

**SECTION 024119
SELECTIVE DEMOLITION**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Demolition and removal of selected portions of building or structure.
- 2. Demolition and removal of selected site elements.
- 3. Salvage of existing items to be reused or recycled.

B. Related Requirements:

- 1. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade improvements not part of selective demolition.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner for reuse.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

- B. Historic items, relics, antiques, and other salvageable objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully remove items to be salvaged in a manner to prevent damage and promptly return to Owner or store as directed by Owner.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Hancock Playground, 147 Master Street, Philadelphia, PA 19122.

1.6 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property for environmental protection and for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Coordination of Owner's continuing occupancy of existing building and of Owner's partial occupancy of completed Work.
- C. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit before Work begins.
- D. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 FIELD CONDITIONS

- A. Owner will occupy building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

- B. Notify Landscape Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Landscape Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- D. Storage or sale of removed items or materials on-site is not permitted.
- E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.9 COORDINATION

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Survey of Existing Conditions: Record existing conditions by use of measured drawings.
 - 1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3.2 UTILITY SERVICES AND MECHANICAL / ELECTRICAL SYSTEMS

- A. Existing Services / Systems to Remain: Maintain services / systems indicated to remain and protect them against damage.
- B. Existing Services / Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off utilities with utility companies.
 - 2. If services / systems are required to be removed, relocated, or abandoned, provide temporary services / systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Disconnect, demolish, and remove stormwater systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.

3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of selective demolition.

- C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. Remove and demolish existing above- and below-grade construction as indicated and only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 - 2. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following manufacturer's written instructions. Keep paint off surfaces that will remain exposed.
 - 5. Do not use cutting torches.
 - 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 7. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 8. Dispose of demolished items and materials promptly.
- C. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- D. Removed and Salvaged Items:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area as directed by Owner.

5. Protect items from damage during transport and storage.

E. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

F. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Landscape Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. Legally remove and dispose of demolition waste materials from Project site.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn demolished materials.

C. Recycling: Contractor is encouraged to recycle materials when possible.

3.6 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 100610

EXTERIOR SIGNAGE

PART 1 REQUIRED SUBMITTALS

1.1 QUALIFICATIONS

A. The awarded Fabricator will have provided their qualifications at or prior to the time of Bid. The Fabricator is required to submit as part of the submittal process additional qualifications for any subcontractors, including but not limited to, installers, electrician, specialty sub-contractor and/or project managers not included or accepted with the bid award of the project. The Owner reserves the right to accept or reject any sub-contractor and/or project manager submitted for review. Qualifications should include: a minimum of 5-10 years relevant experience and shall provide information that illustrates the following:

1. Firm/Personnel qualifications.
2. Projects of similar size and complexity.
3. Demonstration of high quality craftsmanship.
4. Project management team and experience.

B. Regional Vendors:

1. Urban Sign and Crane
527 E. Chestnut Avenue
Voorhees, NJ 08360
856.691.8388
www.urbansigncompany.com
2. M.S. Signs, Inc.
6 Morris Street
Paterson, NJ 07501
973.569.1111
www.mssign.com
3. L&H Sign Company
425 North 3rd Street
Reading, PA 19601
www.lhsigns.com
4. Compass Sign Co LLC
1505 Ford Road
Bensalem, PA 19020
215.639.677
www.compass-sign.net
5. Allied Environmental Signage
69 Megill Road

Farmingdale, NJ 07727
732.751.1818
www.allied-signs.com

6. Or proposed qualified manufacturer, qualifications to be submitted to the owner for approval.

1.2 SHOP DRAWINGS

- A. Submit one (1) electronic set of shop drawings as outlined below: Include plans, elevations, sections and large-scale details of sign construction, wording, and lettering layout. Show anchorages and accessory items. Provide graphic layouts of each individual sign face and message for each sign location. Show fabrication and installation details, including all sign components such as: extrusions, brackets, bracing, hardware, internal framing, etc. Alphabet of each type style required by the contract documents; upper and lowercase, with numerals, punctuation and accents. Shop drawings MUST include all field verified conditions and dimensions. Show installation and mounting heights.

