNDERCUT EXCAVATION

A. When approved by Owner and recommended by the geotechnical engineer, the Contractor may be required to remove natural soil materials in areas where fills are to be placed when determined to be undesirable in their location or condition. The Contractor shall be required to remove the undesirable material and backfill with approved material properly compacted.

B. At locations where unstable or unsuitable soil is shown on the drawings or identified within the geotechnical engineering study, the removal and replacement of such soil shall be as directed on the drawings or as directed by the geotechnical engineer and the Owner.

C. All material removed in the work of undercut excavation will be classified by the geotechnical engineer and Owner as either suitable for other use without excessive manipulation and utilized by the Contractor elsewhere in the work, or unsuitable for future use and manipulated as per Article 2.01.

D. The Contractor shall conduct undercut operations in such a way that the necessary measurements can be taken before any backfill is placed.

E. Backfill in undercut areas shall be placed as a continuous operation along with the undercutting operation. No backfill material shall be placed in water unless otherwise permitted by the geotechnical engineer.

3.04 EXCAVATION, FILL AND SUBGRADE PREPARATION

A. GENERAL
1. The Contractor shall cut or fill to the proposed subgrade elevations based on finished grades and the pavement thicknesses as shown on the drawings. Subgrade elevations shall be constructed to within 0 to minus ½ inch of the proposed grades specified.

B. EXCAVATION
1. Where existing grades are above proposed subgrade elevation, excavate materials to line and grade as shown in the drawings being careful not to over excavate beyond the elevations needed for building subgrades;
2. Excavate organic soils that do not provide adequate foundation support. Excavated on-site organic soils, which are unsuitable for fill may be used in landscaped areas and, if approved by the geotechnical engineer, as fill in parking area at least 5 feet below final elevation. Otherwise this material shall be disposed of as directed by Owner;
3. Excavated on-site soils, which meet the requirements of suitable fill may be used as fill; and,
4. Unsuitable material, such as wood and any other deleterious materials determined to be unsuitable by the geotechnical engineer for use as on-site fill, shall be disposed of as directed by Owner.

C. SUBGRADE PREPARATION FOR FILL
1. Existing grades below proposed grades and thus requiring fill shall be leveled prior to fill placement. The Contractor shall remove existing lawn and top soil in these areas prior to placement of any fill; and,
2. All existing grades to receive fill areas shall be proof rolled and compacted per Article 3.02.

D. FILL PLACEMENT
1. Rock or processed suitable debris pieces larger than six inches (6 inches) across shall not be part of fill;
2. Reduce soil clod size to a maximum of 2 inches before placement. Do not place frozen fill material;
3. No fill material shall be placed in areas of standing water, in areas of frozen or thawing ground, or in areas that have not been approved by the geotechnical engineer;
4. No fill materials shall be placed during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations shall not be resumed until all saturated surficial soils are returned to a satisfactory moisture content as determined by the geotechnical engineer;
5. Fill lift surfaces shall be made smooth and free from ruts or indentations at the end of any work day when precipitation is forecast to prevent saturation of surficial fill material. Fill surfaces shall be graded to drain and sealed with a smooth drum roller at the completion of each work day;
6. The fill shall be placed in uniform loose lifts not exceeding 12-inches thick and compacted with at least 4 coverages of a 10-ton static-drum weight roller;
7. Each lift shall be compacted to the minimum densities listed in Article 3.02 as appropriate for the project and as specified in the geotechnical engineering study;
8. The Contractor shall adjust the water content by aeration or adding water to achieve the required density. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to achieve proper compaction and facilitate the construction schedule;
9. Wet, saturated material shall be air dried as necessary to achieve the field densities specified in this Section. Removal and replacement shall not occur without prior approval or Owner. Removal and replacement shall be used if necessary to facilitate the construction schedule;
10. Remove areas of finished subgrade found to have insufficient compaction density of depth necessary and replace with suitable compacted fill as approved by the Owner or Owners representative. Surface of subgrade after compaction shall be hard, uniform, smooth, stable, and true to grade and cross-section; and,
11. Fill placed on slopes greater than 1 vertical to 3 horizontal shall have each lift benched onto the slope at least 3 feet.

3.05 PROOFROLLING

A. The work covered by this subsection consists of furnishing and operating, proofrolling equipment at the direction of the Owner's representative and/or geotechnical engineer.

B. Proofrolling shall be under the observation of the Owner's representative and/or the geotechnical engineer as described herein and under the following schedule:
1. Immediately following the completion of excavation to proposed subgrades in cut areas, proofrolling shall be performed as specified; and,
2. Immediately prior to and following stone base course placement, in pavement and building pad areas for final floor slab preparation, all subgrade and stone base areas shall be proofrolled. Any areas which deflect, rut or pump under the roller shall be undercut and replaced with compacted fill material or stone base course as directed by the geotechnical engineer and approved by the Owner.

C. Proofrolling shall be done with 1 pass of a fully loaded tandem dump truck equal to or exceeding 50,000 lbs., or other construction equipment if approved by the geotechnical engineer.

D. Construction methods shall be as follows:
1. After the subgrade or stone base course has been completed within 0.50 foot of final grade, the subgrade or stone base course shall then be compacted and tested prior to commencement of proofrolling. The coverage areas and methods will be identified by the

Owner's representative and/or geotechnical engineer. However, the roll shall be operated in a systematic manner so that the number of coverages over all areas to be proofrolled can be readily determined and recorded;

2. The equipment shall be operated at a speed that the geotechnical engineer can comfortably and slowly walk alongside the equipment;
3. If it becomes necessary to take corrective action, such as but not limited to underdrain installation, undercut and backfill of an unsuitable material, and aeration of excessively wet material in areas that have been proofrolled, see Article 3.03. These areas shall be proofrolled again following the completion of the necessary corrections. If the corrections are necessary due to the negligence of the Contractor or weather, the corrective work and additional proofrolling shall be performed by the Contractor at no cost to the Owner; and,
4. The Contractor shall protect all structural facilities on the project, such as but not limited to box culverts, pipe culverts, and utilities, from damage by the proofrolling equipment.

3.06 MAINTENANCE OF SUBGRADE

A. Finished subgrades shall be verified by the Contractor to ensure proper elevation and conditions for construction above subgrade.

B. Protect subgrade from excessive construction traffic and wheel loading including concrete and dump trucks.

C. Remove areas of finished subgrade judged to be unsatisfactory to the depth necessary and replace in a manner that will comply with compaction requirements by use of material equal to or better than the best subgrade material on site. Surface of subgrade after compaction shall be hard, uniform, smooth, stable, and true to grade and cross-section.

3.07 FINISH ELEVATIONS AND LINES

A. For setting and establishing finish elevations and lines, secure the services of a licensed land surveyor acceptable to the Owner and engineer.

B. Provide elevation grade stakes and any other surveying necessary for the layout of the work. The Contractor shall conduct his work in such a manner that survey stakes will be protected as long as their need exists. Grade stakes, which are damaged or stolen, shall be replaced by the Contractor's surveyor at the Contractor's expense.

C. Graded areas shall be uniform, hard and smooth, free from rock, debris, or irregular surface changes. Any deviation shall not result in changes in drainage areas or ponding. All ground surfaces shall vary uniformly between indicated elevations. Finish drainage ditches shall be graded to allow for proper drainage without ponding and in a manner that will minimize the potential for erosion.

D. Correct all settlement and eroded areas for one year after date of project completion at no additional expense to Owner. Bring paved and landscaped areas to proper elevation. Replant or replace any grass, shrubs, bushes, or other vegetation disturbed by construction using corrective measures.

END OF SECTION 312000

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SECTION 312200 - GRADING

PART 1 – GENERAL

1.01 DESCRIPTION

A. Grading shall include all work necessary to bring the designated locations of the project area to the grades shown on the Drawings.

B. Grading shall include all Borrow Excavation, transporting, placement and compaction work required to provide the necessary material volumes to complete the designed grades for the project areas as shown in the Contract Drawings. Borrow Excavation work shall be comprised of two types of excavation:

1. Common Borrow Excavation. This refers to soil material salvaged within the limit of disturbance of the project. This shall include soil that will be excavated and/or stockpiled in order to complete the work depicted in the Contract Drawings.

2. Foreign Borrow Excavation. This refers to soil material required in addition to the material available from regrading operations, and will come from approved sources outside the limits of the project.

C. Finished grades to be landscaped or seeded shall include a minimum topsoil layer of six inches (6”) or as indicated on the Drawings. Finished grades to be otherwise surfaced shall allow sufficient elevation for the completed surface to produce the finished grades and elevations as shown on the Drawings.

1.02 REFERENCES

A. It is the Contractor's responsibility to be thoroughly familiar with the most recent revision or amendment to the following:

1. Philadelphia Water Department, Standard Details and Standard Specifications for Sewers.

2. Philadelphia Water Department, Standard Specifications for Excavation, Refilling, Grading, Landscaping, and Repaving (12-49).

3. Philadelphia Streets Department, Standard Specifications for Paving and Repaving.

4. Philadelphia Streets Department, Standard Construction Items.

5. PennDOT Publication 408, Section 201 – Clearing and Grubbing

6. PennDOT Publication 408, Section 205 – Borrow Excavation

7. PennDOT Publication 408, Section 206 – Embankment

8. PennDOT Publication 408, Section 802 – Topsoil Furnished and Placed

1.03 QUALITY ASSURANCE

A. The grading Contractor or subcontractor is subject to approval by the owner.

B. Any fill or topsoil sources, disposal areas, or temporary offsite storage locations shall be subject to review and approval by the owner.

PART 2 – PRODUCTS

2.01 FILL MATERIALS

A. Fill material (both Common Borrow Excavation and Foreign Borrow Excavation) shall conform to Publication 408 Specifications, Section 205.

B. All Foreign Borrow Excavation materials shall be free of seeds or live plant materials and all noxious or invasive plants and/or weeds. These materials shall be obtained from properly permitted and authorized sites. All Foreign Borrow Excavation materials shall also conform to the following:

1. More than 35% passing No. 200 Sieve.

2. Minimum dry mass density of 95 lb/ft^3 determined by PTM No. 106, Method B.

3. Maximum liquid limit of 65, determined by AASHTO T89.

4. Plasticity index of not less than liquid limit minus 30 (for soils with liquid limits of 41 to 65), determined by AASHTO T90.

C. All fill materials shall be free from clay lumps, brush, litter, roots, stones 2 in. and larger, and other foreign materials.

2.02 TOPSOIL

A. Topsoil shall be acceptable friable loam that is reasonably free of subsoils, clay lumps, litter, roots or other plant materials, stones (2 in. and larger), and other foreign materials.

B. Topsoil may be produced onsite from existing appropriate soils by adding organic plant matter (mulch, shredded plants, etc) to constitute ten percent (10%), as determined according to AASHTO T194, and fully combined with the soil stockpile. Soils with clay content greater than thirty-five percent (35%) or sand content greater than seventy percent (70%) shall not be considered amendable to topsoil by this method.

C. Topsoil shall have a minimum sixty percent (60%) passing through the No. 10 (2 mm) sieve as defined by AASHTO T88.

PART 3 – EXECUTION

3.01 GRADING

A. Install all required Soil Erosion and Sedimentation Control measures as described in these Specifications or indicated on the Drawings. Phasing of Erosion and Sedimentation Control Measures shall follow the sequence provided, or barring provision of a specified sequence shall be installed as appropriate to the Work and as directed by the owner/Authorized Representative.

At a minimum, downstream sediment protection, limit-of-disturbance fencing, and vehicle/tire cleaning shall be instituted prior to commencing any clearing or grading activities.

B. Perform all clearing and grubbing work in accordance with PennDOT Publication 408 Specifications, Section 201.3, Clearing and Grubbing -- Construction. Complete all clearing and grubbing (including stump removal) before starting other grading work.

C. In areas of fill, complete grading to within three feet (3') of finished grade before excavating for and constructing sewers.

D. All grading work, except final grading where sewers are constructed in fill (see above), shall be completed within thirty (30) days of starting clearing and grubbing operations.

E. Place embankment over pipes and embankment around manholes in accordance with the Standard Details and Standard Specifications for Sewers.

3.02 PLACEMENT AND COMPACTION OF FILL AND BACKFILL

A. For general fill and backfilling, place materials in accordance with Section 206.3(b) (Embankment: Placement and Compaction) of PennDOT Publication 408.

B. Where fill materials are to be placed within six inches (6") of the finished graded soil surface on areas that are to be revegetated, materials shall be compacted with a roller having a mass (weight) not over one-hundred-and-twenty pounds per foot width (120 lb/ft-width) of roller or by other acceptable methods as directed by Owner/Authorized Representative. Material shall not be placed in a wet or frozen condition.

3.03 PLACEMENT AND FINISH GRADING OF TOPSOIL

A. Loosen or scarify all areas to be covered by topsoil to a minimum depth of three inches (3"). Remove and dispose of any stones or other objectionable material encountered.

B. Place topsoil on the prepared areas, and (unless otherwise directed in the Drawings or by Owner/Authorized Representative) spread and compact to a uniform depth of six inches (6") to produce the elevations and grades as shown on the Drawings.

C. Compact topsoil with a roller having a mass (weight) not over one-hundred-and-twenty pounds per foot width (120 lb/ft-width) of roller or by other acceptable methods as directed by Owner/Authorized Representative. A sheep foot roller may be used as appropriate.

D. Material shall not be placed or compacted in a wet or frozen condition.

END OF SECTION 312200

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SECTION 312350 - SAWCUTTING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section includes the saw-cutting of existing concrete and bituminous pavement and footway at the locations indicated on the plans.

1.02 RELATED DOCUMENTS

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

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

3.01 GENERAL

A. Saws shall be equipped with guides, blade guards, water-cooling system and cut-depth control. 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.

B. Contractor to mark out sawcut lines in field for approval by the Owner/Authorized Representative prior to proceeding with the paving removal.

END OF SECTION 312350

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SECTION 312500 – SOIL EROSION & SEDIMENT CONTROL

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The work of this Section includes all temporary erosion and sediment control and related and incidental operations, including:

1. Filter Bag Inlet protection;

2. Compost filter sock;

3. Temporary seeding and mulching;

4. Rumble Pad;

5. Pumped Water Filter Bag;

6. Compost Sock Washout Station; and,

7. Maintenance and repair of erosion and sediment control measures.

1.02 SUBMITTALS

A. Submit complete shop drawings and product information for all items to be furnished under this Section upon receipt of notice to proceed and prior to construction.

1.03 QUALITY ASSURANCE

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

B. Codes and Standards: Perform work in compliance with applicable requirements of governing authorities having jurisdiction. Construction operations shall be carried out in a manner such that soil erosion, air pollution, and water pollution is minimized. State, County, and Municipal laws concerning pollution abatement shall be followed.

C. The recommendations and Standards set forth in Chapter 102 of the Pennsylvania Code (Erosion and Sediment Control Handbook), published by the PA Department of Environmental Protection, shall be applicable where the work is not specifically detailed in this Specification, the accompanying Drawings, or the Erosion and Sediment Control Plan.

D. The Contractor shall take action to remedy unforeseen erosion conditions and to prevent damage to adjacent properties as a result of increased runoff and/or sediment displacement. Stockpiles of wood chips, hay bales, crushed stone, and other mulches shall be held in readiness to deal immediately with emergency problems of erosion. All erosion control checks and structures shall be inspected after heavy rainfalls, and if damaged, repaired or replaced.

E. No other construction activities may take place until appropriate Erosion and Sedimentation Control devices have been installed and approved by Owner/Authorized Representative. All changes to the Erosion and Sedimentation Control Plan must be approved by Owner/Authorized Representative prior to implementation.

1.04 UNIT PRICES

A. Payment for all Sediment and Erosion Control work as described in the Drawings or specified herein will be paid for at the appropriate lump sum price bid for the related construction activities by location, which shall include temporary protection of any open trench and inlet structure. No additional payment will be made for maintenance or repair to the protective devices employed.

B. Payment for all permanent inlet protection devices to be employed will be included in the appropriate unit price bid for the inlet structure.

C. No additional payment shall be made for additional erosion and sediment control measures or remediation (beyond the approved erosion and sedimentation control plan) necessitated by Contractor actions or methods. This may include (but is not limited to) street sweeping, increased-capacity products (substituting Super Silt Fence for standard silt fence, for example), or additional erosion control due to excessive site clearing.

1.05 REFERENCES

A. PennDOT, Publication 408/2011 Specifications.

B. Pennsylvania Department of Environmental Protection, Erosion and Sediment Pollution Control Program Manual (March 2012 or most recent version).

PART 2 - PRODUCTS

2.01 FILTER BAG INLET PROTECTION

A. Filter bags shall be manufactured with woven polypropylene geotextile and sewn by a double needle machine, using a high strength nylon thread. Filter bags shall have a design flow rate of 40 gpm/sf.

B. Filter bags shall be manufactured to fit the opening of the catch basin or drop inlet. Filter bags will have the following features:

1. Two dump straps attached at the bottom to facilitate the emptying of the bag;

2. Lifting loops as an internal part of the system to be used to lift the filter bag from the basin;

3. Restraint cord approximately halfway up the sack to keep the sides away from the basin walls, this cord is also a visual means of indicating when the sack should be emptied.

C. Filter bag seams shall have a minimum certified average wide width strength per ASTM D-4884 of 300 psi.

D. Inlet filter bags for installation in new or existing highway grate and open mouth grate inlets shall be Silt Sack as manufactured by ACF Environmental or approved equal.

E. City inlet (and curb opening portion of open-mouth grate inlet) protection shall be a synthetic filter manufactured from recycled synthetic fibers such as Gutterbuddy distributed by ACF Environmental or approved equal.

2.02 COMPOST FILTER SOCK

A. Compost filter socks shall be a three-dimensional tubular sediment control. The compost filter socks shall be Filtrexx Siltsox manufactured by Filtrexx International LLC of Grafton, Ohio, or approved equal.

2.03 TEMPORARY SEEDING AND MULCHING

A. All stockpiles and inactive disturbed areas shall be seeded and mulched in accordance with the design plans if they are to be left exposed for more than twenty (20) days.

2.04 RUMBLE PAD

A. Prefabricated rumble pad shall be used instead of a rock construction entrance and installed according to manufacturer's recommendations. A sufficient number of pads shall be installed to provide a minimum of four (4) tire revolutions while on pad.

   a. More pads may be needed depending on site conditions.

B. Accumulated materials shall be cleaned from the pads daily and as necessary and disposed of in accordance with all applicable regulations.

2.05 PUMPED WATER FILTER BAG

A. Pumped water filter bags shall be provided in accordance with PennDOT Publication 408, Section 855.

2.06 COMPOST SOCK WASHOUT STATION

A. Concrete washout water shall be directed to the compost sock washout station as indicated on the plans. The compost sock washout station shall be comprised of a compost filter sock in accordance with this specification.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. All temporary erosion and sediment control measures specified herein shall be in place before the beginning of any earthwork or excavation.