1.3 PRODUCT SPECS AND WARRANTY INFORMATION

- A. Provide documentation outlining all project warranties, including both product and manufacturing. Submit cut sheets for all specified products.

1.4 SAMPLES

- A. Samples shall be clearly labeled on the back (where possible), designating item number, name of manufacturer, sign type and location. Fabricator shall submit a minimum of two (2) samples of each color and finish applied on each material type as indicated in the drawing package. Samples should represent the final finish of each element and will be used as control samples for production approval. Samples should represent extreme variations in color and texture that might occur during fabrication. Please submit the following samples as specified in the drawing package, list project specific submittal requirements.

1.5 COLOR SAMPLES

- A. Color sample(s) for each specified color, process and finish. Color submittal(s) shall be submitted on each relevant substrate specified.

1.6 MATERIAL SAMPLES

- A. Material samples of each specified Material (M1, M2 etc.) in each color and finish specified. Submit manufacturer's standard color palette where required for color and finish selection.

1.7 CHPL SAMPLES

- A. Custom High Pressure Laminate (CHPL) manufacturer must supply project-specific electronic PDF proofs for content approval and minimum 8" x 10" x .060" actual material lab samples for color and finish approval from production-ready digital art work and

1.8 PAPER TEMPLATES

- A. Templates should be fully assembled or have complete registration marks for assembly. Fabricator shall provide for Designer approval, full-size paper templates for review and approval in the field of the following sign types:

- 1. CUS.1

1.9 SIGN SAMPLES

- A. Sign Contractor shall construct the following sign samples/mock-ups:

- 1. PID-4 (only required by Fabricator on initial fabrication contract for this program)

1.10 REVIEW PROCESS

- A. Each reviewing party, i.e. Designer, Owner, Architect, etc. will each require a minimum of 10 business days to review all submittals. The process and sequence of submittal and review shall be discussed and agreed to during the project kickoff meeting. Designer reserves the right to reject any submittal (shop drawing, sample, etc.) that does not satisfy the requirements as outlined in this document including but not limited to: field conditions, construction, finish or color requirements. Submit additional drawings/samples as required to obtain final approval.

PART 2 PROJECT REQUIREMENTS

2.1 WORK INCLUDED

- A. Site verification, fabrication, and delivery-of all sign types and quantities indicated in the final approved Copy List and Sign Location Plan. Installation of signs may be completed by the Fabricator or the General Contractor. Fabricator to verify the sign quantities from the Copy List and Sign Location Plans and if discrepancies exist, notify the Designer of any such discrepancies. Work shall include all support structures and fasteners required for installation. Work shall include all design engineering needed to produce the project to comply with all applicable municipal, state and federal code, and structural soundness. Fabricator is responsible for submitting engineered drawings signed and sealed by structural engineer. Fabricator to provide all services, subcontractors, labor, materials and equipment needed to complete the work described in this design drawings and specifications document. It is the Fabricator's responsibility to have all drawings signed and sealed by a Structural Engineer. Fabricator shall visit site before construction begins and inspect each proposed sign location. Any issues or concerns shall be communicated to the Designer in writing within twenty-four (24) hours. Upon award of the bid, the selected Fabricator shall arrange a meeting with the Designer to review the scope of work. Fabricator will be responsible for generating evacuation maps at all programmed locations based on template provided by Designer. Fabricator will be responsible for providing the Designer and Owner a project schedule that outlines durations for all work including delivery dates for submittals and Designer and Owner review time. Sign Contractor shall update and reissue the schedule throughout the project and communicate all changes/impacts on the schedule to Designer and Owner. Prior to installation, the

Fabricator shall conduct a pre-install walk through with the Designer and Owner to address any potential issues/questions. At the substantial completion of the project the Fabricator shall perform a walk-through with the Designer and Owner to inspect the installation and create a punch list of all unsatisfactory items. Fabricator is required to complete all punch list items within 3-4 weeks of receipt of punch list.

2.2 WORK QUALITY

- A. All work to be done in a professional manner and to the highest trade standards. Fabricator is responsible for insuring the quality standards above for all related professional and trade subcontracted work including: general carpentry, masonry, electrical, landscaping, or utilities required for the installation of all sign types as described, unless otherwise agreed to by Owner. All subcontracted work must meet the general accepted professional standards.

2.3 REFERENCE STANDARD

- A. The following materials reference standards will apply to the work materials (use most current version of reference standards):
1. ASTM A36 Structural Steel
 2. ASTM A123 Zinc (Hot Galvanized) coatings on products fabricated from rod, pressed, and forged steel shape, plates and bars.
 3. ASTM B221 Aluminum-alloy extruded bars, rods, wire, shapes and tubes.
 4. ASTM D822 Light and Water exposure apparatus (Carbon-arc type) for testing paint, varnish, lacquer, and related products.
 5. ASTM E84 Surface-burning characteristics of building materials, lacquer and related products.
 6. AWI Comply with applicable requirements of "Architectural Woodwork Quality Standards" published by the Architectural Woodwork Institute.
 7. CDA Copper Development Association, Inc.
 8. FS L-P-391 Plastic sheet, rods and tubing, rigid, cast materials
 9. FS L-P-387 Plastic sheet, laminated, thermosetting
 10. PS-1 Construction and industrial plywood
 11. PEI Porcelain Enamel Institute
 12. TM 8135 QQ-B-613 (Fed Spec) Brass, Muntz 280
 13. UL-943 Fluorescent lamp ballasts quality

2.4 WARRANTIES

- A. Warrant all products (including, but not limited to: materials, hardware and finishes) against any and all defects based on manufacturers' supplied warranties from date of installation. All manufacturer warranties should be submitted to the Designer and Owner for review.
1. Vinyl die-cut letters: warranted against delimitation from substrate.
 2. Paint finishes: warranted against fading or chalking, corrosion developing beneath paint surfaces of the support systems (except for obvious vandalism or other external damage to the paint surfaces).
 3. Corrosion of the fastenings.

4. The signs not remaining true and plumb on their supports during normal wear.
 5. Fading of the colors when matched against a sample of the original color and material.
 6. Discoloration of metal finishes.
 7. Adhesives, e.g. tape and epoxy
 8. Paneling not remaining true and plumb on their supports during normal wear.
- B. The Fabricator shall correct any and all material and/ or workmanship defects which may appear during the warranty period by restoring defective work to the standard of the contract documents at no cost to the Owner and to the Owner's satisfaction. Corrections include, but are not limited to: disfiguring of any surface due to chalking, rusting, bubbling, or other disintegration of the sign face or of the messages or of the edge finish of the sign inserts or panel.
- C. Manufacturer warrants that under normal wear and use the installation and sign posts will not crack or fail for a period of one (10) years from the date of substantial completion.
- D. Installer shall provide labor and material warranty for a period of (1) full year from the date of substantial completion.

2.5 CHPL SAMPLES

- A. Manufacturer warrants that under normal wear and use the workmanship and materials used in the CHPL product purchased from the Manufacturer will meet the standards set forth on the applicable specification materials and that the product will not delaminate, peel, blister, crack or fade for a period ten (10) full years from the date of purchase.
- B. In the event that the product does not perform as warranted:
1. Manufacturer shall be allowed to conduct an on-site inspection and investigation, or be provided digital images of defects
 2. Manufacturer shall work directly with the end-user to resolve any warranty matter,
 3. The sole remedy will be the repair or replacement of the defective product at the sole discretion of the Manufacturer, and/ or
 4. The repair or replacement by Manufacturer shall be limited to the re-manufacture and shipment of the replacement or repaired product to the site of the end-user's product.
- C. This warranty only applies to the manufacture and material used in the manufacture of the product. Manufacturer shall not be liable for any other costs, including but not limited to installation, labor or other costs or expenses. Any repair or replacement shall be warranted for a period up to the remaining life of the original warranty. Further the repair or replacement costs incurred by Manufacturer shall not exceed the purchase price paid for the product.