B. All erosion and sediment control devices shall be installed according to the manufacturer's specifications.

C. When temporary erosion and sediment control measures as described herein do not provide adequate control, replacement or relocation of measures may be required as directed by the owner/Authorized Representative.

D. Erosion and sediment control measures shall be inspected weekly and after every precipitation event.

E. Contractor shall maintain complete written logs of inspections and shall make them available to PWD Inspector/Owner/Engineer upon request.

F. All maintenance work, including but not limited to cleaning, repair, replacement, regrading, and restabilization of temporary erosion and sediment control measures shall be performed immediately.

G. Contractor shall ensure that erosion and sedimentation control measures remain in place and fully functional until site achieves final stabilization.

3.02 PUMPED WATER FILTER BAG

A. Sediment-laden water shall be pumped through a pumped water filter bag as specified herein.

B. Filter bags shall be removed and replaced when they have reached their capacity to filter sediment effectively, or upon any breach of the filter bag.

C. The Contractor shall not discharge to any sewer without the prior approval of PWD.

3.03 TEMPORARY INLET PROTECTION

A. The downstream inlets from the site of any disturbance or construction on the project site shall be protected with approved inlet protection practices. Downstream inlets are considered to be the next immediate inlet downslope that will receive runoff from the site of any disturbance, as well as any and all inlets within the site itself.

B. All new inlets shall be protected with approved inlet protection practices upon installation. Inlets draining exclusively to a stormwater feature (‘green’ inlets) shall remain fully closed to runoff until final site cleanup.

C. Final site cleanup shall include removal of all temporary inlet protection, cleaning of all permanent inlet protection, and cleaning of all inlets (existing downstream inlets and newly installed) of accumulated construction debris and sediment.

D. Highway grate and open mouth grate inlets shall be protected using inlet filter bags as specified herein.

E. Open mouth grate inlets and open mouth inlets (city inlets) shall be protected with a compost sock or synthetic filter as specified herein.

F. Inlet protection shall be installed, inspected, cleaned and replaced according to manufacturer’s specifications.

1. Inlet filter bags and open mouth inlet protection shall be removed and replaced when filled with silt or when extended periods of ponding occur following a precipitation event. New inlet filter bags or approved inlet protection devices shall be installed and secured immediately after removal of silted protection devices.

3.04 PROTECTION OF BIOINFILTRATION BASINS

A. Install compost sock as necessary around bioinfiltration basins to prevent sediment from accumulating in the trench subgrade or stone. Compost sock shall be installed, inspected, cleaned, and replaced according to manufacturer’s instructions. Any trench not protected with sedimentation barriers during either a rain event or after the end of a working day shall be assumed to be compromised, and subject to scarification and/or replacement of compromised soils with clean aggregate at the discretion of Owner/Authorized Representative. Compost socks shall not be required during active on-site construction, except as required during rain events.

B. At the end of each working day, no stormwater storage stone shall be left unwrapped in geotextile and exposed to sedimentation. Any stormwater storage stone unprotected from

sedimentation during a period of construction inactivity shall be assumed to be compromised, and shall be fully replaced at no cost to the City.

C. All construction activities shall cease on any bioinfiltration basin found to have standing water or a subgrade in unsuitable condition (sediment deposits or excessively damp soils) as determined by Owner/Authorized Representative. Appropriate measures shall then be dictated by Owner/Authorized Representative, possibly including but not limited to abandonment of the trench installation, establishment of a dewatering system for the duration of construction.

3.05 STORAGE STOCKPLIES

A. Stockpiles of all loose materials (aggregate, fill, soils, etc.) shall be protected from dust and rain by use of a cover. The cover shall be free of defects, and secured adequately to maintain protection of the materials. Owner/Authorized Representative reserves the right to refuse use of any material that has been compromised by inadequate protection onsite.

B. Stockpiles shall not be placed upslope from any infiltration structure. Any drainage structure (such as but not exclusively inlets) downslope of a stockpile shall be adequately protected from runoff.

C. Stockpile heights are not to exceed 35 feet high. Stockpile slopes shall be 2:1 or flatter.

3.06 REMOVAL AND FINAL CLEANUP

A. Once the site has been fully stabilized and approval is given by Owner/Authorized Representative, temporary erosion and sedimentation control measures and all accumulated silt and sediment shall be removed. All permanent inlet protection measures shall be cleaned, inspected, and verified to be in working order.

B. Any remaining dirt or debris within the public right of way shall be removed by the Contractor, using necessary means as sufficient to remove the dirt and debris from the public right of way. This may include, but is not limited to, street sweeping, sidewalk vacuuming, inlet cleaning, power washing, or hand removal.

C. Silt and waste materials shall be disposed of in a proper manner. No extra construction materials are to remain onsite upon completion of the Work. The Work of this Contract shall not be considered complete until all extraneous construction-related items have been removed (temporary traffic control devices, signage, etc).

END OF SECTION 312500

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SECTION 315000 - EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work under this Section shall include all labor, on-site materials, and equipment necessary for the excavation of trench and grading as hereinafter specified and/or as otherwise required for the proper and timely completion of this Contract.

1.02 RELATED DOCUMENTS

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

1.03 RULES AND REGULATIONS

A. American Society for Testing and Materials (ASTM):

ASTM C131 Test method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angles Machine.
ASTM C136 Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 535 Test Method for Resistance to Degradation of Large- Size Aggregate by Abrasion and Impact in the Los Angeles Machine.
ASTM D422 Standard Method for Particle-Size Analysis of Soils
ASTM D427 Standard Test Method for Shrinkage Factors of Soils
ASTM-D1140 Standard Test Method of Material in Soils Finer than 200 (75-um) Sieve
ASTM D1557 Standard Test Methods for Moisture-Density Relations of Soil-Aggregate Mixtures Using 10-lbs (4.54-kg.) Rammer and 18-in. (457-mm) Drop
ASTM D2216 Method fir Laboratory Determination of Water (moisture) Content of Soil, Rock, and Soil- Aggregate Mixtures.
ASTM D2487 Standard Test for Classification of Soils for Engineering Purposes
ASTM D2922 Standard Test Methods for Density of Soil Aggregate n Place by Nuclear Methods (Shallow Depth)
ASTMD4253 Standard Test Methods for Maximum Index Density of Soils Using a Vibratory Table
ASTM D4254 Standard Test Methods for Minimum Index Density of Soils and Calculations of Relative Density
ASRMD4318 Standard test Method for Liquid Limit, Plastic Index of Soils

1.03 SUBMITTALS

A. Samples

1. Furnish and deliver samples of fill and backfill materials as selected by the Engineer.

1.04 PERFORMANCE REQUIREMENTS

A. If any hazardous waste materials are discovered on the site, the Contractor shall cease operations in that area until authorized to resume. The Contractor shall notify the Engineer of such material and cooperate with any outside agency or specialist that may be called in to determine the extent of the hazard and methods of its disposition.

B. TOLERANCES

1. Construct finished sub-grades to plus 0 inches minus ½ inch of the elevation indicated.

2. Construct finished grade of slopes not steeper than 3:1 to plus or minus 1/2 inch and on slopes steeper than 3:1 to plus or minus 2 inches. Slopes shall not encroach upon roadbeds

3. Maintain the moisture content of fill material as it is being placed within plus or minus 3 percent of the optimum, moisture content of the material as determined by the laboratory test herein specified.

4. Protect all existing and new construction including utilities, finishes and equipment from water, damage, weakening or other disturbance.

1.05 DEFINITIONS

A. Earthwork Terminology used in this Section and not defined herein shall be interpreted in accordance with the definitions given in ASTM D653.

1. Sub-grade: Sub-grade is the lowest elevation of excavation and the highest elevation if embankment required to accommodate the indicated construction.

2. Backfill: Soil or soil-rock material used to backfill excavations and to backfill excavated spaces around building walls.

3. Imported Material: Soil or granular material which is hauled in from off-site areas.

4. Unsuitable Material: Excavated material or material below the natural ground surface in embankment areas or below sub-grade elevation in excavated areas, which is unsuitable for its planned use.

5. Relative Compaction: The ratio, expressed as a percentage, of the in-place dry density of fill material as compacted in the field to the maximum dry density of the same material as determined by laboratory test ASTM D1557, Method D.

6. Optimum Moisture Content: The water content at which a soil can be compacted to a maximum dry unit weight by a given compactive effort.

7. Relative Density: Refer to ASTM D4253 and ASTM D4254.

8. Excavation: Excavation is the removing of all materials encountered with the Contract Limits, regardless of the nature of the material encountered and the method by which it is removed, for grading, sub-grading for roadways or paved areas and other structures not specified elsewhere in these specifications. All excavation is unclassified and no additional compensation will be made for rock.

1.06 PROJECT CONDITIONS

A. Protection

1. Provide the necessary barricades, signs, lights, etc. to prevent accidents, to avoid all hazards and to protect the public, the work and property at all times, including Saturday, Sunday and holidays.

2. Be responsible for any and all damages which may arise or occur to any party whatsoever by reason of neglect in providing proper lights, guards, barriers or any other safeguards to prevent damage to property, life and limb.

3. Prior to any excavation the Contractor, with the cooperation of the Owner of the respective existing utility or its agents shall locate and paint the location of all water services, gas services, gas mains, water mains, sanitary sewers, telephone raceways or conduits and drains, within five (5) feet of the proposed excavations.

4. In case water, gas pipes, conduits, or other utilities are broken in the prosecution of the work, the Contractor shall stop work and give immediate notice to the proper authorities and shall be responsible for any damage to persons or property caused by such breaks. Failure to give prompt notice to the authorities shall deem the Contractor responsible for any damages legal or otherwise caused by the interruption or loss of utility service.

B. Parking and Storage

1. Parking of vehicles and storage of materials shall be confined to designated areas approved by the Owner.

C. Dust Control

1. During the progress or work, the Contractor shall conduct his operation and maintain the area of his activities so as to minimize the creation and dispersion of dust.

1.07 ENVIRONMENTAL REQUIRMENTS

A. Unfavorable Weather Conditions

1. Excavating, filling, backfilling, and grading work shall not be performed during weather conditions which might damage the condition of existing ground, in-progress work, or completed work. When the work is interrupted by rain, excavating, filling, backfilling and grading work shall not resume until the site is suitable for the work.

2. Sub-grade shall be free from mud, snow, ice, and deleterious material when work is resumed.

PART 2 - PRODUCTS

2.01 FILL AND BACKFILL

A. Material suitable for use as fill and backfill shall be an inert, non-expansive soil, free from organic matter and of such quality that it will compact thoroughly without the presence of voids. Excavated on-site material will be considered suitable for fill and backfill.

B. Suitable excavated material shall be conditioned for reuse and properly stockpiled for later filling and backfilling operations. Conditioning shall consist of spreading material in layers not to exceed 8 inches and raking free of debris and rubble. Rocks exceeding four inches in largest dimension and deleterious material shall be moved from the site and disposed off.

PART 3 - EXECUTION

3.01 EXISTING UTILITIES

A. Verify on site the location and depth (elevation) of all existing utilities and services before performing any excavation work. Excavation within 3 feet of a utility line shall be performed by hand.

3.02 EXCAVATION

A. GENERAL

1. Excavation consists of the removal and on-site placement or disposal of whatever material is encountered when establishing required sub-grade elevations.

2. Excavation shall be made to the grades as shown on the Contract Drawings.

3. Where excavation grades are not shown on the Contract drawings, excavation shall be made as required to accommodate the installation of all facilities.

B. Cold Weather Protection

1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 °F.

C. Stability of Excavations

1. Sloped sides of excavation shall comply with state and local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.

2. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

D. Shoring and Bracing

1. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.

2. Establish requirements for trench shoring and bracing to comply with local Codes and authorities having jurisdiction.

3. Maintain shoring and bracing excavations regardless of the time period excavations will open carry down shoring and bracing as excavation progresses.

E. Material Storage

1. Stockpile suitable excavated materials where directed, as required for fill.

2. Locate and retain soil materials away from edge of excavation.

3.03 BACKFILL

A. Backfill excavation as promptly as work permits, but not until waterproofing membrane is applied and is ready to be backfilled.

B. Placement and Compaction

1. Place backfill materials in layers not more than 4” in loose depth for materials by hand-operated tampers.

2. Place backfill and fill materials evenly adjacent to structures, to required elevations. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around structure to approximately same elevation in each life.

3.04 GRADING

A. Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish below the required sub-grade elevations.

3.05 CLEAN-UP

A. Upon completion of the work of this section, place in stockpile areas all excess excavated material, rubbish, trash and debris resulting from operations. Leave the site in a neat and orderly condition.

END OF SECTION 315000

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SECTION 321116 – SUBBASE COURSE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This item consists of the preparation of the subgrade and the construction of a layer of aggregate of the depth indicated, to the lines and grades shown on the drawings, or as directed by the engineer.

PART 2 - EXECUTION

2.01 GENERAL

A. Subbase material shall not be placed on soft, muddy or frozen areas, nor until all irregularities in the prepared areas, including soft areas in the foundation, have been satisfactorily corrected. The subgrade shall be compacted to not less than one hundred percent (100%) of the determined dry weight density.

B. Unstable subbase conditions, including soft foundation areas which develop ahead of the base and paving operations shall be satisfactorily corrected by scarifying, reshaping, and recompacting, or by replacement as required.

2.02 PLACEMENT

A. The subbase material shall be maintained in a moist condition during hauling, placing, and compacting, and shall be deposited on the prepared area by means of an approved mechanical spreaders in a matter that will not cause segregation. Graders, bulldozers and similar equipment shall not be considered as approved mechanical spreaders. Subbase shall be constructed in layers of uniform depth not to exceed eight inches (8”) in compacted depth. However, when granulated slag is used as a subbase material, the maximum compacted depth of each layer shall be four inches (4”). A maximum compacted layer of six inches (6”) may be placed when approved equipment and compaction pattern establishes that the density required is obtained for the full depth of each layer.

B. When constructed in part width, the extension of the subbase construction shall not proceed to its full width until the existing edge of the subbase is trimmed and all foreign and deleterious material is removed from the remaining prepared area.

2.03 COMPACTION

A. The uniformly spread material shall be compacted by means of approved equipment to not less than one hundred percent (100%) of the maximum dry weight density (PENNSYLVANIA TEST METHODS (PTM) No. 106, Method B) as determined by PTM No. 112, or PTM No. 402. When the material is too coarse to satisfactorily use these methods, compaction will be determined by the Engineer based on non-movement of the material under the specified compaction equipment. Compaction shall progress gradually from the sides to the center with each succeeding pass uniformly overlapping the previous pass, and shall continue until the entire area is satisfactorily shaped and compacted to the required lines and grades. One (1) density determination shall be made for each three thousand (3,000) square yards or less, on each layer of completed subbase.

2.04 DEPTH TEST

A. The depth of the finished subbase will be determined by cutting or digging holes to the full depth of the completed subbase. One depth measurement shall be made for each three thousand (3,000) square yards, or less, of the completed subbase. Any section in which the subbase is one half inch (1/2") or more deficient in specified depth shall be scarified to a depth of at least three inches (3"), blended with the necessary additional material, and then recompacted to the specified density and depth or otherwise satisfactorily corrected.

B. All test holes shall be cut or dug, backfilled with similar material, and satisfactorily compacted by and at the expense of the Contractor. This operation shall be under the direct supervision of the inspector who will check the depth for record purposes.

2.05 MAINTENANCE OF TRAFFIC

A. No traffic shall be allowed on the completed subbase other than necessary local traffic and that developing from the operation of essential construction equipment, unless otherwise directed by the Engineer. Any defects which may develop in the construction of the subbase or any damage caused by the operation of local or job traffic is the responsibility of the Contractor and shall be immediately repaired or replaced at the expense of the Contractor.

B. The competed subbase shall be uniformly moistened immediately prior to the construction of the base course and/or pavement, except when a hot-mix bituminous base course is to be placed.

C. Completed subbase which has been subjected to hauling or exposed to the elements for periods in excess of one-hundred-twenty (120) calendar days will require re-testing of the material and re-approval by the Engineer before construction of the base course or pavement may proceed. Subbase so used or exposed, not meeting the requirements herein specified shall be reconstructed or replaced as directed by the Engineer at the expense of the Contractor.

PART 3 - QUALITY CONTROL REQUIREMENTS

3.01 GENERAL

A. Conform to all applicable provisions of City of Philadelphia Standard Contract Requirements for Public Works Contracts.

END OF SECTION 321116

SECTION 321213 – ASPHALT TACK COAT

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section includes the conditioning and treating of an asphalt surface with an application of bituminous bonding material.

1.02 RELATED DOCUMENTS

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

B. PROJECT CONDITIONS

1. Environmental Limitations: Do not apply asphalt materials if substrate is wet or excessively damp or if the following conditions are not met:

i. Tack Coat: Minimum surface temperature of 60 deg. F.

PART 2 - PRODUCTS

2.01 BITUMINOUS MATERIALS

A. Emulsified asphalt, Class AE-T, PennDOT Publication 408, Section 702. Submit a certificate to the Representative indicating the asphalt residue content of the material being used.

2.02 FINE AGGREGATE (FOR BLOTTING)

A. In accordance with PennDOT Publication 408, Section 703.1.

PART 3 - EXECUTION

3.01 CONDITIONING OF EXISTING SURFACE

A. Remove and dispose of loose and foreign material from the surface of the existing pavement or previously placed pavement courses. If necessary, use a broom.

B. Before placing a wearing course, correct irregularities in the binder course. Do not allow traffic upon the binder course to prevent contamination, if practical. Remove and replace binder course that cannot be cleaned to the Owner’s Representative’s satisfaction.

C. Apply a tack coat to previously placed courses if the Owner’s Representative determines a tack coat is necessary to ensure bonding between two layers.

3.02 APPLICATION OF BITUMINOUS MATERIAL

A. Use a distributor designed, equipped, calibrated, maintained, and operated to uniformly apply material on surfaces with varying widths and up to 15 feet wide. Provide a distributor capable of maintaining a uniform distributing pressure and controlling the application rate within a tolerance of 0.02 gallon per square yard. Provide a distributor equipped with a tachometer, pressure gauges, accurate volume-measuring devices or a calibrated tank, a thermometer for measuring temperatures of tank contents, a power-operated pump, and full circulation spray bars with lateral

and vertical adjustments. The contractor may use hand-spraying equipment in areas inaccessible to the distributor.

B. Determine the distributor's application rate in the field according to Pennsylvania Test Method No. 747.

C. Apply emulsified asphalt tack coat, at a rate approved by the Representative, to leave a uniform asphalt residue from 0.02 gallon per square yard to 0.07 gallon per square yard on the treated surface, as directed. Obtain approval of the application rate. Apply the tack coat only when the air temperature is 40F and rising and when the existing surface is dry. Uniformly distribute the tack coat over the surface and as directed.