2.6 QUALITY ASSURANCE

- A. Work done and materials furnished shall meet the highest industry standards in every respect and, unless otherwise specified, materials and equipment shall be new and of the latest design.
- B. The Design Intent Package should provide everything necessary for a complete contract.
- C. In the event of conflict or omission, the Fabricator shall consult the Designer for resolution. All clarifications are to be made in writing in the form of an RFI from the Fabricator to the Designer.
- D. Use only personnel thoroughly skilled and experienced with the products and method for fabrication and installation of signage specified.
- E. The Owner shall reserve the right to reject any shop drawings, samples or other submittals, as well as any finished product or installation, that cannot meet the standard of quality established. Any such decision will be considered final and not subject to recourse.
- F. Materials and hardware not specified, but necessary to the complete functioning of the sign, shall conform to the quality level established.
- G. Substitutions of items specifically indicated in this specifications package that serve the same function with equal performance will be considered upon submission of substitution.

2.7 PROTECTION AND STORAGE

- A. Fabricator is responsible for storage of signs and assemblies and protection from damage at the shop, in transit and until erected in place, complete, inspected and accepted by Owner.
- B. Fabricator is responsible for the replacement pilferage both prior to and until inspection and acceptance of installation by the Owner.

2.8 INSPECTION

- A. All production materials, color samples and paints, fabricated or partially fabricated items shall be available for inspection, on-site or in the shop, by the Owner or Designer during the manufacturing process and until final delivery, installation and acceptance, to determine compliance with the requirements of these specifications. Shop inspection approvals do not guarantee final acceptance of installed work.

2.9 INSTALLATION

- A. Install sign units and components with concealed fasteners unless otherwise shown. Refer to drawings for general method of installation. Verify each surface in field to determine appropriate mounting hardware. Fabricator is responsible for determining where below ground or in-wall structural tie-ins may be required. All elements should be installed true and plumb in accordance with the design intent of this document. Sign location drawings show approximate locations of signs. Fabricator, Designer and Owner shall conduct a pre-install mark out walk through to confirm all locations and identify areas of conflict. Fabricator is responsible for determining the location of underground structures and utilities on ground-mounted signs. Any conflicts should be brought to the attention of the Owner and Designer.

2.10 REGULATORY REQUIREMENTS

- A. All installation work shall comply with applicable municipal, state and federal codes, sign ordinances and ADA guidelines for handicapped and fire/life safety signing.
- B. All OSHA safety requirements will be implemented during fabrication and installation as needed or required to comply with safety regulations.
- C. All field/site work shall be conducted in compliance with the Owner/Construction Manager's requirements/ regulations for the site, particularly areas open and accessible to the public. Work area protection shall be required as needed and all site-specific rules should be reviewed and outlined during the project kick-off meeting.

2.11 CLEAN UP

- A. Daily and upon completion of installation remove all waste, dirt, wrappings and excess materials, tools and equipment, and thoroughly clean all surfaces to the satisfaction of the Owner.

2.12 REORDERING

- A. Reordering all items specified in this package shall be available to the Owner in additional quantities for a period of 10 years after completion of all work called for in this specification.

PART 3 QUALITY OF MATERIALS

3.1 ALUMINIUM

- A. Aluminum shall be of best commercial quality and the various forms shall be straight and true. There shall be no scratches, scars or buckles. Size thickness and finish of aluminum shall be per NAAMM "Metal Finishes Manual". Comply with the following industry standards.
- B. Aluminum sheets shall conform to ASTM B209 6061-T6
- C. Aluminum extrusions shall conform to ASTM B241 6063 T6. Wall thickness shall be a minimum of 1/8" thick unless otherwise shown.
- D. Brushed Finishes-Brush with abrasive of increasing grit# in a linear directional pattern.
- E. Final surface shall have visible grain pattern to match sample approved by Designer. Spray with clear protective finish.
- F. Polished Finish-Brush with abrasive of increasing grit #. Buff to a mirror finish with no visible grain. Match sample approved by Designer. Spray with clear protective finish.
- G. Non-Directional Finish-Brush with abrasive mounted in a random orbital sander. Match sample approved by Designer. Spray with clear protective finish.