D. Uniformly distribute the tack coat at the junction of adjacent applications.

E. Correct all uncoated or lightly coated areas to the Representative's satisfaction. At designated locations, correct areas with an excess of bituminous material by covering the area with sufficient dry fine aggregate to blot up or remove excess tack coat.

F. Allow the tack coat to cure, without being disturbed, until the Inspector-in-Charge determines the water has completely separated and evaporated.

3.03 PROTECTION OF TREATED SURFACE.

A. Maintain and protect the treated surface against damage. Repair damaged areas to the Representative's satisfaction before placing succeeding construction.

END OF SECTION 321213

SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section includes all labor, equipment, and materials for the installation and testing of Hot Mix Asphalt Superpave Wearing Course and Hot Mix Asphalt Superpave Binder Course of specified depths.

1.02 RELATED DOCUMENTS

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

1.03 REFERENCES

A. The most current version of the publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

B. Commonwealth of Pennsylvania, Department of Transportation (PennDOT)

1. Bulletin No. 15: Approved Construction Materials

C. Asphalt Institute (AI): “The Asphalt Handbook”

D. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

1. ASTM D 692: Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures

2. ASTM D 979: Standard Practice for Sampling Bituminous Paving Mixtures

3. ASTM D 1073: Standard Specification for Fine Aggregate for Bituminous Paving Mixtures

4. ASTM D 1188: Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens

5. ASTM D 2041: Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures

6. ASTM D 2726: Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures

7. ASTM D 2950: Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods

8. ASTM D 3549: Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens

9. ASTM D 3666: Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

E. The Contractor is required to have one copy of the latest edition of each of the following publications available for review in the job-site construction office at all times while performing the work described in this Section. The Contractor is to comply with each of the following unless more stringent requirements are indicated on the Drawings or within these specifications.

1. City of Philadelphia, Department of Streets: Standard Construction Items, except that measurement and payment sections do not apply

2. Publication 408: Specifications (PennDOT Publication 408), except that measurement and payment sections do not apply.

1.04 SUBMITTALS

A. Product Data: For each product specified. Include technical data and tested physical and performance properties.

B. Job-Mix Design: Certification, by PennDOT and other authorities having jurisdiction, of approval of each job mix proposed for the Work.

C. Qualification Data: For firms and persons specified in the “Quality Assurance” Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.

D. Material Test Reports: Test Reports shall be from the approved testing agency. Indicate and interpret test results for compliance of materials with requirements indicated.

E. Material Certificates: Certificates signed by manufacturers certifying that each material complies with the requirements.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed hot-mix asphalt paving similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Manufacturer Qualifications: Engage a firm experienced in manufacturing hot-mix asphalt similar to that indicated for this project and with a record of successful in-service performance.

1. Firm shall be a registered and approved paving mix manufacturer listed in PennDOT Bulletin No. 15.

C. Testing Agency Qualifications: Demonstrate to the Owner's satisfaction, based on Owner’s evaluation of criteria conforming to ASTM D 3666, that the independent testing agency has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

D. Obtain materials from the same source throughout.

E. Pre-construction conference: Conduct conference at the project site to comply with the requirements of Division 1 sections and to review the methods and procedures related to asphalt paving including but not limited to the following:

1. Review proposed sources of paving materials, including capabilities and location of plant that will manufacturer hot-mix asphalt.

2. Review condition of substrate and preparatory work performed by other trades.

3. Review requirements for protecting paving work, including restriction of traffic during installation period for remainder of construction period.

4. Review and finalize construction schedule for paving and related work. Verify availability of materials, paving installer's personnel, and equipment required to execute the work without delays.

5. Review inspection and testing requirements, governing regulations, and proposed installation procedures.

6. Review forecasted weather conditions and procedures for coping with unfavorable conditions.

1.06 REGULATORY REQUIREMENTS

A. Contractor shall obtain all necessary City of Philadelphia Streets Department road opening permits and approvals, and City of Philadelphia Department of Licenses and Inspections permits and approvals, upon the Contractor receiving Notice to Proceed and prior to proceeding with the Work.

1.07 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if substrate is wet or excessively damp or if the following conditions are not met:

1. Asphalt Binder Course: Minimum surface temperature of 40 deg. F and rising at time of placement in accordance with PennDOT Publication 408 Section 401.3 (a).

2. Asphalt Wearing Course: Minimum surface temperature of 40 deg. F at time of placement in accordance with PennDOT Publication 408 Section 401.3 (a).

PART 2 - PRODUCTS

2.01 AGGREGATES

A. Aggregates shall be in accordance with the latest revision of PennDOT Publication 408, Section 703. Provide aggregate from sources listed in PennDOT Bulletin 14.

B. Coarse Aggregate: Sound, angular crushed stone; crushed gravel; complying with ASTM D 692.

C. Fine Aggregate: Sharp-edged natural sand or sand prepared from stone; gravel, complying with ASTM D 1073.

1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total fine aggregate mass.

2.02 ASPHALT MATERIALS

A. Asphalt Cement: PG-64-22 emulsion in accordance with PennDOT Publication 408, Section 420.2 (a)1.

1. Water: Potable

2. Mix designs shall contain a maximum of 15% reclaimed asphalt pavement.

B. AUXILIARY MATERIALS

1. Herbicide: Commercial chemical for weed control, registered by Environmental Protection Agency (EPA) and PADEP. Provide granular, liquid, or wettable powder form.

2. Sand: In accordance with PennDOT Publication 408, Type B.

3. Pavement Marking or Striping Paint: Refer to Section 32 17 23 for Pavement Markings.

C. MIXES

1. Hot-Mix Asphalt: Provide dense, hot-laid, hot mix asphalt plant mixes approved by PennDOT designed according to procedures in AI's "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types", and complying with the following requirements:

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

ii. Superpave Binder Course: Superpave Asphalt Mixture Design, HMA Binder Course, PG 64-22, 3 to < 10 Million ESALs, 19 mm Mix, 3.5" Depth, in accordance with PennDOT Publication 408, Section 409.

iii. Superpave Wearing Course: Superpave Asphalt Mixture Design, HMA Wearing Course, PG 64-22, 3 to < 10 Million ESALs, 9.5 mm Mix, 1.5" Depth, SRL-L in accordance with PennDOT Publication 408, Section 409.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.

B. Refer to Section 31 20 00 Earth Moving for subgrade preparation requirements.

C. Asphalt paving courses shall be installed in accordance with PennDOT Publication 408, Section 401.

D. Protect adjacent work and structures from splashing of paving materials.

3.02 CONDITIONING OF EXISTING SURFACE

A. The vertical surface of curbs, structures, gutters, and existing paving in contact with bituminous mixtures, shall be painted with a uniform coating of bituminous material of the class and type designated for the surface course.

3.03 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

1. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.

B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

C. Adjust elevation of existing utility structure tops to remain, including but not limited to manholes, inlet grates, valve boxes, etc. to final grades. Depending on the type of utility structure, adjustment shall be accomplished by the installation of factory-fabricated adjustment rings, installation of

additional masonry courses under existing manhole castings or inlet tops, or resetting structures. Coordinate with utility owners prior to disturbing existing underground utilities to remain.

D. At existing curbs to remain, mill existing pavement as required to maintain existing curb reveal unless otherwise noted on the Drawings.

3.04 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt mix on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and compacted thickness as indicated on the Drawings.

1. Place hot-mix asphalt binder course in a single lift and thickness indicated on the Drawings or within these specifications.

2. Place hot-mix asphalt wearing surface course in single lift.

3. Spread mix at minimum temperature of 250 deg. F.

4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated on the Drawings or within these specifications.

B. Place paving in consecutive strips not less than 10 feet wide, except where infill edge strips of a lesser width are required. After the first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete asphalt binder course for a section before placing asphalt wearing surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.05 JOINTS

A. Construct joints to ensure continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat.

2. Offset longitudinal joints in successive courses a minimum of 6 inches, however, the joint at the top layer shall be at the centerline of the roadway for 2-lane roads, and at the lane lines for roads with more than two lanes.

3. Offset transverse joints in successive courses a minimum of 24 inches.

4. Construct transverse joints by bulkhead method or sawed vertical face method as described in AI's "The Asphalt Handbook".

5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.

6. Compact asphalt at joints to a density within 2 percent of specified course density.

B. Apply bituminous material of the class and type designated for the surface course where new pavement meets existing bituminous pavement, and where bituminous pavement meets curbs and utility structures. Apply sealant in layer thickness that provides for curing and will not cause tracking

or lifting of sealant to other surfaces. Apply a fine sand covering temporarily over sealant during curing period.

3.06 PAVEMENT COMPACTION

A. When the subgrade is exposed proof roll according to the requirements shown. Densify to a stable subgrade. If the Owner determines that the subgrade cannot be densified to a stable condition, then the Owner may direct the Contractor to remove additional subgrade material to the depth required for a stable condition. The Contractor shall then replace unstable subgrade material with 3A stone compacted in 6-inch loose lifts.

B. Begin new pavement compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers, or vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 F.

C. Breakdown Rolling: Accomplish breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Repair surfaces by loosening displaced material, filling with hot-mix asphalt, and rerolling to required elevations.

D. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling, while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Density: not less than 95 percent of the density requirements established by the Marshall method at the time of approval of the mix design.

E. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

F. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while still hot, with back of rake or smooth iron. Compact thoroughly using tamper or other satisfactory method.

G. Repairs: Remove newly paved areas that are defective or contaminated with foreign materials. Remove paving course over areas affected and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

H. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

I. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.07 INSTALLATION TOLERANCES

A. Thickness: Compact each course to produce the thickness indicated on the Drawings within the following tolerances:

1. Binder Course: Plus or minus ¼ inch

2. Wearing Surface Course: Plus ¼ inch, no minus.

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

1. Base Course: ¼ inch.

2. Binder Course: ¼ inch

3. Wearing Surface Course: 1/8 inch.

4. Crowned Surfaces: Test with crowned template centered at right angle to crown. Maximum allowable variance from template is 0.25 inch.

3.08 FIELD QUALITY CONTROL

A. Testing Agency: As part of this contract, the Contractor shall engage a qualified independent testing agency meeting the requirements of paragraph 1.6 to perform field inspections and test and to prepare test reports.

1. Testing agency shall conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.

B. Additional testing, at Contractor's sole expense, will be performed to determine compliance of corrected Work with specified requirements.

C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D3549.

D. Surface Smoothness: Finished surface of hot-mix asphalt will be tested for compliance with smoothness tolerances.

E. In-Place Density: Samples of uncompacted paving mixtures and compacted pavement will be secured by the testing agency according to ASTM D 979.

1. Reference laboratory density shall be determined by averaging results from 4 samples of hot-mix asphalt-paving mixture delivered daily to site and compacted according to job-mix specifications.

2. Reference maximum theoretical density shall be determined by averaging results from 4 samples of hot-mix asphalt paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.

3. In-place density of compacted pavement shall be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.

4. One core sample shall be taken for every 1000 sq. yd. or less of installed pavement, but no case will fewer than 3 cores be taken.

i. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.

ii. The Contractor shall fill all holes from which cores were taken. Restore and seal the surface to conditions similar to the adjacent areas.

F. Remove and replace or install additional hot-mix asphalt, at the Contractor's sole expense, where test results or measurements indicate that it does not comply with specified requirements.

3.09 CLEANUP

G. Remove bituminous material from utility structure frames and covers. Open and reset utility manhole covers and inlet grates to ensure castings are not sealed shut.

H. Clean up debris and unused material, and remove from the site. Dispose of all material in accordance with local, state, and federal regulations. Do not dump material in manholes or inlets.

END OF SECTION 321216

SECTION 321236 - ASPHALT SEAL COAT

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Work under this section shall include repairing pavement cracks, cleaning and preparing the pavement surface, mixing the pavement sealer, and applying the asphalt pavement sealer over bituminous pavement surfaces.

1.02 REFERENCE STANDARDS

A. American Society of Testing and Materials
   1. ASTM D-140 Standard Practice for Sampling of Bituminous Materials
   2. ASTM D-449 Asphalt Used in Damp-proofing and Waterproofing, Type II and III
   3. ASTM D-2939 Standard Test Methods Emulsion Bitumen's Use as Protective Coatings
   4. ASTM D-3405 Joint Sealant Hot-Applied for Concrete and Asphalt Pavement
   5. ASTM D-3320 Emulsified Coal Tar Pitch (Mineral Colloid Type)
   6. ASTM D-3910 Design, Testing and Construction of Slurry Seal

1.03 SUBMITTALS

A. Material Certificates: Submit materials certificate to the Owner's engineer which is signed by material producer and Contractor, certifying that materials comply with, or exceed, the requirements herein.
B. Seal Coat design shall be as per the requirement of the regulatory authority having jurisdiction or as approved by the engineer and Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

A. A refined rubberized coal tar emulsion meeting the following specifications:
   1. ASTM D-3320 US Airforce Requirements
   2. R.P.355a (GSA-FSS) Federal Government Spec.
      a. Water, % - 40% Maximum
      b. Non-Volatile, % - 51% Minimum
      c. Ash of Non-Volatile, % - 35% Minimum
      d. Specific Gravity 25oc – 1.23 Minimum

      Only materials meeting the above specifications will be accepted, Certificate of Compliance from the refined coal tar manufacturer is required prior to application.

B. Oil Spot Treatment: SealMaster PetroSeal or prep seal oil spot primer as specified by the manufacturer for pavement sealer.
C. Pavement Sealer:
   1. SealMaster® Asphalt Pavement Sealer as manufactured by SealMaster®;
   2. Armor Seal A-100 as manufactured by Armor Manufacturing;
   3. Star-Seal Asphalt Pavement Sealer as manufactured by Star-Seal of Florida Inc.;
   4. Seal Guard by JAO Corporation; and,
   5. Slurry Seal.
D. Water

E. Aggregate or sand as required and specified by the manufacturer
F. Polymer Additive (optional)

2.02 EQUIPMENT

A. Self-propelled squeegee equipment shall have a least 2 squeegee or brush devices (one behind the other) to assure adequate distribution and penetration of sealer into the bituminous pavement. Equipment shall have continuous agitation or mixing capabilities to maintain homogenous consistency of pavement sealer mixture throughout the application process.
B. Pressurized spray application equipment shall be capable of spraying pavement sealer with sand added. Equipment shall have continuous agitation or mixing capabilities to maintain homogenous consistency of pavement sealer mixture throughout the application process.
C. Hand squeegee and brushes shall be acceptable only in areas where practicality prohibits the use of mechanized equipment.

2.03 FORTIFIER

A. Water based epoxy-latex additive, designed as a fortifier for refined coal tar emulsions to increase resistance to power steering marks, fuel and chemical effects to assist in fast drying of the coating is acceptable.
B. Thickeners only are not permitted.

2.04 MIX DESIGNS

A. Sealer concentrate – 100 Gallon
B. Silica Sand 400 to 500 lb. Meeting 50 to 75 fineness rating.
C. Water 40% maximum.
D. Fortifier 3%
E. Curing agents

PART 3 - EXECUTION

3.01 WEATHER LIMITATIONS

A. Apply pavement sealer when ambient temperature is 60° F and rising for a period of 24 hours after application. Do not apply when temperature is expected to drop below 50° F in a 24-hour period. Do not apply if rain is imminent within 8 hours.
B. Between September 15 and May 1, check the specifications and requirements of the New Jersey Department of Transportation on the permitted dates of applying the seal coats.

3.02 PREPARATION

A. New asphalt must be allowed to cure at least 30 to 60 days under good weather condition before apply the sealer, and should be sealed within 6 to 12 months from the date of installation.
B. Surface must be free from dirt, dust and includes grass along the edges. Remove and dispose of any loose and unsuitable materials, dirt, and debris from pavement surface by power blower or mechanical sweeping equipment.
C. Surface hairline cracks up to ½ inch must be filled with crack filler; cracks larger than ½ inch must be cleaned and filled with elastomeric emulsion crack filler.
D. When using a high performance crack sealant, please note on your proposal.
E. Potholes, alligator areas, and similar surface defects must be cut out and repairs made. Notify Owner's Project Coordinator before work is done.

F. Treat all grease, oil and gasoline spots with compatible primer of the manufactured coating. In hot weather, the surface should be fogged with water prior to sealing.
G. Prior to spreading pavement sealer, paint all existing white paint stripes with black paint.
H. Contractor to dispose of all cans, bags and leftover materials off-site.

3.03 APPLICATION

A. Mix pavement sealer in accordance with the manufacturer's procedure to a uniform consistency before using. For each coat, the sealant shall be diluted with clean potable water while agitating. The percent of water to be added will be as per the manufacturer specification based on the asphalt surface quality, and the type of traffic it will experience. When the rubberized mixture has thickened, add sand or aggregate slowly to the mixing tank. Mix thoroughly before and slowly during the application.
B. Allow a minimum of 24 hours of curing time before allowing traffic over treated surface or application of traffic marking paint. Use of solvent borne paint shall not be permitted.
C. Lines, stencils, and markings shall be repainted in original size & location unless authorized by the Owner's project coordinator.
D. It is the Contractor's responsibility to check local zoning codes & regulations.

END OF SECTION 321236

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SECTION 321613 – CAST-IN-PLACE SITE CONCRETE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SCOPE OF WORK

A. This Section includes the following applications:

1. Concrete Footway;
2. Concrete Curb;
3. Concrete Basketball Backstop Foundations, and;
4. Chain Link Fence Foundation.

1.03 REFERENCES

A. The most current version of the publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

B. Commonwealth of Pennsylvania, Department of Transportation, Specifications, Publication 408, (PennDOT 408), except that measurement and payment sections do not apply.

C. AMERICAN CONCRETE INSTITUTE (ACI)

1. ACI 301: Specification for Structural Concrete
2. ACI 347: Guide to Formwork for Concrete
3. ACI 304R: Guide for Measuring, Mixing, Transporting and Placing Concrete
4. ACI 309R: Guide for Consolidation of Concrete
5. ACI 306.1: Standard Specification for Cold Weather Concreting
6. ACI 311.4R: Guide for Concrete Inspection
7. ACI 311.5R: Batch Plant Inspection and Field Testing of Ready-Mixed Concrete
8. ACI 350R: Code Requirements for Environmental Engineering Concrete Structures
9. ACI SP 66: ACI Detailing Manual

D. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

1. ASTM A 185: Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
2. ASTM A 615: Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
3. ASTM C 31: Standard Practice for Making and Curing Concrete Test Specimens in the Field
4. ASTM C 33: Standard Specification for Concrete Aggregates
5. ASTM C 39: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
6. ASTM C 42: Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
7. ASTM C 94: Standard Specification for Ready-Mixed Concrete
8. ASTM C 143: Standard Test Method for Slump of Hydraulic Cement Concrete
9. ASTM C 150: Standard Specification for Portland Cement
10. ASTM C 171: Standard Specification for Sheet Materials for Curing Concrete

11. ASTM C 172: Standard Practice for Sampling Freshly Mixed Concrete
12. ASTM C 231: Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
13. ASTM C 260: Standard Specification for Air-Entraining Admixtures for Concrete
14. ASTM C 309: Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
15. ASTM C 494: Standard Specification for Chemical Admixtures for Concrete
16. ASTM C 618: Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
17. ASTM C 1064: Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete
18. ASTM D 1751: Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
19. ASTM D 1752: Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

E. The Contractor is required to have one copy of the latest edition of each of the following publications available for review in the job-site construction office at all times while performing the work described in this Section. The Contractor is to comply with each of the following unless more stringent requirements are indicated on the Drawings or within these specifications.

1. City of Philadelphia Department of Streets - Standard Construction Items, except that measurement and payment sections do not apply
2. ACI 301: Specification for Structural Concrete

1.04 SUBMITTALS

A. General: Submit each item in accordance with the General Requirements and Conditions of the Contract documents.

B. Product Data: For each type of manufactured material and product indicated.

C. Design Mixes: For each concrete pavement mix and class. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

D. Joint Layout: Submit a sketch showing the location of all expansion and control joints and scoring prior to placing concrete. Indicate method of installing score lines.

E. Shop Drawings: For concrete reinforcement, including dowels, wire fabric, bar layout, and all other reinforcement. Shop drawings shall be in accordance with the ACI SP66, and detailed at scales to clearly show the layout of all new reinforcing steel.

F. Laboratory test reports: From a testing laboratory meeting the requirements of paragraph 1.05.C below, indicating and interpreting test results for compliance with the requirements indicated within these specifications and based on comprehensive testing of current materials and mix designs.

G. Material Certificates: Signed by manufacturers and the Contractor certifying that each of the following materials complies with or exceeds requirements:

1. Cementitious materials and aggregates.
2. Admixtures.
3. Curing compounds.

4. Applied finish materials.
5. Bonding agent or adhesive.
6. Joint fillers and sealers.
7. Forming accessories.
8. Steel reinforcement.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed pavement work similar in material, design, and extent to that required for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer must be certified according to the National Ready Mix Concrete Association's Plant Certification Program.

C. Testing Agency Qualifications: "Testing Agency Qualifications": An independent testing agency conforming to the requirements of the American Concrete Institute Publications ACI 311.4R and ACI 311.5R (latest editions), and also acceptable to the project team

D. Source Limitations: Obtain each type of class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.

E. ACI Publications: Comply with ACI 301, unless modified by the requirements of the Contract Documents.

F. Concrete Testing Service: Engage a qualified independent testing laboratory to perform material evaluation tests and to design concrete mixes.

1.06 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans.

1.07 REGULATORY REQUIREMENTS

A. Traffic Control: Maintain access of and protection for vehicular and pedestrian traffic as required for construction activities in accordance with local regulations.

B. Contractor shall obtain a curb permit for each City of Philadelphia Highway District the work is being performed in.

C. Contractor shall obtain all necessary City of Philadelphia Streets Department road opening permits and approvals, and City of Philadelphia Department of Licenses and Inspections permits and approvals, upon the Contractor receiving Notice to Proceed and prior to proceeding with the Work.

PART 2 - PRODUCTS

2.01 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces. Use flexible or curved forms for curves of a radius 100 feet or less.

B. Form Release Agent: Provide commercially formulated form-release agent with a maximum of 350 g/l volatile organic compound (VOCS) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.02 CONCRETE MATERIALS

A. General: Use the same brand and type of cementitious material from the same manufacturer throughout the Project.

B. Portland Cement: ASTM C 150, type IA.

C. Fly Ash: ASTM C 618, Class C or F including supplementary optional requirements relating to reactive aggregates and alkalis, and loss on ignition (LOI) not to exceed 5 percent.

D. Normal-Weight Aggregates: ASTM C 33, class 4, uniformly graded, from a single source, with coarse aggregate as follows:

1. Size 67.
2. Maximum size of coarse aggregates not more than one-fifth of narrowest dimension between sides of forms, one-third of depth of slabs, nor three-fourth of minimum clear spacing between reinforcing bars.
3. Do not use fine or coarse aggregate containing substances that cause spalling.

E. Fine Aggregate: ASTM C33. Fine aggregate for applied concrete floor topping shall pass a No. 4 sieve, 10 percent maximum shall pass a No. 100 sieve.

F. Water: Potable, ASTM C 94.

2.03 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Joint Dowel Bars: ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.

C. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

2.04 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain no more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures. Use only one manufacturer as a source for all admixtures. Contractor is responsible for verifying that any and all admixtures, when used in combination, are compatible with any other admixture used in mix design. Verification to be provided with mix design and product data submittals, for review by the Owner.

B. Air-Entraining Admixtures: ASTM C 260, certified by manufacturer to be compatible with other required admixtures and not containing more chloride ions than are present in municipal drinking water.

C. Water-Reducing Admixture: ASTM C 494, Type A, certified by manufacturer to be compatible with other required admixtures and not containing more chloride ions than are present in municipal drinking water.

D. High-Range Water-Reducing Admixture: ASTM C 494, Type F or G, and not containing more chloride ions than are present in municipal drinking water.

E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

G. Prohibited Admixtures: Calcium chloride, thiocyanate or admixtures containing more than 0.05 percent chloride ions are not permitted.

2.05 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular film-forming compound, manufactured for application to fresh concrete for temporary protection from rapid moisture loss.

E. Clear or white Liquid-Membrane-Forming Curing Compound: PENNDOT 408 Section 711.2

2.06 CONCRETE PROTECTION MATERIALS

A. Concrete protection materials shall be a linseed oil mixture of equal parts, by volume, of linseed oil and either mineral spirits, naphtha, or turpentine. At the option of the Contractor, commercially prepared linseed oil mixtures, formulated specifically for application to concrete to provide protection against the action of deicing chemicals may be used, except that emulsified mixtures are not acceptable.

2.07 RELATED MATERIALS

A. Expansion-and-Isolation-Joint-filler-Strips: PENNDOT 408, Section 705.1, Type (b) filler

B. Joint Sealer: In accordance with PennDOT 408, Section 705.4.

C. Graphite Lubricant: In accordance with PennDOT 408, Section 705.6.

2.08 CONCRETE MIXES

A. Prepare design mixes, proportioned according to PENNDOT 408, for each type and strength of concrete.

B. Use an independent testing agency meeting the requirements of paragraph 1.5.C for preparing and reporting proposed mix designs for the trial batch method. Do not use the Owner's field quality-control testing agency as the independent testing agency.

C. Proportion mixes to provide concrete with the following properties.

1. Compressive strength: Class C – 2,000 psi (28 day); Class A – 3,300 psi (28 day); Class AA – 3,750 psi (28 day); H.E.S – 3,000 psi (3-day).

    i. Concrete Footway – Class A
    ii. Concrete Curb – Class A
    iii. Concrete Basketball Backstop Foundations – Class A

iv. Chain Link Fence Foundation – Class A

2. Maximum Water-Cementitious Materials Ratio: at point of placement, 0.45.

3. Slump Limit: 3 inches, in accordance with ASTM C143.

i. Slump Limit for concrete containing high-range-water admixture (superplasticizer): not more than 8 inches after adding admixture to plant-or-site verified, 2-to-3 inch slump concrete.

D. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:

1. Fly Ash: 15 percent.

2.09 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94.

1. When air temperature is between 85 degrees F and 90 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 PREPARATION

A. Compact subgrade as indicated in Section 312000. Proceed with pavement only after nonconforming conditions have been corrected and subgrade and base course are stable and ready to receive pavement. Subgrade shall be in a moist condition when concrete is placed.

B. Remove loose material from compacted base course surface immediately before placing concrete.

3.02 FORMWORK, EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure formwork, including edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement. Form work shall be in accordance with ACI 347.

B. Clean forms after each use and coat with form release agent to ensure separation from concrete without damage.

C. Curbs: Curb outside forms shall have a height equal to the full depth of the curb. The inside form of curb shall have batter as indicated on the Drawings and shall be securely fastened and supported by the outside form.

D. Sidewalks: Sidewalk forms shall be of a height equal to the full depth of the finished sidewalk.

3.03 STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement and with recommendation in CRSI's "Placing Reinforcing bars" for placing and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, dirt, ice or other bond reducing materials.

C. Arrange, space, and securely tie bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

3.04 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318 or ACI 350R and as indicated on the Drawings.

B. Inspection: Before placing concrete, inspect and complete formwork installation, and installation of all items to be embedded or cast in. Notify other trades so that they may install any embedded or cast in items required for their work prior to Contractor's inspection.

C. Remove snow, ice, or frost from subbase or base course surface before placing concrete. Do not place concrete on surfaces that are frozen.

D. Moisten base course to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

E. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

F. Do not add water to concrete during delivery, at Project, or during placement.

G. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

H. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.

    1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

I. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Immediately lay welded wire fabric or bar mats in final position. Place top layer of concrete, strike off, and screed.

    1. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer, or use bonding agent if approved by the Engineer.

J. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open texture and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations.

K. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

L. Cold-Weather Placement: Comply with ACI 306.1 and as follows: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 degrees F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F and not more than 80 degrees F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.

M. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as specified when hot weather conditions exist.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 degrees F. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover reinforcement steel with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog spray forms and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.05 JOINTS

A. General: Construct construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated on the Drawings.

1. When joining existing pavement, place transverse joints to align with previously placed joints, unless indicated otherwise on the Drawings.

B. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, manholes, inlets, structures, sidewalks, other fixed objects, and where otherwise indicated on the Drawings.

1. Locate expansion joints at maximum intervals of 150 feet, unless shorter intervals are otherwise indicated on the Drawings.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than ½ inch or more than 1 inch below finished surface if joint sealant is indicated to be used above joint filler.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not to be used.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
7. Install joint sealer in accordance with Manufacturer's instructions.

C. Transverse Control Joints: Form weakened-plane transverse control joints, sectioning concrete into areas as indicated on the Drawings. Where sectioning is not indicated on the Drawings, space joints as described within this Section. Construct transverse control joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to a 3/8-inch radius unless shown otherwise on the Drawings. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.

D. Sidewalk Joints:

1. Sidewalk joints shall be constructed to divide the surface into rectangular areas. Transverse joints shall be spaced at a distance equal to the sidewalk width or 6 feet on center, whichever is less, and shall be continuous across the slab. Transverse expansion joints shall be installed at sidewalk returns and opposite expansion joints in adjoining curbs.

E. Edging: Tool edges of pavement, curbs, and joints formed in concrete after initial floating with an edging tool to a 3/8-inch radius unless shown otherwise on the drawings. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

1. Sealant: Provide joint sealant at all isolation joints in accordance with sealant manufacturer's written instructions.

3.06 CONCRETE FINISHING

F. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.

G. Comply with ACI-302-1R, regarding slab construction, regarding overworking of slab surfaces during finishing operations; in such cases where the air entrainment exceeds 3%.

H. Float Finish: Begin the second floating operation when bleed water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Re-float surface immediately to a uniform granular texture.

I. Surface Texture: Before the surface sheen has disappeared and before the concrete hardens, the surface of the pavement shall be given a texture as described herein. After curing is complete, all textured surfaces shall be thoroughly power broomed to remove all debris. Any type of transverse texturing shall produce grooves in straight lines across each lane within a tolerance of plus or minus 1/2 inch of a true line.

1. Produce a surface which is free from porous spots, irregularities, depressions, and small pockets or rough spots which may result from accidentally disturbing particles of coarse aggregate embedded near the surface.
2. Broom Texturing – Concrete pavement and sidewalks. Surface texture shall be applied using an approved mechanical stiff bristle broom drag of a type that will uniformly score the surface. The broom shall be operated to score the surface transverse to the pavement center line. The broom shall be capable of traversing the full width of the pavement in a single pass at a uniform speed and with a uniform pressure. Successive passes of the broom shall be overlapped the minimum necessary to obtain a uniformly textured surface. Brooms shall be washed thoroughly at frequent intervals during use. Worn or damaged brooms shall be removed from the job site. Brooming should be completed before the concrete has hardened to the point where the surface will be unduly torn or roughened, but after hardening has progressed enough so that the mortar will not flow and reduce the sharpness of the scores. Specific requirements for the texturing will be given on the drawings, but, if not given, the scores shall be uniform in appearance and approximately 1/16 inch in depth but not more than 1/8 inch in depth. Hand brooming will be permitted only on isolated odd shaped slabs or slabs where hand finishing is permitted. For hand brooming, the brooms shall have handles longer than half the width of slab to be finished. The hand brooms shall be drawn transversely across the surface from the centerline to each edge with slight overlapping strokes.
3. On inclined slab surfaces including sidewalk curb ramps, provide a coarse, non-slip finish by scoring surface with a stiff-bristled broom, perpendicular to line of traffic.

3.07 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold and hot temperatures. Comply with the recommendations of ACI 306R for cold weather protection and follow recommendations in ACI 305R for hot weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy weather conditions cause moisture loss approaching 0.2 lb./sq. ft x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials.
    i. Water.
    ii. Continuous water-fog-spray.
    iii. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with a 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

E. For concrete pavement and sidewalks, apply boiled linseed oil mixture no sooner than 28 days after placement to clean dry concrete surfaces free of oil, dirt, or other foreign material. Apply in 2-sprayed applications at rate of 40 sq. yd per gallon for the first application and 60 sq. yd per gallon for the second application. Allow complete drying between applications.

3.08 TOLERANCES

A. Formwork: ACI 117, except the elevation tolerance of formed surfaces before removal of shores is +0 inch and -3/4 inch.

B. Cross-Sectional Dimension: ACI 117, except tolerance for thickness of slabs 12 inches or less is +3/4 inch and - 1/4 inch.

C. Reinforcement Fabricating and Placing: ACI 117, except that fabrication tolerance for bar sizes Nos. 3, 4, and 5 (Tolerance Symbol 1 in Fig. 2.1(a), ACI, 117) used as column ties or stirrups is +0 inch and -1/2 inch where gross bar length is less than 12 feet, or +0 inch and -3/4 inch where gross bar length is 12 feet or more.

D. Slab Finishes: ACI 117, Section 4.5.6, F-number method in accordance with ASTM E1155 for exterior slabs, except as follows:

1. Test entire slab surface, including those areas within 2 feet of construction joints and vertical elements that project through slab surface.

2. Maximum elevation change which may occur within 2 feet of any column or wall element is 0.25 inches.
3. Allow sample measurement lines that are perpendicular to construction joints to extend past joint into previous placement no further than 5 feet.

3.09 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: ¼ inch.
2. Thickness: Plus 3/8 inch, minus ¼ inch.
3. Surface: Gap below 10-foot-long, unleveled straightedge not to exceed ¼ inch.
4. Joint Spacing: 3 inches.
5. Contraction: Joint Depth: Plus ¼ inch, no minus.
6. Joint Width: Plus 1/8 inch, no minus.

3.10 FIELD QUALITY CONTROL TESTING

A. Testing Laboratory: As part of this contract the Contractor shall retain the services of an independent testing and inspection laboratory meeting the qualifications of paragraph 1.5.C to sample materials, perform tests and prepare and submit reports during concrete placement.

B. Testing Services: Testing shall be performed according to the following requirements:

1. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.
2. Slump: ASTM C 143: One test at point of placement for each concrete truck delivery. Slump testing is to be performed prior to concrete placement. Addition of water to the concrete mix is not permitted after slump test.
3. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.
4. Concrete temperature: ASTM C 1064; one test hourly when air temperature is 40 degrees F and below and when 80 degrees F and above, and one test for each set of compressive-strength specimens.
5. Compression Test Specimens: ASTM C 31 one set of four standard cylinders for each compression-strength test, unless directed otherwise. Cylinders shall be molded and stored for laboratory-cured test specimens except when field-cured test specimens are required. Contractor shall provide an insulated storage box for concrete cylinders.
6. Compression-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd., but less than 25 cu. yd., plus one for each additional 50 cu. yd. One specimen shall be tested at 7 days and two specimens at 28 days; and one specimen shall be retained in reserve for later testing if required.
7. When frequency of testing will provide fewer than five compressive-strength tests for a given class of concrete, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
8. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive compressive-strength test results equal or exceed specified compressive-strength and no individual compressive-strength test result falls below specified compressive-strength by more than 500 psi.
9. Thickness Evaluation: The anticipated thickness of the concrete shall be determined prior to placement by passing a template through the formed section.

C. Test results shall be reported in writing to the Owner, concrete manufacturer, and Contractor, within 24 hours of testing. Reports of compressive-strength tests shall contain the concrete manufacturer and Contractor name, Project identification name and number, date of concrete placement, name of

concrete testing laboratory, concrete type and class, location of concrete batch in pavement, design compressive-strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day and 28-day tests.

D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by the Owner but shall not be used as the sole basis for approval or rejection.

E. Additional Tests: Testing laboratory shall make additional tests of concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by the Owner. Testing laboratory may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

F. Appearance: Exposed surfaces of the finished work will be inspected by the Owner and any deficiencies in appearance will be identified. Areas which exhibit excessive cracking, discoloration, form marks, or tool marks or which are otherwise inconsistent with the overall appearances of the works shall be removed and replaced at the Contractor's sole expense.

3.11 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet the requirements in this Section. Concrete sections shall be removed to the nearest regularly spaced joint.

B. Drill test cores where directed by the Owner when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt and other foreign material. Sweep concrete pavement not more than 2 days before date scheduled for Substantial Completion inspections.

E. Repair Surface Defects in accordance with ACI 301.

END OF SECTION 321613

SECTION 321723 – PAVEMENT MARKINGS

PART 1 - GENERAL

1.01 RELATED

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

1.02 SUMMARY

A. Section Includes:

1. Acrylic paint for use on asphalt and concrete surfaces for the following play areas:

a. 4 Square
b. Basketball Court Line Striping

2. Epoxy Pavement Markings for the following areas:

a. Parking lot line striping (if required)

3. Play Area Stencils for the following:

a. 4 Square

B. References

1. American Society for Testing and Materials (ASTM)
2. National Asphalt Paving Association (NAPA)
3. American Sports Builders Association (ASBA)
4. Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings

1.03 SUBMITTALS

A. Manufacturer specifications for components, color chart and installation instructions.

B. Authorized Applicator certificate from the surface system manufacturer.

C. Current Material Safety Data Sheets (MSDS).

D. Material certifications signed by material producer and contractor, certified that each material item complies with or exceed ASTM and EPA standards and application specifications.

E. Sample: Field sample of color seal and line markings representing surface texture and colors selected by Owner or Architect. Samples to be 5” x 5” minimum.

1.04 QUALITY ASSURANCE

A. Surfacing shall conform to the ASBA guidelines for planarity.

B. All surface coatings products shall be supplied by a single manufacturer.

C. The contractor shall record the batch number of each product used on the site and

maintain it through the warranty period. Copies of the batch number shall be provided to the architect and owner and shall be included in the project manual.