3.2 STAINLESS STEEL

- A. Structural Stainless steel shapes to be rolled or laser fused, as manufactured by Stainless Structurals, LLC. (936-538- 7600, www.stainless-structurals.com)
- B. Chromium stainless steel sheet. Use type 304 or type 316 stainless steel with 16% chromium and 10% nickel.
- C. For steel exposed to view on completion, provide materials having flat, smooth surfaces without blemishes. Do not use materials whose surfaces exhibit pitting, seam marks, roller marks, rolled trade names, or roughness. Stainless Steel Plate, Sheet and Strip: Provide stainless steel plate, sheet, or strip, AISI Type 302, complying with requirements of ASTM A 167.
- D. Stainless Steel Finishes: Finish designations prefixed by "AISI" conform to the system established by the American Iron and Steel Institute for designating finishes.
- E. Finish: Bead blasted & Pickled.

3.3 CUSTOM HIGH PRESSURE LAMINATE

- A. Provide Custom High pressure laminate as manufacturer by iZone or an approved equal.
- B. Custom High Pressure Laminate material composed of required layers of phenolic resin impregnated brown kraft filler paper to produce specified thicknesses, surfaced by a layers of melamine overlay, graphics imaged on saturation grade paper with UV resistant pigment based process color inks, and with an optically clear UV overlay that will resist no less that 99% of all sunlight and UV rays, as well as provide a graffiti resistant surface that allows for removal with standard cleaners.
- C. Layers of material are to be assembled, and heat/ pressure consolidated at approximately 1200 PSI at temperatures exceeding 275° Fahrenheit at manufacturer's prescribed time frames.
- D. All manufacturing processes of printing, pressing, machining, finishing and crating to be accomplished within a single standalone manufacturing facility to ensure consistent quality control and providing standard product delivery times of three weeks.

3.4 WOOD

- A. #1 grade black locust lumber. Sustainably harvested. Eased edges. Apply a UV clear coat to enhance the wood grain and provide additional protection.

3.5 REFLECTIVE GRAPHICS

- A. Provide 3M Scotchlite enclosed lens reflective sheeting or approved equal.

3.6 CONCRETE

- A. All concrete footers are to be poured in place.

- B. All concrete footers are to be poured from thoroughly mixed and agitated concrete in order prevent unreasonable voids in the finished casting.
- C. Concrete to meet specified "PSI Test" for strength: 3,500 psi minimum. Concrete to meet specified "Slump test" before pouring footing. All footings to extend past the frost line.
- D. Any footers or posts for signs will be placed in wet concrete and allowed to fully cure in place before any signage is attached or mounted to it in any way. All exposed faces of concrete shall receive a finish to match existing, adjacent surfaces.

3.7 VHB FOAM TAPES

- A. Provide 3M Scotch VHB 4930
- B. Adhesive shall be Acrylic VHB
- C. Carrier shall be closed cell foam

3.8 ACCESSORIES ANCHORS AND FASTENINGS

- A. Provide anchors and fasteners required to secure work in place. Do not expose fastenings on surface of sign panels unless specifically noted otherwise. Do not deform, distort or discolor sign face surfaces by attachment of concealed fastenings.
- B. All fastenings shall be non-corrosive and resistant to oxidation or other corrosive action, of the same composition completely through their cross sections, particularly when used below grade. Use highest quality stainless steel hardware and fasteners.
- C. Anchors, inserts or fasteners shall be compatible with sign materials, shall not result in galvanic action or chemical interaction of adhesives and shall have demonstrable and sufficient strength for intended use.
- D. Steel anchors and fastenings for exterior use shall be galvanized in accordance with ASTM A153.
- E. Fabricate and install signs with fastenings to withstand all actions imposed by use; 30 psf wind perpendicular to surfaces, water, ice, snow loads and similar forces.
- F. Anchor bolts in concrete shall be cast in place. Fabricator shall furnish instructions for the setting of anchors and bearing plates. Fabricator shall ascertain that the items are properly set during the process of the work.
- G. Secure work with fastenings of same color and finish as the components they secure where they are exposed to view, unless noted otherwise. All exposed fasteners must be vandal resistant and have vandal-proof "spanner" type slots to be removed only with a special driver head.