D. The installer shall be an authorized applicator of the specified system. The contractor shall provide proof from the manufacturer that he/she is authorized applicator and in good standing at the time of installation.

1.05 MATERIAL HANDLING AND STORAGE

A. Store materials in accordance with manufacturer specifications.

B. Deliver product to the site in original unopened containers with proper labels attached.

C. All surfacing materials shall be non-flammable.

1.06 WARRANTY

A. Prior to final payment, submit (2) year written warranty signed by the contractor. This shall warrant against defects in the material and workmanship.

1.07 INSTALLER QUALIFICATIONS

A. An experienced installer who has specialized in installing work similar to material design and extent indicated for this project and whose work has resulted in successful performance.

B. Installer shall be regularly engaged in construction and surfacing of acrylic sport courts, play courts or similar decorative surfaces.

C. Installer shall be an Authorized Applicator of the specified surface system.

D. Engage an installer who employs workers trained and approved by a color coating manufacturer.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Acrylic paint with skid-resistant additive in the following colors:

a. White
b. Yellow
c. Orange
d. Or approved alternative.

B. The epoxy pavement markings shall meet the following:

1. PennDOT Publication 408, Section 964.

C. The following Play Area stencils shall be used:

1. 4 Square, or approved equal.

PART 3 - EXECUTION

3.01 PREPARATION

A. Clean surfaces of loose dirt, oil, grease, leaves and other debris in strict accordance with manufactures directions.

B. Allow new asphalt or concrete to cure in accordance with manufacturer's recommendation prior to application of surfacing materials.

3.02 APPLICATION

A. Apply acrylic paint in accordance with manufacturer's specifications.

B. Apply epoxy pavement markings in accordance with PennDOT Publication 408, Section 964.

C. Play Area Stencils shall be used in accordance with manufacturer's specification.

3.03 PLACEMENT

A. The layout of the proposed basketball court and 4 square shall be confirmed and approved by the owner/authorized representative prior to installation.

B. Lines shall be carefully laid out in accordance with ASBA guidelines. The area to be marked shall be taped to insure a crisp line.

3.04 PROTECTION

A. Erect temporary barriers to protect coatings during drying and curing.

B. Upon completion of final coat keep all foot traffic off sealed surface. Allow the final coat to cure at least 24 hours, under good drying conditions before allowing foot traffic on surface. Less favorable conditions will require longer drying time.

3.05 CLOSE-OUT

A. Upon satisfactory completion of painting, excess acrylic paint and stencils shall remain property of the owner.
B. Remove all containers, surplus materials and debris. Dispose of materials in accordance with all local, state and federal regulations.

END OF SECTION 321723

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SECTION 321816 - PLAYGROUND PROTECTIVE SURFACING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes the unitary synthetic poured dual density rubber seamless surface.

1.03 DEFINITIONS

A. Critical Height: Standard measure of shock attenuation. According to CPSC No. 325, this means "the fall height below which a life-threatening head injury would not be expected to occur."

B. TPV: Thermoplastic Vulcanizate.

C. Fall Height: According to ASTM F 1487, this means the “vertical distance between a designated play surface and the protective surface beneath it.” The fall height of playground equipment should not exceed the Critical Height of the protective surfacing beneath it.

D. Use Zone According to ASTM F 1487, the "area beneath and immediately adjacent to a play structure or equipment that is designated for unrestricted circulation around the equipment and on whose surface it is predicted that a user would land when falling from or exiting the equipment."

1.03 PERFORMANCE REQUIREMENTS

A. Impact Attenuation: According to ASTM F 1292-13 or latest version.

B. Accessibility of Surface Systems: According to ASTM F 1951-13 or latest version.

C. IPEMA certified: Product and crew chiefs must be IPEMA certified

1.04 ACTION SUBMITTALS

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

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

C. Shop Drawings: For each playground surface system, include materials, plans, cross sections, drainage, installation, and edge termination. Include patterns made by varying colors of surfacing. Include details of graphics.

D. Samples for Initial Selection:

1. Include similar samples of playground surface system and accessories involving color selection.

E. Samples for Verification: For each type of playground surface system indicated.

1. Minimum 4 inch disc Sample of synthetic rubber seamless surface.

F. Product Schedule: For playground surface systems see contract drawings.

1.05 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Extent of surface systems and use zones for equipment.
2. Critical heights for playground surfaces and fall heights for equipment.

B. Qualification Data: For qualified Installer and testing agency.

C. Product Certificates: For each type of unitary synthetic playground surface system, from manufacturer.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each unitary synthetic playground surface system. Product must be IPEMA certified.

E. Field quality-control reports.

F. Warranty: Sample of Warranty. Minimum of 5 years not pro-rated. A 10 year non prorated warranty must also be available to include yearly maintenance.

1.06 CLOSEOUT SUBMITTALS

A. Maintenance Data: For playground surface system to include in maintenance manuals.

B. Material Certificates: Material certificates will be filled out and signed by specified manufacturer/supplier that specified materials were shipped and in proper amounts for square footage/thickness/color.

1.07 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.08 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer. Crew Chief must be IPEMA Certified.

B. Source Limitations: Obtain playground surface system materials, including primers and binders, from manufacturer specified

1. Provide secondary materials including adhesives, primers**,** and repair materials of type and from source recommended by manufacturer of playground surface system materials.

C. Standards and Guidelines: Comply with CPSC No. 325, "Handbook for Public Playground Safety"; ASTM F 1292; and ASTM F 1487.

1.09 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit playground surface system installation to be performed according to manufacturers' written instructions and warranty requirements. Temperature should be 40 degrees and rising during the installation period. The installer shall have sole discretion based off of their judgement to proceed or to halt the installation based on their judgement.

1.10 COORDINATION

A. Coordinate installation of playground safety surface with specification section 116813 Playground Equipment.

1.11 WARRANTY

A. Warranty Period: Five years from Substantial date of completion.

1. Failures include, but are not limited to, the following:

a. Failure for impact attenuation as per ASTM 1292-13
b. Deterioration of surface and other materials beyond normal weathering and wear
c. Excessive UV fade/Loss of color

2. Impact attenuation warranted for 5 years

PART 2 - PRODUCTS

2.01 UNITARY SYNTHETIC DUAL-DENSITY SEAMLESS SURFACE

A. Surface System: Poured-in-place, two-layer system with wearing course over cushion course. Provide manufacturer's standard thickness for each layer as required for overall thickness indicated, tested for impact attenuation according to ASTM F 1292-04 and for accessibility according to ASTM F 1951.

1. Products: Subject to compliance with requirements, provide the following:

a. Sport Surface Specialties, DuraTurf ® PIP PO BOX 577 East Aurora, NY 14052 716-652-2039 office 716-805-1450 fax www.sportsurface.net

b. or approved equal

2. Wearing Course: Minimum ½” thick after troweling using TPV granules 1-3.5mm manufactured by Rosehill Polymers as distributed by American Recycling Center in Owosso, Michigan. A 5/8” rod will be used to level the material so that when troweled it will be ½” thick. Urethane shall be 11.5 lbs per 55 lb bag or 21% of the weight of the rubber used if partial bags are required. All colors must be UV stable for a minimum of 5 years. Polymer content must be 25% minimum. EPDM is

not an equal. Aliphatic grout or .5 to 1.5mm granules will be applied under all high impact areas. Tiles will not be allowed. Wear mats will not be allowed.

3. Cushion Course: Manufacturer's standard formulation of 5/8” chunk rubber with correct amount of urethane for impact attenuation and longevity. Chunk rubber may not be recycled SBR rubber from tires. It must be high quality virgin derived rubber that is pre consumer recycled product.

4. Binder: Weather-resistant, flexible, non-hardening, 100 percent solids polyurethane complying with requirements of authorities having jurisdiction for nontoxic and low VOC content. Binders allowed are Prem Arc urethanes as distributed by American Recycling Center in Owosso, Michigan. No TDI urethanes will be permitted.

5. Critical Fall Height: In accordance with manufactures specifications

6. Overall Thickness: In accordance with manufactures specifications for specified equipment

7. Primer/Adhesive: Manufacturer's standard primer and weather-resistant, moisture-cured polyurethane adhesive suitable for unit, substrate, and location indicated.

8. Wearing Course Color(s): 50/50 Black Standard

B. Leveling and Patching Material: Portland cement-based grout or epoxy- or polyurethane-based formulation suitable for exterior use and approved by playground surface system manufacturer.

C. Accessibility: Provide playground surface system that is determined to be accessible when tested according to ASTM F 1951 and designed to comply with requirements for an accessible route as recommended by the ADA Accessibility Guidelines for Buildings and Facilities. (ADAAG).

PART 3 - EXECUTION

3.01 EXAMINATION:

A. Examine substrates and conditions, with Installer present, for compliance with requirements for maximum moisture content, sub grade and substrate conditions, drainage, and other conditions affecting performance of the Work. Drainage at the low end of the site is of the utmost importance. Any brick or concrete walls or curbs at the low end of the area to receive the play surface must have drainage access via weep holes. Weep holes must extend a minimum of 2 inches above the top of the new concrete slab and a minimum of 1/8” below the top of the new concrete slab. The latter is necessary because the rubber surfacing system is porous and water will permeate (drain downward) to the concrete slab.

B. Hard-Surface Substrates: Verify that substrates are satisfactory for unitary playground surface system installation and that substrate surfaces are dry, cured, and uniformly sloped to drain within recommended tolerances according to playground surface system manufacturer's written requirements for cross-section profile.

1 Asphalt Substrates: Verify that substrates are dry, sufficiently cured to bond with adhesive, free from surface defects, and free of dust, dirt, loose particles, grease, oil, and other contaminants incompatible with playground surface system or that may interfere with adhesive bond.

2 Concrete Substrates: Verify that substrates are dry, free from surface defects, and free of laitance, glaze, efflorescence, curing compounds, form-release agents, hardeners, dust, dirt, loose particles, grease, oil, and other contaminants incompatible with playground surface system or that may interfere with adhesive bond. Determine adhesion, dryness, and acidity characteristics by

performing procedures recommended in writing by playground surface system manufacturer.

3 Stone Substrates: Verify that substrates are a minimum of 4” thick with proper drainage and compacted to 95%. Stone used shall be #57 Limestone or suitable equivalent and shall vary no more than 1/8” within a 10 ft. radius. Core drillings for equipment poles shall be filled flush to the top of the stone with concrete to prevent sinkholes after installation of PIP surface.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. General: Prepare substrates to receive surfacing products according to playground surface system manufacturer's written instructions. Verify that substrates are sound and without high spots, ridges, holes, and depressions.

B. Stone Substrates: Provide sound surface free of laitance, efflorescence, curing compounds, and other contaminants incompatible with playground surface system.
1. Repair unsatisfactory surfaces and fill holes and depressions.
2. Mechanically scarify or otherwise prepare concrete substrates to achieve recommended degree of roughness.
3. Saw cut concrete for terminal edges of playground surface systems as indicated.
4. Treat control joints and other nonmoving substrate cracks to prevent telegraphing through playground surface system.
5. Confirm slope and drainage are correct and in place.

3.03 INSTALLATION, GENERAL

A. General: Comply with playground surface system manufacturer's written installation instructions. Install playground surface system over area and in thickness indicated.

3.04 INSTALLATION OF SEAMLESS PLAYGROUND SURFACE SYSTEMS

A. Seamless Surface: Mix and apply components of playground surface system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface and impact-attenuating system of total thickness indicated.

1. Poured Cushion Course: Spread evenly over primed substrate to form a uniform layer applied at manufacturer's standard spreading rate in one continuous operation. Thickness of cushion course should meet ASTM 1292-04 guidelines and shall be a minimum of 1” thick. Varying thickness is allowed to match fall height.

2. Intercoat Primer: Over cured cushion course, apply primer at manufacturer's standard spreading rate.

3. Wearing Course: Spread over primed base course to form a uniform layer applied at manufacturer's standard spreading rate in one continuous operation and, except where color changes, with no cold joints. Finish surface to produce manufacturer's standard wearing-surface texture. Minimum thickness of wear course shall be ½” after being trowled. A minimum of 5/8 screed rod shall be used when leveling wear course.

4. Edge Treatment: As indicated on contract drawings. Fully adhere edges to substrate with full

coverage of substrate. Maintain fully cushioned thickness required to comply with safety performance requirements.

3.05 FIELD QUALITY CONTROL

A. Testing Agency**:** Engage a qualified testing agency to perform tests and inspections.

B. Testing Services: Testing and inspecting of completed applications of playground surface system shall take place according to ASTM F 1292-04 or latest version.

C. Remove and replace applications of playground surface system where test results indicate that it does not comply with requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with requirements.

3.06 PROTECTION

A. Provide protection of surface during curing process.

END OF SECTION 321816

SECTION 329000 – PLANTINGS AND SEEDING

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The work of this Section includes furnishing all labor, materials, equipment and incidentals required to complete all planting related landscaping work indicated on the Drawings and as specified herein, including but not necessarily limited to the following;

1. Excavation for plantings.
2. Furnishing and installing plant materials as shown on the Drawings, including shrubs, trees, and perennials.
3. Mulch, fertilize, stake, and prune all plants and trees.
4. Watering all specified plants.
5. Final cleanup and all other work required to complete the job in accordance with the Drawings and Specifications.
6. Preparation of as-planted sketch plans.
7. Maintenance of all specified plants and trees for an 8-week maintenance period.
8. Monthly planting status reporting of completed planted and maintenance activities.
9. Provision of “As Planted” record drawings.
10. Plant and tree warranties.

1.02 REFERENCE STANDARDS

A. American Association of Nurserymen (AAN)
B. ANSI Z60.1 - American Standard for Nursery Stock, most current edition
C. ANSI A 300 - Standard Practices for Tree, Shrub, and other Woody Plant Maintenance, most current edition and parts.
D. Soil Science Society of America (SSSA) Methods of Soil Analysis, Parts 1, 2, 3 & 4
E. American Society of Agronomy (ASA)
F. Other Agencies

1. American Society of Testing and Materials (ASTM)

a. ASTM A 641/A 641M - Galvanized-steel wire
b. ASTM B 221, Alloy 6063-T6, Aluminum Edging
c. ASTM D5539-94 – Standard Specification for Seed Started Mix

2. Association of Official Agricultural Chemists (AOAC)
3. Woods End Research Laboratory, Solvita compost maturity index test.
4. International Society of Arboriculture (ISA)
5. PWD GSI Landscape Design Guidebook recommended plant list (Fall Update)
6. Philadelphia Parks and Recreation (PP&R - previously Fairmount Park Commission) Recommended Street Tree List
7. PP&R Contractor Guidelines.
8. USDA Rules and Regulations under the Federal Seed Act
9. Philadelphia Streets Department, Standard Construction Items.
10. Pennsylvania Department of Transportation, Form 408 Specifications.

G. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.03 SUBMITTALS

A. Submit complete product data for all materials furnished under this Section. One set of complete submittals is required per planting season. Any changes to materials require resubmittal. Unless otherwise noted below, all submittals must be received at least three (3) months prior to the start of the upcoming planting season.

B. Submit qualifications of crew, equipment, and suppliers using the Landscaping Qualifications Form in Appendix F. Qualifications must conform to the requirements detailed in Section 1.06, Contractor Qualifications, below.

C. Samples, testing and certifications of all materials shall be submitted for inspection and acceptance upon Owner's request. None of the landscaping materials shall be delivered to the site until samples and test results are approved by Owner/Authorized Representative, however such approval does not constitute final acceptance.

1. Mulch: Submit [1-quart] volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

D. Submit a schedule for planting at least three (3) months prior to the start of the upcoming planting season. Schedule shall conform to planting seasons as defined in these Specifications and take into account allotted days for completion of the Work in the Contract; any extensions of the time allotment to be made for accommodation of planting seasons may be made at the sole discretion of a Project Manager.

E. Submit a proposed list of plant species with botanical and common names, variety, size, quantity, and source of plant materials in the varieties, sizes, and quantities indicated on the Drawings at least three (3) months prior to the start of the upcoming planting season. Sources of planting materials must be confirmed by the Contractor and written documentation of plant availability in accordance with the submitted planting schedule shall be provided by the supplier(s).

F. Plant Substitutions for plants not available locally should be ordered from nurseries located out of the state. Substitutions may be permitted only after substantiated written confirmation and documentation is submitted that a specified plant is either not obtainable or is not recommended for the location as shown on the landscaping plan. Substitutions should be drawn from the recommended plant list included in the PWD GSI Landscape Design Guidebook.

G. The Contractor must provide to a Project Manager each of their plant supplier's shipping lists for review and approval after ordering, but prior to supplier's shipping any plant material. Only specified plant species will be accepted. No cultivated varieties (cultivars) are acceptable.

H. The Contractor shall be required to submit status reports to Owner/Authorized Representative on a monthly basis during planting and maintenance activities. Photographic documentation as needed shall be provided as part of each status report.

I. Submit Monthly Project Status Reports. Project Status Reports shall list detail all planting, maintenance activities, and upcoming site work. Photographic documentation shall be included with the Monthly Project Status Report. Project Status Reports shall be submitted within one (1) week of the end of each month.

J. Sketch plans, photographs, and written documentation of all plant installations, including initial planting and any plant replacements during the eight (8)-week maintenance period shall be submitted for approval within one (1) week of provisional acceptance subsequent to the maintenance period.

1. Sketch plans must include a revised schedule with species (botanical name) and cultivars and final quantities along with a revised planting plan.

2. Landscape sketch plans may be a markup of the original landscaping plan. Changes to the original landscaping plan shall be clearly noted and shown in red.

3. All sketches shall be labeled “As Planted”, dated, and shall contain the name or initials of the Designer.

1.04 CONTRACTOR QUALIFICATIONS

A. Crew Requirements: Crews shall consist of a minimum of two workers. One (1) landscape foreperson shall be present at all times during execution of the work. The foreperson shall direct all work performed under the following sections. Notify the Department of the name and phone number of crew member with credentials outlined below, along with a contact phone number, at least five (5) business days in advance of the first day of the specified activity.

1. The foreperson shall have experience with at least five (5) landscape installations of similar scope and complexity and shall have a minimum of three (3) years of experience in successful completion of similar landscape installation work. The Vendor must submit a resume of the foreperson(s) who will supervise the work crew(s).

2. All crew certification documentation should be readily available onsite so Owner/Authorized Representative can confirm certifications during site inspections.

3. Multiple certifications can be held by an individual crew member to satisfy the requirements set for in these Specifications.

B. Pesticide applications: No pesticides shall be applied unless approved in writing by the Owner. For pesticide applications, one (1) crew member must have certification as a Pest and Disease Applicator, Pennsylvania State licensed, certified commercial applicator, category: Ornamental and Shade Trees, Lawn and Turf. This crew member shall be required to be present during application of pest and disease control practices. The Vendor must submit the Pesticide and Disease Applicator’s License IDs for employees performing pest and disease control.

1. The Vendor must submit a resume of the employee(s) who will supervise the work crew(s).

2. All crew certification documentation should be readily available onsite so Owner/Authorized Representative can confirm certifications during site inspections.

3. Multiple certifications can be held by an individual crew member to satisfy the requirements set for in these Specifications.

1.05 QUALITY ASSURANCE

A. All plant materials shall be tagged and approved by the Owner prior to site delivery. The Contractor shall notify Owner/Authorized Representative of planting and tagging days a

minimum of seven (7) days prior.

B. Each plant or same-species group of plants shipped to the job site must be clearly labeled with its scientific name and common name. The Contractor is responsible to check to see that the plants are correctly labeled. Owner/Authorized Representative will not accept improperly labeled plants. The Contractor is prohibited to add, alter or remove labels. The Contractor will not be paid for material that is improperly labeled or for material on which the Contractor has altered or removed the labels.

1.06 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown ("root ball"), with a ball size not less than the diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than the diameter and depth recommended by ANSI Z60.1 for type and size of plant required.

D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than the minimum root spread according to ANSI Z60.1 for type and size of plant required.

E. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well- established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

F. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.

G. Finish Grade: Elevation of finished surface of planting or stormwater soil.

H. Multi-stem trees: Trees that have shall have three or more main stems that arise from the ground from a single root crown or at a point just above the root crown.

I. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.

J. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

K. Planting Area: Areas to be planted.

L. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been

modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

M. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

N. Plugs: A cylinder of medium in which a plant is grown. The term is generally used to describe seedlings and rooted cuttings which have been removed from the container but with the medium held intact by the roots.

O. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

P. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

Q. Stormwater Soil: A planting soil mixture intended to provide water quality management by filtering stormwater runoff and provide sufficient infiltration for management of specified quantities of surface water flows.

R. Subgrade: Surface or elevation of subsoil remaining after completing excavation or backfill immediately beneath planting soil or lightweight fill material , that is integrated with Specified Soil or Growing Media by tilling in a layer of Transition Mix.

1.07 INSPECTION OF PLANT MATERIALS

A. Owner/Authorized Representative may observe plants and trees at supplier before delivery to site for compliance with requirements for genus, species, variety, size, and quality. Owner/Authorized Representative reserves the right to be present for inspection of plants at nursery and may attach their seal to each plant. The Contractor is responsible for paying any up charge for Owner/Authorized Representative to attach their seal to specific plants.

B. Owner/Authorized Representative shall be present at time of delivery to inspect plants and trees delivered to the site. A Project Manager retains the right to inspect or reject substandard plants or trees for size and condition of balls and root systems, insects, injuries, latent defects, and speciation, and to reject unsatisfactory or defective material at any time during progress of work. Rejected plants and trees must be removed immediately from the project site.

C. The Contractor shall stake the plant layout for approval by Owner/Authorized Representative. No plants or trees may be planted without on-site approval by Owner/Authorized Representative.

D. All trees shall be labeled by tree name (genus, species, and cultivar), and all labels securely attached to individual trees upon delivery to the jobsite.

1.08 DELIVERY, STORAGE AND HANDLING

A. The Contractor shall confine the storage of material and equipment to locations approved by Owner/Authorized Representative.

B. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

2. Accompany each delivery of bulk materials with appropriate certificates.

D. Materials shall not be dropped or dumped from vehicles. Materials shall be reviewed for compliance with specified requirements. Unacceptable materials shall be removed and disposed from the job site. Materials shall be stored in designated areas.

E. Deliver plants freshly dug. Do not prune trees and shrubs, except as directed by Owner/Authorized Representative. Protect bark, branches, and root system from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during delivery. Carefully handle all trees and shrubs during delivery to avoid mechanical damage. Handle all planting stock by the root ball. After delivery, set plants in a location protected from sun and wind. Provide adequate water to the root ball package during shipping and storage.

F. Roots of plants shall be adequately protected at all times from sun and from drying winds.

G. Plants which cannot be planted immediately upon delivery shall be set on the ground, out of direct sun if possible, and be well-protected with soil, mulch, or other acceptable material. Plant materials shall not be stored on site for more than two (2) days prior to planting. It is the Contractor's responsibility to keep plants watered and maintained upon delivery to site; give plants enough water so that the entire soil mass is wet and water is draining out the pot bottom. Secure plants from theft and vandalism.

H. No tree shall be planted if the root ball is cracked, broken, or dropped either before or during the planting process. No container plants will be accepted if the container is cracked or broken except upon special approval of Owner/Authorized Representative.

I. Deliver plants on day of installation after preparations for installation have been completed. A Project Manager shall be onsite to approve condition and speciation of delivered trees and plant layout.

1.09 PROJECT CONDITIONS

A. Restrictions: Planting shall only be performed during the periods within the seasons which are normal for such work as determined by weather and by locally acceptable practice and which are approved by Owner/Authorized Representative. No planting shall be performed between acceptable planting periods unless otherwise approved by Owner/Authorized Representative. The Contractor shall schedule his work to conform to these requirements. Planting close to the end of the season should be avoided if possible to maximize favorable planting conditions.

1. Spring Planting: March 15 – June 15.
2. Fall Planting: September 15 – December 15.

B. Weather Limitations: Proceed with planting activities only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions and according to manufacturer's written instructions. Owner/Authorized Representative reserves the right to postpone planting activities due to unfavorable weather conditions.

1. During periods of drought, irrigation shall be provided as approved by Owner/Authorized Representative. Water rates shall be equivalent to one inch (1") of rainfall per week.

C. Access over finished grade soils shall be restricted. If access is required across placed soils, Contractor shall be required to rework compacted soil areas prior to fine grading to the full depth of the placed soils as directed by Owner/Authorized Representative.

1.010 SITE ACCESS

A. For each of the different areas where the Contractor needs to gain access to perform his work, the Contractor shall make arrangements with the Owner in advance to access the site. These arrangements may require the construction of temporary roadways or bridges and the removal and replacement of existing structures.

1.011 EXISTING STRUCTURES AND PAVING

A. It is expected the Contractor will prepare their own preconstruction documentation in addition to the City's own photographs, to verify the original site conditions and the immediate vicinity of the project areas. The Contractor shall provide a set of preconstruction photographs to the Owner/Authorized Representative.

B. Any disturbed paving or curb, footway or driveway shall be restored according to any instructions provided by the Philadelphia Streets Department. All disturbed surfaces outside of the Streets Department restoration area shall be restored in kind.

1.012 MAINTENANCE SERVICE

A. Project Maintenance: Provide maintenance of planted areas by skilled employees of the landscape installer as defined under quality assurance above. Maintain as required in Part 3 herein. Begin maintenance immediately after plantings are installed and continue for an eight (8) week period.

1.013 INSPECTION FOR PLANTING CERTIFICATION

A. Planting certification for provisional approval shall be determined by Owner/Authorized Representative on a site by site basis. Certification shall verify that the plants are in healthy condition at the time of inspection, that the planting methodology appears correct, and that the plants should be expected to survive as installed by the Contractor. Certification shall be made by a designee of the Owner that has experience locally installing native plants of similar types used in the project. Individual plantings or entire areas or species may be rejected at this time for certification. Owner/Authorized Representative reserves the right to determine remediation required in the event of non-certified plantings, up to and including full replacement.

B. A Project Manager will perform inspection on a site by site basis at the end of the eight (8)-week maintenance period and upon the written request of the Contractor received at least ten (10) calendar days before the anticipated date of inspection.

C. At the end of the maintenance period, the Contractor shall be responsible for replacement planting for any plants that are missing, dead, not true to name or size as specified, or not in satisfactory growth, as determined by Owner/Authorized Representative. Any determination made by a Project Manager regarding plant replacement shall be final, and the Contractor shall be responsible for replacing the plantings in kind (unless otherwise directed) as soon as weather conditions permit during the next appropriate planting season at no additional cost to the City. The Contractor shall not be responsible for damage or plant mortality due to vandalism.

D. The Contractor shall prepare a list of items to be completed or corrected for review by Owner/Authorized Representative. Upon completion of the inspection, Owner/Authorized

Representative shall amend the list of items to be completed or corrected. Corrective work shall be completed within two (2) weeks of receipt of the list of items needing correction or completion.

E. The eight (8)-week maintenance period must reoccur if any replacement of plants is required the time of inspection.

F. After all necessary corrective work has been completed and approved by Owner/Authorized Representative subsequent to required maintenance period(s), Owner/Authorized Representative shall certify in writing the planting certification and the one-year warranty period will commence.

G. Should approval of work be delayed after the end of the maintenance period(s) has elapsed, the Contractor shall continue maintenance activities until such approval is granted.

1.014 WARRANTY PERIOD AND REPLACEMENTS

A. The Contractor shall warranty that plant material is properly handled and installed. The Contractor shall be responsible for replacement planting required for a period of twelve (12) months after a planting is certified. At the end of the warranty period, plants that are missing, dead, not true to name or size as specified, or not in satisfactory growth, as determined by Owner/Authorized Representative, shall be replaced within the quantity limits set forth in section 1.16.D below. Any determination made by a Project Manager regarding plant replacement shall be final, and the Contractor shall be responsible for replacing the plantings in kind (unless otherwise directed) as soon as weather conditions permit during the next appropriate planting season at no additional cost to the City. The Contractor shall not be responsible for damage or plant mortality due to vandalism.

B. All replacement of plants and trees shall be conducted in accordance with the material and construction (including schedule) in these Specifications.

C. Replace any trees or shrubs that are more than twenty-five percent (25%) dead or in unhealthy condition at end of warranty period, as determined by Project Manager. Reseed herbaceous cover that is less than eighty-five percent (85%) alive at end of warranty period.

D. Plant replacements for all plants installed during a planting season, across all sites under the contract, shall be limited to the following quantities at the end of the warranty period:

1. 20% of trees
2. 20% of shrubs
3. 20% of herbaceous cover
4. Additional replacements may be required from installation to the end of the provisional maintenance period should plants not survive.

1.015 FINAL INSPECTION AND FINAL ACCEPTANCE

A. At the end of the warranty period, final inspection will be made by a Project Manager. Owner/Authorized Representative will request the Contractor to attend the site inspection at least ten (10) calendar days before the anticipated date of inspection.

B. Upon completion of the inspection, Owner/Authorized Representative shall provide a list of items to be completed or corrected. Corrective work shall be completed within two (2) weeks of receipt of items needing correction or completion.

C. After all necessary corrective work has been completed, a Project Manager will certify in

writing the final acceptance of planting.

PART 2 - PRODUCTS

2.01 PLANT CONDITIONERS

A. Herbicide application is not permitted for school planting. All weeding shall be performed manually.

B. Water used in this work shall be furnished by the Contractor and shall be suitable for irrigation and free from ingredients harmful to plant life. Hose and other watering equipment required for the work shall be furnished by the Contractor.

C. The use of hydrogels (in soil mixes or directly applied to plant roots) is prohibited in any green stormwater infrastructure system.

2.02 PLANT MATERIALS

A. Furnish and install plants, and pre-tagged and approved trees, as shown on the Drawings and specified herein. Plants shall be nursery grown under climatic conditions similar to those in the locality of the project and shall conform to the variety and sizes indicated. Plant material not obtained from an approved source is prohibited.

B. 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.

1. All single-stem trees must have a straight trunk, well–balanced crown, and intact leader. Branching height (height of the lowest living branch) must be one-third to one-half (⅓ - ½) of tree height. Shrubs must be multi-stemmed with a well-balanced crown.

2. Tree measurements should be taken with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree for height and spread; do not measure branches or roots tip to tip. Take caliper measurements six inches (6”) above root flare for trees up to four-inch (4”) caliper size and 12 inches (12”) above the root flare for larger sizes.

3. All plant material including trees, shrubs, and ground cover shall meet the size and root requirements indicated in the Plant Schedule. All Plant material shall be in accordance with the American Standards for Nursery Stock (ANSI Z60.1), latest edition.

4. 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 growing. 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.

5. Plugs shall be cut into square or round plugs, strongly rooted, and capable of vigorous growth and development when planted; Plug Size: three (3) inches

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

C. Plants shall be freshly dug for delivery. No heeled in plants or plants from cold storage shall be accepted. All plants shall be sound, healthy, well branched, and free of disease or pests. Plants shall be free of physical damage such as bark abrasions, disfiguring knots, sunscald, or unhealed cuts over three-quarters of an inch (¾"). Trees with multiple leaders shall not be accepted. Plants or trees with girdling root systems shall not be accepted.

D. Plants larger than those shown in the planting schedule on the Drawings may be used, if approved by a Project Manager, but use of such plants shall be at no additional cost to the Owner. If the use of larger plants is approved, the spread of roots or ball of earth shall be increased in proportion to the size of the plant as approved and in accordance with ANSI Z60.1.

E. All plants shall be grown on their own roots. Grafted materials are only acceptable if grafted at least twelve (12) months before use, unless otherwise specified.

F. Plant material not obtained from an approved source is prohibited

2.03 TREES

A. In accordance with the design plans.

2.04 MULCH

A. Organic mulch shall be double-shredded well-composted, hardwood bark, aged six (6) months to one year. Size shall be a maximum width or length of two inches (2") and a minimum of a half inch (½") in width or length. Mulch shall be free of wood chips, stones or other undesirable matter. Mulch shall be natural hardwood color. Dyes shall not be permitted.

1. Source: The Contractor is reminded that mulch generally meeting these requirements is available for purchase from the Fairmount Park Organic Recycling Center, 3850 Ford Road, Philadelphia, (215) 685-0108.

2. Other supplier conforming to organic mulch requirements above.

2.05 WEED-FREE STRAW AND SALT HAY

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

2.06 TREE WRAP

A. Contractor shall not use tree wrap on trees unless specifically directed by Owner/Authorized Representative. Where directed by Owner/Authorized Representative, tree wrap shall be a woven polypropylene fabric. When used, tree wrap shall be installed on each tree immediately after planting.

2.07 TREE-STABILIZATION MATERIALS

A. Trunk-Stabilization Materials:

1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.

2. Wood Deadmen: Timbers measuring 8 inches in diameter and 48 inches long, treated

with specified wood pressure-preservative treatment.

3. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes.

4. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, galvanized-steel wire, two-strand, twisted, 0.106 inch (2.7 mm) in diameter.

5. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.

2.09 EROSION CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a 100% biodegradable mesh. Include manufacturer's recommended steel wire staples, six (6) inches long.

B. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb./sq. yd., with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, six
(6) inches long.

2.010 WATER

A. Water used in this work shall be furnished by the Contractor and shall be suitable for irrigation and free from ingredients harmful to plant life. Hose and other watering equipment required for the work shall be furnished by the Contractor.

B. The use of hydrogels (in soil mixes or directly applied to plant roots) is prohibited in any green stormwater infrastructure system.

PART 3 – EXECUTION

3.01 GENERAL

A. Planting, mulching and conditioning shall only be performed during those periods within the seasons which are normal for such work as determined by the weather and locally accepted practice, as approved by Owner/Authorized Representative and set forth in Section 1.10 herein.

B. Protect adjacent and adjoining structures, utilities, walks, pavements, fences and other facilities, trees, shrubs, mulched beds, plantings, and mulched areas from damage caused by planting operations. Any damages to infrastructure shall be repaired by the Contractor at no cost to Owner.

C. Schedules for planting shall be submitted to Owner/Authorized Representative for approval at least three (3) months prior to the start of the upcoming planting season. The Contractor shall notify Owner/Authorized Representative of plant tagging and planting days with a minimum of seven (7) days' notice. In the event of inclement weather, planting should occur when conditions permit. In the event of rain, specifically, planting should occur the following day.

D. The Contractor shall stake out locations of trees and shrubs to secure approval of layout prior to planting.

3.02 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance of the Work.

1. The Contractor shall review details of existing subsurface infrastructure to ensure digging or staking does not damage existing infrastructure. Contractor is responsible for costs to repair any damage to subsurface infrastructure caused by planting or staking operations.

2. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
3. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.

4. Review details of subsurface infrastructure to ensure digging or staking does not interfere with other assets.

5. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

6. Uniformly moisten excessively dry soil that is not workable or which is dusty.

B. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Project Manager and replace with new stormwater soil.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, other facilities, trees, shrubs, mulched beds, plantings, turf areas, and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil- bearing water runoff or airborne dust to adjacent properties and walkways.

C. All plants shall be installed at locations as shown on the Drawings. The Contractor shall stake out locations, outline areas, and obtain a Project Manager's approval of layout before excavating or planting. Make minor adjustments as required.

3.04 MINOR GRADING AND FILL

A. See Section 312000 for earthwork and grading requirements.

B. The addition of soil may be required given the condition of the site as directed by Owner/Authorized Representative. Minor grading shall take place following the addition of soil, or as deemed necessary by Owner/Authorized Representative.

C. Protect newly graded soils from traffic, freezing and erosion. Keep soils free of trash, debris or construction materials from other work.

D. Repair and re-establish grades to specified tolerances where completed surfaces become eroded, rutted, settled, or over compacted due to subsequent construction operations or weather conditions.

E. Scarify or remove and replace material to a depth as directed by Owner/Authorized Representative.

F. Where settling occurs, before final acceptance, remove mulch and backfill with additional approved soil, compact to specified density.

G. Finished grades to be landscaped or seeded shall include a minimum stormwater layer of six inches (6”). Finished grades to be otherwise surfaced shall allow sufficient elevation for the completed surface to produce the finished grades and elevations as shown on the Drawings.

3.05 PLANTING OPERATIONS

A. Planting shall be done by experienced workmen familiar with planting procedures under the supervision of a qualified foreman.

B. The Contractor shall make all efforts to not destroy soil structure by excessive traffic, working, or compacting the soil throughout the planting operation. Utilize the smallest practicable piece of low ground pressure mechanical equipment in the adjacent areas.

C. To prevent potential for plant settlement, do not over-excavate prior to planting.

D. Stormwater soil and planting soil shall be backfilled in lightly compacted layers of not more than nine inches (9”) and each layer watered sufficiently to settle before the next layer is put in place.

E. If more than two (2) days elapse following preparation of stormwater soil, then the Contractor shall be responsible for regrading and loosening areas before planting.

F. Plants which cannot be planted immediately upon delivery shall be set on the ground, out of direct sun when possible, and be well-protected with soil, mulch, or other acceptable material. Plant materials shall not be stored on site for more than two (2) days prior to planting. It is the Contractor’s responsibility to keep plants watered and maintained upon delivery to site; give plants enough water so that the entire soil mass is wet and water is draining out the pot bottom. Secure plants from theft and vandalism.

G. Owner/Authorized Representative reserves the right to reject a plant or group of plants at any time during the project.

3.06 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches

1. Excavate circular planting pits with sides sloping inward at a 45-degree angle where possible, or as indicated in planting detail drawings. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

2. Excavate approximately two times as wide as ball diameter for planting stock where possible, or as indicated in tree planting detail drawings.

3. For bare root stock, excavate at least 12 inches wider than root spread or as indicated on the drawings, whichever is the greater dimension and deep enough to accommodate vertical roots.

4. Do not excavate deeper than depth of the root ball, measured from the root flare to

the bottom of the root ball

5. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling; the root flare must be visible for planted trees.

6. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.

7. Maintain supervision of excavations during working hours.

8. Keep excavations covered or otherwise protected when unattended by Installer's personnel.

9. If drain tile is indicated on Drawings or required under planting areas, excavate to top of porous backfill over tile.

B. Backfill Soil: Topsoil, planting soil, or stormwater soil removed from excavations may be used as backfill soil unless otherwise indicated.

C. Obstructions: Notify Owner/Authorized Representative if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations

1. Hardpan Layer: Drill 6-inch-diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.

D. Drainage:

1. Notify Project Manager/Contracting Officer if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

2. Verify by testing that pits are free draining. If pits are not free draining notify Owner/Authorized Representative and submit alternative method of drainage for approval

3.07 INSTALLATION OF TREES AND CONTAINER SHRUBS

A. Remove all debris from the pit and tamp loose soil in the bottom of the pit by hand.

B. Do not handle the plant by the trunk, branches, leaves or stem.

C. Place the plant straight in the center of the planting pit, carrying the plant by the root mass.

D. Carefully cut and remove all of the wire baskets that are packaging the root system using the least amount of disturbance as possible.

E. Cut and remove all ropes around the burlapped ball. Remove all nails. Remove all burlap, wires, and/or other materials from the planting hole.

F. When planting container plants, scarify the sides and bottom of the root mass such that no roots continue to circle around the root mass. When possible, pull encircling roots away from root mass and position them in the soil around the planting hole such that they are being pulled away from the plant.

G. Backfill planting pit with soil and tamp firmly to fill all voids and air pockets. Do not over compact soil (backfilled soil should have a maximum bulk density of 1.5g/cm3). Make sure

plant remains straight during backfilling/tamping procedure.

H. The top of the root mass of the trees/shrubs should be flush with, or slightly elevated (no more than 1/8th its height) above the final grade. Do not cover stem with soil or mulch.

I. When planting on a slope, plant “out-of-the-hill” by raising the grade around the planted hole so it is flat at the surface. Do not plant “into-the-hill” by lowering the grade and do not leave the grade at an angle.

J. Water plants thoroughly at their bases immediately after planting to saturate backfill. Watering shall occur of a sufficient quantity to saturate the backfill and shall be applied slowly enough to sink into the soil avoiding runoff.

K. Install slow-release watering bags on all trees such as Treegator or equivalent with at least 15 gallon capacity. Fill watering bags during maintenance.

L. A layer of mulch should be placed around each tree and shrub installed as set forth in herein and as indicated in planting detail drawings.

M. The Contractor shall leave no open planting pits at the close of each day.

N. A woven polypropylene tree wrap shall be used to protect trees from deer damage if so directed by Owner/Authorized Representative. Tree wrap shall be installed on each tree immediately after planting.

O. Maintain protection of trees during installation and maintenance periods. Treat, repair or replace any damaged planting.

P. During planting, all areas shall be kept neat, clean and free of all trash and debris, and all reasonable precautions shall be taken to avoid damage to existing plants, turf, structures, and private property.

Q. Remove all tags, labels, strings and wire from the plant materials, unless otherwise directed by Owner/Authorized Representative.

R. Promptly remove soil debris created by work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks or other paved areas.

S. Final cleanup shall be the responsibility of the Contractor and consist of removing all trash and materials incidental to the project and disposing of them off-site.

T. When planting on side slopes, grade shall be raised to provide a level surface for planting.

3.08 PROTECTION OF TREES

A. Refer to section 015639 for Tree Protection requirements.

3.09 TREE REMOVAL

A. Refer to section 015639 for Tree Removal requirements.

3.010 TRIMMING AND PRUNING

A. Each plant shall be trimmed in accordance with AAN and ANSI Z60.1 standards to preserve the natural character of the plant and as directed by Owner/Authorized Representative.

B. Trimming and pruning shall be done with clean, sharp tools.

3.011 TREE STABILIZATION

A. Trunk Stabilization by Upright Staking and Tying: Install trunk stabilization as follows unless otherwise indicated:

1. Place stakes as low as possible, no higher than 2/3 the height of the tree.

2. Stake trees with two stakes for trees up to 12 feet high and 2-1/2 inches or less in caliper; three stakes for trees less than 14 feet high and up to 4 inches in caliper. Space stakes equally around trees.

3. Materials used to tie the tree to the stake should be flexible and allow for movement all the way down to the ground so that trunk taper develops correctly.

4. Support trees with bands of flexible ties at contact points with tree trunk. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

B. Trunk Stabilization by Staking and Guying: Stake and guy trees more than 14 feet in height and more than 3 inches in caliper unless otherwise indicated. Install trunk stabilization as follows:

1. Site-Fabricated, Staking-and-Guying Method: Install no fewer than three guys spaced equally around tree.

a. Securely attach guys to stakes 30 inches long, driven to grade. Adjust spacing to avoid penetrating root balls or root masses. Provide turnbuckle for each guy wire and tighten securely.

b. For trees more than 6 inches in caliper, anchor guys to wood deadmen buried at least 36 inches below grade. Provide turnbuckle for each guy wire and tighten securely.

c. Support trees with bands of flexible ties at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.

d. Attach flags to each guy wire, 30 inches above finish grade.

e. Paint turnbuckles with luminescent white pain

C. No staking shall be performed without full understanding of subsurface infrastructure locations.

3.012 INSTALLATION OF CONTAINER PLANTS

A. Install plants after stapled erosion control blanket is installed and approved by a Project Manager (where applicable). When stapled erosion control blanket is approved, dig a hole for each plug or plant that is about the same depth as the soil of the plug or potted plant. For plugs, a ‘dibble bar’ with the same diameter as the plug can be used to create the hole, when punched through the blanket. For container plants, the stapled erosion control blanket shall be cut in a circular hole shape to match the diameter of the container.

B. Remove the plants and soil from the pots and carefully break apart bound root balls. Position each plant in its hole so that the soil level of each plant is flush to the surrounding finished grade soil surface. After planting, fill soil in around the plant completely, firming the soil and

ensuring there are no air pockets as plants are installed. When planted, cover the top of the potted soil mix with about ½-in of stormwater soil to match surrounding finished grades and help reduce wicking of moisture out of the potted soil mix. Water installed plants immediately after planting. Where specified on the Drawings, install mulch as directed.

C. When planting on a slope, plant "out-of-the-hill" by raising the grade around the planted hole so it is flat at the surface. Do not plant "into-the-hill" by lowering the grade and do not leave the grade at an angle.

3.013 GROUND COVER AND HERBACEOUS PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated on Drawings in even rows with triangular spacing.

B. Use stormwater soil for backfill.

C. Dig holes large enough to allow spreading of roots.

D. For plugs supplied in flats, plant each in a manner that minimally disturbs the root system.

1. Plant plugs in holes or furrows, spaced twelve (12) inches apart in triangular pattern unless otherwise indicated on drawings. On slopes, contour furrows to near level.

E. Work soil around roots to eliminate air pockets and maintain plant at finished grade.

F. Water thoroughly after planting, taking care not to wet plant foliage when sunny.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.014 PLANTING AREA MULCHING

A. Immediately after planting operations are completed, planting beds placed outside the infiltration areas and channels (areas covered in erosion control blankets) shall be covered with the specified mulch as indicated.

1. For Trees and Shrubs in Turf Areas: Apply organic mulch ring of 3-inch average thickness, with a 3-foot radius around trunks or stems. Do not place mulch within three inches (3") of trunks or stems.

2. For Continuous Planting Areas: Apply 3-inch average thickness of organic mulch extending 12 inches beyond edge of individual planting and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within three inches (3") of trunks or stems and off of leaves or stems for container plants and plugs.

B. No mulch shall be placed in areas that will experience surface flows (channels, swales, etc.) or surface ponding of water (areas of basins, bumpouts, or other surface features that are designed for surface water detention). These areas that will be flooded shall only be covered with erosion control blankets and plantings or landscaping stone as specified.

3.015 WATERING

A. Trees shall be watered twice within the first twenty-four (24) hours of the time of planting and not less than twice per week until provisional acceptance. Trees shall be watered at the roots, to minimize wetting of the leaves. Water shall be released slowly to prevent runoff and

in sufficient quantity to saturate the soils (approximately fifteen to twenty (15-20) gallons per watering). In the event of steady rainfall, frost, or yellowing of the leaves, watering may be temporarily reduced with the approval of Owner/Authorized Representative.

B. Plantings must be thoroughly watered twice within the first twenty four (24) hours of the time of planting and not less than twice per week until provisional acceptance. Plants shall be watered at the roots to minimize the wetting of the leaves. Overhead watering is permitted only during overcast weather. Water shall be released slowly to prevent runoff and in sufficient quantity to saturate the soils.

C. Suitable water for planting and maintenance will be the responsibility of the Contractor. The Contractor shall furnish his own hose and hose connections or other watering equipment.

D. See Table of Maintenance Tasks and Schedule for further watering requirements.

3.016 SITE RESTORATION

A. General

1. Restore all disturbed areas to the satisfaction of Owner/Authorized Representative.

2. Backfill all disturbed areas outside the Limits of Disturbance to original elevation and slope. Ensure stability of reconstructed slopes. On steep slopes, provide and arrange logs, large rocks or other devices to check erosion. Slope areas shall be seeded with the specified seed mix. The entire disturbed area of the slope shall be covered with erosion control blanket to prevent erosion. The fabric shall be pinned to the slope at 3-three foot (3') intervals.

3. Restore all disturbed trenches, rubble gutters, bridle paths, asphalt paths, cinder roads, stone walls, structures, utilities, sidewalks and other fixtures in kind, to original condition, and to the satisfaction of Owner/Authorized Representative.

3.017 MAINTENANCE

A. Maintenance for provisional acceptance shall begin immediately after planting is installed on a site by site basis. Contractor will begin a formalized cyclical maintenance program that will last until the end of the maintenance period of eight (8) weeks.

B. Proposed maintenance activities and schedule shall be coordinated with the Owner/Authorized Representative and shall be in accordance with the program submitted by the Contractor based on Table of Provisional Maintenance Tasks and Schedules below.

C. Plants shall be watered, mulched, weeded, pruned, and sprayed as described herein and otherwise maintained and protected during this period. Dead or damaged plants shall be replaced before the end of the provisional maintenance period. Maintenance activities are outlined in the table below.

D. Submit Monthly Project Status Reports using the template in Appendix B detailing the completed maintenance activities.

E. Site inspection for provisional approval shall take place at the end of the eight (8) week period. The Contractor shall coordinate the site inspection with the Owner/Authorized Representative ten
(10) calendar days prior to the anticipated date of inspection. Should approval by the Owner/Authorized Representative be delayed until after the 8-week period has elapsed, the

Contractor is responsible for continuing maintenance activities until such approval is granted.

F.

Table of Provisional Maintenance Tasks and Schedules:

Task	Description	Frequency
Remove trash, sediment and organic debris	Remove trash, sediment, and organic debris from all SMP surfaces and inlet gutters	Weekly
Remove trash, sediment and organic debris	Clean pretreatment devices; empty filter bags for inlets, domed rises or other structures. Sweep or vacuum at least five (5) ft. one either side of inlets or curb cuts.	Monthly
Remove non-target/invasive vegetation	Remove all non-target or invasive vegetation not part of the original planting manually. Weeds shall be disposed of offsite in an approved manner.	Monthly, from March to November
Water vegetation	Place and fill 15-20 gallon water bags such as Treegator® or equivalent on trees. Follow directions of manufacturer. Replace bags if they become damaged or missing.	Weekly
	Water shrubs and herbaceous plants at the base of the plant with a hose or ground-level irrigation system. Natural rainfall is not considered a watering as it will not provide the required depth of water. Each watering should slowly soak the entire depth of root system.	3 times per week on dry days; no later than 3-4 hours from dusk. Watering with an overhead system is only permitted when weather is overcast.
	Water groundcover and plugs - do not allow soil to dry out. Provide a half-inch (0.5”) of water at each watering.	Daily, when there is no rainfall for first 6 weeks; twice weekly thereafter
Apply insecticides or other chemicals	Apply insecticides or other chemicals	As approved by Owner / Authorized Representative
Prune trees and shrubs	Remove dead, damaged, or diseased wood	As needed during Provisional Maintenance period; should be completed prior to Final Owner/Authorized Representative Inspection and Walk-through

Replace tree stakes	Replace or amend tree stakes or tree protection	As needed during Provisional Maintenance period; should be completed prior to Final Owner/Authorized Representative Inspection and Walk-through.

Apply mulch	Apply mulch to landscaped beds as needed to maintain three-inch (3") depth; extending from the edge of the bed or pit to a radius of three inches (3") from the stem of each plant. Mulch shall not touch the woody stem of a shrub or tree. When there is more than a one-inch (1") drop from the edge of the pavement to the mulch, add mulch to reduce the gap to a minimum of a half-inch (0.5") from the edge of the pavement.	As needed during Provisional Maintenance period; should be completed prior to Final Owner/Authorized Representative Inspection and Walk-through
Reset elevation of plants	Reset settled plants to proper grade and position	As needed during Provisional Maintenance period; should be completed prior to Final Owner/Authorized Representative Inspection and Walk-through
Replace dead or damaged plants	Replace plants that are more than 25% dead	As needed during Provisional Maintenance period; should be completed prior to Final Owner/Authorized Representative Inspection and Walk-through

END OF SECTION 329000

SECTION 329200 - PLANTING SOILS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The scope of work includes all labor, materials, tools, supplies, equipment, facilities, transportation and services necessary for, and incidental to performing all operations in connection with furnishing, delivery, and installation of Planting Soils related to general planting. Scope of work includes, but is not limited to, sourcing, purchase, delivery and installation of Planting Soil and soil amendments, clean up and disposal of all excess and surplus material, and placement of erosion control matting over all soil surfaces not stabilized through planting

B. The specific soil types in this section include:

1. Planting Soil

1.02 REFERENCE STANDARDS

A. In the event that the requirements of any of the referenced standards and specifications herein conflict with each other the more stringent requirement shall prevail. Where reference is made to one of the standards, the revision in effect at the time of bid opening shall apply.

B. American Society for Testing Materials (ASTM):

1. ASTM C33 – Gradation Requirements for Coarse Aggregates.
2. ASTM C602 Standard Specification for Agricultural Liming Materials.
3. ASTM D422 – Standard Test Method for Particle Size Analysis of Soils.
4. ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
5. ASTM D3385 – Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer.
6. ASTM D4972 – Standard Test Method for pH of Soils.
7. ASTM D5298 – Standard Specification for Topsoil Used for Landscaping Purposes.
8. ASTM D7481 – Standard Test Methods for Determining Loose and Tapped Bulk Densities of Powders using a Graduated Cylinder.
9. ASTM F1632 – Standard Test Method for Particle Size Analysis and Sand Shape Grading of Golf Course Putting Green and Sports Field Rootzone Mixes.
10. ASTM F1647 – Standard Test Methods for Organic Matter Content of Athletic Field Rootzone Mixes.
11. ASTM F1815 – Standard Test Methods for Saturated Hydraulic Conductivity, Water Retention, Porosity, and Bulk Density of Athletic Field Rootzones.

C. Other Standards:

1. U.S. Department of Agriculture (USDA), Natural Resources Conservation Service, Soil Texture Calculator.

2. USDA, Natural Resources Conservation Service, 2003. National Soil Survey Handbook, title 430-VI, current edition.

3. USDA Soil Survey Laboratory Methods Manual, Soil Survey Investigations Report, current edition.

4. Environmental Protection Agency (EPA) Section 503 Regulations.

5. Department of Environmental Protection (DEP), Pennsylvania Bulletin, Management of Fill, Clean Fill Policy, current edition.

6. U.S. Composting Council (USCC), Test Methods for the Examination of Composting and Compost (TMECC), current edition.

7. USCC, Landscape Architecture / *Design Specifications for Compost Use, Planting Bed Establishment with Compost.*

8. Association of Official Analytical Chemists (AOAC), Official Methods of Analysis, current edition.

9. Soil Science Society of America (SSSA), *Methods of Soil Analysis*, current edition.

10. Modified Philip Dunne (MPD) Infiltrometer method for measurement of the saturated hydraulic conductivity of surface soil.

11. Philadelphia Parks and Recreation Contractor Guidelines.

1.03 DEFINITIONS

A. Amendment: product added topsoil to improve soil's physical qualities. Amendments are classified as general soil amendments, fertilizers, biological, and pH amendments.

B. Bulk Density: an indicator of soil compaction calculated as the dry weight of soil by its volume typically expressed in g/cm^3.

C. Coarse Sand: sharp natural or manufactured fine aggregate and further defined in this specification.

D. Compacted soil: soil where the density of the soil is greater that the threshold for root limiting, and further defined in this specification.

E. Compost: Well-decomposed stable organic material as defined by the US Composting Council and further defined in this specification.

F. Debris: Elements including, but not limited to, concrete, concrete masonry, wood, excavated rock and rock fragments, rubble, overburden soils, abandoned utility structures, trash, refuse and litter.

G. Drainage: The process of water moving through the soil, transitioning the soil from dry to saturated to field capacity, the rate of which may be expressed as the saturated hydraulic conductivity rate (Ksat; units are inches per hour).

H. Existing Soil: Mineral soil existing at the locations of proposed planting after the majority of the construction within and around the planting site is completed and just prior to the start of work to prepare the planting area for soil modification and/or planting, and further defined in this specification.

I. Fertilizer: amendment used for the purpose of adjusting soil nutrient composition and balance.

J. Fine grading: The final grading of the soil to achieve exact contours and positive drainage, often accomplished by hand rakes or drag rakes other suitable devices, and further defined in this specification.

K. Finished grade: surface or elevation of Soil after final grading and 12 months of settlement of the soil, and further defined in this specification.

L. Planting Soil: Planting soil shall be harvested from fields or development sites or manufactured uniformly mixed individual soil components (Topsoil, Sand, and Compost) or existing mineral soil at the locations of proposed planting meeting the criteria specified herein.

M. Salvaged Topsoil: Stripped native loam removed within the limits of work, but outside of the “Tree Protection Areas”, to its entire natural depth.

N. Scarify: Loosening and roughening the surface of soil and sub soil prior to adding additional soil on top, and further defined in this specification.

O. Soil Horizons: as defined in the USDA National Soil Survey Handbook (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242)

P. Soil Tilling: Loosening the surface of the soil to the depths specified with a rotary tine tilling machine, roto tiller, (or spade tiller), and further defined in this specification.

Q. Subgrade: Surface or elevation of subsoil remaining after completing excavation or backfill immediately beneath Planting Soil.

R. Topsoil: Topsoil shall be a harvested from fields or development sites and shall be loose, friable mineral particles resulting from natural soil formation from the A, E and upper B horizons, or “solum” where most plant roots grow and as defined further herein.

1.04 SUBMITTALS

A. Submit a list of materials to be provided for work under this Section including the name and address of the materials producer and the location from which the materials are to be obtained.

B. Submit dated certificates or letters, signed by the materials producer, stating that materials meet or exceed the specified requirements.

C. Submit samples of soil(s) to an approved soil testing laboratory for testing. Send samples no less than one (1) month and no greater than three (3) months before delivery to the worksite. Submit soil test reports with results to Owner/Authorized Representative for each criteria listed within the Part 2 Products section herein for Individual Components for Soil Mixes (Topsoil, Compost and Sand) and for Soil Mixes Using Individual Components (Planting Soil).

1. Test reports for Individual Components and Soil Mixes must be submitted concurrently.

2. The source of supply for Individual Components for Soil Mixes and Soil Mixes Using Individual Components must be indicated on the test report submittals.

3. Test reports must be the same material to be supplied and must be current within the period of time defined as follows unless approved otherwise by Owner/Authorized Representative. If tests fail to meet the specifications, obtain other sources of material, retest and resubmit until accepted by Owner/Authorized Representative. No soils shall be delivered to the worksite until approved by Owner/Authorized Representative.

    a. Topsoil: no more than six (6) months old.
    b. Compost: no more than three (3) months old.
    c. Sand: no more than six (6) months old.
    d. Planting Soil: test data must be no more than three (3) months old.

4. Sample test results shall be considered valid until the time of construction and for the material supplied.

D. Provide one (1) one-gallon sample in a resealable plastic bag to Owner/Authorized Representative prior to delivery to site. All samples must be submitted simultaneously with the laboratory test reports described in 1.06C. Samples are required for the following:

1. Planting Soil.
2. In-situ Soil Amendments: Compost.

E. Submit appropriate certificates and delivery tickets to Owner/Authorized Representative for each delivery of soil mixes, bulk materials, fertilizers and soil amendments. The soil supplier must be indicated on delivery tickets for all soil mix deliveries and the supplier must match the approved submittals.

F. Submit final soil moisture and compaction testing reports at the completion of soil installation per Part 3.03 and 3.04 of the specifications herein.

1.05 LABORATORY SOIL TESTING REQUIREMENTS

A. The laboratory shall be an independent laboratory, recognized by the State Department of Agriculture. The testing laboratory must have experience in performing agronomic testing including physical and chemical properties of soil. Tests shall be made in strict compliance with the standards of the Association of Official Analytical Chemists and follow standards from the NRCS Soils Manual and ASTM testing methods applicable to the specific tests requested. Laboratory shall have staff fully qualified to review test results, and to make recommendations to amend samples based on what is planned to grow in the soil. American Association for Laboratory Accreditation (A2LA) certification is preferred.

B. Compost that participates in the US Composting Council's Seal of Testing Assurance (STA) Program and tested through an STA program lab, using appropriate test methods from the TMECC (Test Methods for the Examination of Compost and Composting) is preferred. Test data shall be presented on a Compost Technical Data Sheet.

C. All soil testing will be at the expense of the Contractor.

1.06 QUALITY ASSURANCE

A. All materials, methods of construction, and workmanship shall conform to applicable requirements of ASTM, PTM, PennDOT Standard Specifications and AASHTO Standards, PADEP Clean Fill Guidance, PADEP state health standards for residential areas, unless otherwise specified. Any fill

or topsoil sources, disposal areas, or temporary offsite storage locations shall be subject to review and approval by the Owner/Authorized Representative.

1.07 DELIVERY, STORAGE AND HANDLING

A. Preparation, amendment, and mixing of soils shall be performed at the soil supplier location.

B. Weather: Do not mix, deliver, place or grade soils when frozen or with moisture above field capacity. Soils shall not be handled, hauled, placed, or compacted when wet or frozen. Soil shall only be handled when the moisture content is between the specified ranges in percent water by volume as defined in Part 3.03 of the specifications herein.

C. Protect soil and soil stockpiles, including the stockpiles at the soil blender's yard, from wind, rain and washing that can erode soil or separate fines and coarse material, and contamination by chemicals, dust and debris that may be detrimental to plants or soil drainage. Once spread, soils shall be protected with staked erosion control blankets.

D. All manufactured packaged products and material shall be delivered to the site in unopened containers and stored in a dry enclosed space suitable for the material and meeting all environmental regulations. Biological additives shall be protected from extreme cold and heat. All products shall be freshly manufactured and dated for the year in which the products are to be used.

E. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

F. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

G. None of the soil materials shall be delivered to the site until sample certifications are approved by Owner/Authorized Representative, however, such approval does not constitute final acceptance. Certification submittal shall include recommended soil amendment products if proposed to modify the soils. Any approval of soils made conditional upon utilizing one or more amendments shall be understood to afford to the Owner/Authorized Representative the right for further testing and refusal of materials that do not meet these Specifications.

H. Soils shall not be stored on-site for longer than one (1) month prior to installation.

PART 2 - PRODUCTS

2.01 INDIVIDUAL COMPONENTS FOR SOIL MIXES

A. Soils shall not contain any traces of hydrocarbons, petroleum products, chemically prohibited substances, or any other elements considered to be toxic to human health and any of the vegetation that is used.

B. TOPSOIL

1. Topsoil definition: Topsoil shall be a harvested from fields or development sites and shall be loose, friable mineral particles resulting from natural soil formation from the A, E and upper B horizons, or "solum" where most plant roots grow. Manufactured soils where sand, composted organic material, chemical additives or similar elements has been blended to meet the requirements of Topsoil is not acceptable. The soil shall be free of construction and trash debris, rocks, hydrocarbons, petroleum materials, herbicides, or other harmful contaminants that would impact plant growth.

2. Topsoil shall comply with the following parameters:

    a. Organic matter (ASTM F1647, Method A): 1.5% minimum (by dry weight).
    b. pH (1 soil : 1 water): 5.0 - 7.0.

3. Stockpiled Existing Topsoil at the site meeting the above criteria may be acceptable.

C. ORGANIC AMENDMENT / COMPOST

1. Compost is as defined by the “US Composting Council Landscape Architecture / Design Specifications for Compost Use, Planting Bed Establishment with Compost”. Compost shall be a well decomposed, stable, weed-free organic matter source. It shall be derived from: agricultural, food, or industrial residuals; leaf litter and yard trimmings; or source-separated waste. The product shall contain no substances toxic to plants and shall be reasonably free (< 1% by dry weight) of man-made foreign matter. The compost will possess no objectionable odors and shall not resemble the raw material from which it was derived.

2. Compost shall comply with the following parameters:
    a. pH: 6.0 - 8.0.
    b. Soluble salt content (electrical conductivity, 1 soil : 2 water): maximum 5 dS/m (mmhos/cm).

        1) 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.

    c. Moisture content %, wet weight basis: 30 – 60.

    d. Organic Matter Content, % dry weight basis: 30 – 65.

    e. Particle size, dry weight basis: 98% pass through 1/2 inch screen.

    f. Stability carbon dioxide evolution rate: mg CO2-C/ g OM/ day ≤ 3.

    g. Maturity, seed emergence and seedling vigor, % relative to positive control: minimum 80%.

    h. Physical contaminants (inerts), %, dry weight basis: <0.5%.

    i. Chemical contaminants, mg/kg (ppm): meet or exceed US EPA Class A standard, 40CFR § 503.13, Tables 3 levels.

    j. Biological contaminants select pathogens fecal coliform bacteria, or salmonella, meet or exceed US EPA Class A standard, 40 CFR § 503.32(a) level requirements.

D. COARSE SAND

1. Sharp natural or manufactured fine aggregate shall be hard and durable and free of limestone (calcareous sand), shale and slate particles and free of harmful contaminants that would impact plant growth complying with the following parameters:

    a. pH shall be lower than 7.0.

b. Sieve analysis:

Sieve	Percent passing (by mass)
3/8 inch (9.5 mm)	100
No 4 (4.75 mm)	95-100
No 8 (2.36 mm)	80-100
No 16 (1.18 mm)	50-85
No 30 (.60 mm)	25-75
No 50 (.30 mm)	5-40
No 100 (.15 mm)	2-20
No 200 (0.75 mm)	2-15

c. Particle analysis must be per USDA classification, Sand.

Sand (2 - 0.05 mm): ≥88%
Silt (0.05 - 0.002 mm): ≤9%
Clay (< 0.002 mm): ≤3%

E. CHEMICAL AMENDMENTS

1. Lime, ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:

a. Class: Class T, with a minimum 99 percent passing through No. 8 sieve and a minimum 75 percent passing through No. 60 sieve.

b. Provide lime in form of dolomitic limestone.

2.02 SOIL MIXES USING INDIVIDUAL COMPONENTS

A. DEFINITION

1. Manufactured uniformly mixed individual soil components (Topsoil, Sand, Compost) meeting the criteria specified herein. Provide Planting Soils at the locations indicated on the Drawings complying with the following parameters.

B. PLANTING SOIL

1. Planting soil shall be harvested from fields or development sites or manufactured uniformly mixed individual soil components (Topsoil, Sand, and Compost) or existing mineral soil at the locations of proposed planting meeting the criteria specified herein.

2. Provide Planting Soil at the locations indicated on the Drawings complying with the following parameters:

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

Sand: 45 - 55%
Silt: no more than 30%
Clay: no more than 20%
Gravel content larger than 2mm shall be less than 12%.

b. pH (1 soil : 1 water): 6.0 - 7.2.

c. Organic matter (ASTM F1647, Method A): 3 - 6% (by dry weight).

d. Hydraulic conductivity (ASTM F1815) at 85% Proctor (ASTM D698): 1.0 - 3.0 in/hr

e. Soluble salt content (electrical conductivity, 1 soil : 2 water): maximum 1.60 mmho/cm. Sodium (Na) salinity shall not exceed 700 ppm.

f. Cation Exchange Capacity (CEC): >15 meq/100g.

g. Nutrient analysis including macronutrients and micronutrients (Mehlich-3) with soil fertility interpretation and recommendations relevant to the specified plant species.

h. Compost shall not be added at more than 20% by volume.

C. AMENDMENTS

1. At the time of final grading, add fertilizer if required to the Planting Soil at rates recommended by the testing results for the species of plants to be grown.

D. SUPPLIERS

1. Soils commonly utilized for Owners work have been confirmed to be available from the list of suppliers shown below. This list does not constitute acceptance or endorsement of soil from these suppliers, nor is the Contractor bound to purchase landscaping materials from suppliers on this list.

   a. American Biosoils & Compost, Douglassville PA, 610-222-3580
   b. County Conservation Company, Sewell NJ, 856-227-6900
   c. Earth Materials, LLC, Vineland, NJ, 609-548-0445
   d. GreenPRO Materials, Jackson, NJ, 908-647-0159
   e. Laurel Valley Soils, Landenberg, PA, 866-587-6457
   f. Ridgewood Soils, Birdsboro, PA, 610-816-0364

PART 3 - EXECUTION

3.01 SITE EXAMINATION

A. Prior to installation of Soil, examine site to confirm that existing conditions are satisfactory for the work of this section to proceed. The Owner/Authorized Representative shall approve the condition of the subgrade and the previously installed subgrade preparation and the installation of subsurface drainage.

1. Confirm that the subgrade is at the proper elevation and compacted as required.

2. Confirm that all surface areas to be filled with Soil are free of construction debris, refuse, compressible or biodegradable materials, stones greater than 2 inches diameter, soil crusting films of silt or clay that reduces or stops drainage from the Soil into the subsoil; and/or standing water. Remove unsuitable material from the site.

3. Confirm that no adverse drainage conditions are present.

B. If unsatisfactory conditions are encountered, notify the Owner/Authorized Representative immediately to determine corrective action before proceeding.

3.02 PROTECTION

A. Identify protection zones according to Section 015639 "Construction Tree Protection."

B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Vehicle traffic.
4. Foot traffic.
5. Erection of sheds or structures.
6. Impoundment of water.
7. Excavation or other digging unless otherwise indicated.

C. If soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the soil and contamination; restore the subgrade as directed by Owner/Authorized Representative and replace contaminated soil with new soil.

3.03 SOIL INSTALLATION

A. BLS sample and testing report from soil delivered to worksite must be approved by Owner/Authorized Representative prior to soil installation as defined in 1.06 Submittals of the specifications herein.

B. All equipment utilized to install or grade Soils shall be wide track or balloon tire machines rated with a ground pressure of 4 psi or less. All grading and soil delivery equipment shall have buckets equipped with 6 inch long teeth to scarify any soil that becomes compacted.

C. In areas of soil installation above existing subsoil, scarify the subgrade material prior to installing Soil.

1. Scarify the subsoil of the subgrade to a depth of 3 – 6 inches with the teeth of the back hoe or loader bucket, tiller or other suitable device.

2. Immediately install the Planting Soil. Protect the loosened area from traffic. DO NOT allow the loosened subgrade to become compacted.

3. In the event that the loosened area becomes overly compacted, loosen the area again prior to installing the Planting Soil.

D. Install the Planting Soil in 12 - 18 inch lifts to the required depths. Apply compacting forces to each lift as required to attain the required compaction. Scarify the top of each lift prior to adding more Planting Soil by dragging the teeth of a loader bucket or backhoe across the soil surface to roughen the surface.

1. Approved compaction equipment includes a smooth drum roller or plate compactor. Typically one to three passes per lift will achieve the desired compaction. Contractor to test desired compaction methodology with actual soil to be installed to confirm installation method and material properties are compatible and will achieve the specified compaction rates.

2. Provide adequate equipment to achieve consistent and uniform compaction of the Soils. Use the smallest equipment that can reasonably perform the task of spreading and compaction. Use the same equipment and methods of compaction for the entire project area once soil, installation methodology, and compaction criteria have been coordinated and confirmed.

E. Do not pass motorized equipment over previously installed and compacted soil except as authorized below.

1. Light weight equipment such as trenching machines or motorized wheel barrows is permitted to pass over finished soil work.

2. If work after the installation and compaction of soil compacts the soil to levels greater than the above requirements, follow the requirements of Over Compaction Reduction herein.

F. Phase work such that equipment to deliver or grade soil does not have to operate over previously installed Planting Soil. Work in rows of lifts the width of the extension of the bucket on the loader. Install all lifts in one row before proceeding to the next. Work out from the furthest part of each bed from the soil delivery point to the edge of each bed area.

G. Where travel over installed soil is unavoidable, limit paths of traffic to reduce the impact of compaction in Planting Soil. Each time equipment passes over the installed soil it shall reverse out of the area along the same path with the teeth of the bucket dropped to scarify the soil. Comply with Over Compaction Reduction herein in the event that soil becomes over compacted. Access over finished grade soils shall be restricted. If access is required across placed soils, Contractor shall be required to rework compacted soil areas prior to fine grading to the full depth of the placed soils as directed by Owner/Authorized Representative.

H. Maintain moisture conditions within the Soil during installation or modification to allow for satisfactory compaction.

1. Volumetric soil moisture level during installation shall be above permanent wilt point and below field capacity for each type of soil texture within the following ranges.

Soil texture	**Permanent wilting point**	**Field capacity**
Sand, Loamy sand, Sandy loam	5-8%	12-18%
Loam, Sandy clay, Sandy clay loam	14-25%	27-36%
Clay loam, Silt loam	11-22%	31-36%
Silty clay, Silty clay loam	22-27%	38-41%

2. The Contractor shall confirm the soil moisture levels with a moisture meter (Digital Soil Moisture Meter, DSMM500 by General Specialty Tools and Instruments, or approved equivalent). Suspend operations if the Soil becomes wet. Apply water if the soil is overly dry.

I. Installing Planting Soil with soil or mulch blowers or soil slingers is not permitted.

3.04 SOIL COMPACTION REQUIREMENTS

A. Maintain at the site at all times a soil cone penetrometer with pressure dial and a soil moisture meter to check soil compaction and soil moisture.

1. Moisture meter shall be “general digital soil moisture meter”.

B. Perform a minimum of one compaction test every 12-inch lift of soil and every 300 square feet of soil installed. Maintain an up-to-date written report of compaction test results. Report shall include the date and time of test, the SMP number, and value reading from the penetrometer. Owner/Authorized Representative may review the written report at any time to confirm

conformance with the specification. Submit final compaction and soil moisture report at the completion of soil installation.

C. The following are threshold levels of compaction as determined by each method for the subsoil surface and full profile of Planting Soil, testing each lift of Soil with a penetrometer. The same penetrometer and moisture meter shall be used to test installed soil throughout the work.

1. Acceptable Compaction

a. Standard Proctor Method – 75-85%.

b. Penetration Resistance Method – about 75-250 psi.

c. Soil below 75 psi soil becomes increasingly unstable and will settle excessively.

2. Unacceptable Compaction

a. Standard Proctor Method – Above 85%.

b. Penetration Resistance Method – Approximately above 300 psi

3. Prior to testing the soil with the penetrometer check the soil moisture. Penetrometer readings are impacted by soil moisture and excessively wet or dry soils will read significantly lower or higher than soils at optimum moisture.

4. The penetrometer readings shall be within 20% plus or minus of the specified levels.

5. Where the Standard Proctor Method is utilized, the following Bulk Density levels based on 75% minimum and 85% maximum standard Proctor indicate acceptable compaction.

Soil Texture	**Bulk Density (g/cm^3)**	
	Max.	**Min.**
Loamy Sand	1.80	1.65
Sandy Loam	1.65	1.45
Sandy clay loam	1.55	1.35
Loam	1.50	1.30
Silt Loam	1.45	1.25

3.05 OVER COMPACTION REDUCTION

A. Any soil that becomes compacted to a density greater than the specified density shall be dug up and reinstalled. This requirement includes compaction caused by other sub-contractors after the Planting Soil is installed and approved.

B. Surface roto tilling shall not be considered adequate to reduce over compaction at levels 6 inches or greater below finished grade.

3.06 FINE GRADING

A. Owner/Authorized Representative shall approve all rough grading prior to fine grading.

B. Grade the finish surface of all planted areas to meet the grades shown on the Drawings.

C. 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.

D. 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 Owner/Authorized Representative in the event that conditions make it impossible to achieve positive drainage.

E. Provide smooth, rounded transitions between slopes of different gradients and direction. Modify the grade so that the finish grade before adding mulch and after settlement is one or two inches below all paving surfaces or as directed by the Drawings.

3.07 CLEANING

A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.

B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.

C. Place erosion control matting over all soil surfaces not stabilized through planting. Erosion control matting to be left in place. See Section 312500 Erosion and Sediment Control for requirements of erosion control matting.

END OF SECTION 329200