3.9 DISPLAY CASES

- A. Provide Display Cases as manufacturer by Allen Display (allendisplay.com) or an approved equal.
1. **24wx36h**, 1 Door Enclosed Bulletin Board, Outdoor Usage, Frame Finish: Sat in Aluminum, hinged, shatter-resistant acrylic door with lock, weatherized rear panel, thick rubber door seal, interior back with tackable vinyl, self healing to withstand repeated tacking, exterior case depth is 2"
 2. **36wx48h**, 1 Door Enclosed Bulletin Board, Outdoor Usage, Frame Finish: Satin Aluminum, hinged, shatter-resistant acrylic door with lock, weatherized rear panel, thick rubber door seal, interior back with tackable vinyl, self healing to withstand repeated tacking, exterior case depth is 2"
 3. **48wx36h**, 2 Door Enclosed Bulletin Board, Outdoor Usage, Frame Finish: Satin Aluminum, hinged, shatter-resistant acrylic door with lock, weatherized rear panel, thick rubber door seal, interior back with tackable vinyl, self healing to withstand repeated tacking, exterior case depth is 2"
- B. **Self-healing Tack Surface** Provide Tack Surface as manufacturer by Rubber Flooring Inc. (rubberflooringinc.com) or an approved equal.
1. Tough Rubber Roll - 3' or 4' widths and custom lengths - 5mm thick recycled rubber buffings are the cleanest, strongest, and most consistent raw material as compared to some of the cheap recycled crumb rubber alternatives available. Product is made in the U.S.A.

**SECTION 116800
PLAY EQUIPMENT AND STRUCTURES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes equipment as follows:
 - 1. Playground Equipment manufactured by KOMPAN.
 - 2. Fitness Equipment manufactured by KOMPAN.

1.3 DEFINITIONS

- A. Definitions in ASTM F1487 apply to Work of this Section.
- B. IPEMA: International Play Equipment Manufacturers Association.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Hancock Playground, 147 Master Street, Philadelphia, PA 19122.
 - 1. Attendees to include KOMPAN Representative, General Contractor, and Equipment Installer.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of playground and fitness equipment.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Include fall heights and use zones for playground and fitness equipment, coordinated with the critical-height values of protective surfacing specified in Section 321816.13 "Playground Protective Surfacing."

- C. Samples for Initial Selection: For each type of exposed finish.
 - 1. KOMPAN color charts.
 - 2. Include Samples of accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish on the following products:
 - 1. Include Samples of accessories to verify color and finish selection.
 - 2. Posts and Rails: Minimum 6 inches long.
 - 3. Platforms: Minimum 6 inches square.
 - 4. Molded Plastic: Minimum 3 inches square.
- E. Product Schedules: For Playground Equipment and Fitness Equipment, use same designations as indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and testing agency.
- B. Product Certificates: For each type of playground and fitness equipment.
- C. Material Certificates: For the following items:
 - 1. Shop finishes.
- D. Field quality-control reports.
- E. Sample Warranty: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For playground and fitness equipment and finishes to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm whose playground and fitness equipment components have been certified by IPEMA's third-party product certification service.
 - 1. Playground and fitness equipment manufacturer must be approved by Philadelphia Parks and Recreation (PPR).
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of playground and fitness 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 and use.
 2. KOMPAN Warranty Period:
 - a. Lifetime Warranty: galvanized structural parts including steel poles, cross beams, floor frames, and top brackets; stainless steel hardware; and EcoCore™ and other HDPE panels.
 - b. Ten (10) Year Warranty: HPL floors and panels; galvanized and aluminum metal parts with painted top layer; other galvanized metal parts; other stainless steel parts; Corocord rope; “S” clamps of stainless steel; solid plastic parts; hollow plastic parts; non-painted metal parts; Robinia & Siberian larch wood; and other engineered timber.
 - c. Five (5) Year Warranty: resin coated plywood plates; other painted metal parts; springs and ball bearing assemblies; other rope and net constructions; and concrete elements.
 - d. Two (2) Year Warranty: movable plastic and metal parts; EPDM rubber membranes material; electronic components; and sun shades and sail solutions.
 3. KOMPAN Warranty Coverage:
 - a. The warranty applies to KOMPAN’s products for the time periods described for each product type above and with the limitations described in the warranty. The warranty period applies from the date of purchase by the first customer. The warranty covers only defects in materials. KOMPAN’s liability under the warranty is limited to repair or replacement of defective products, without charge, at KOMPAN’s discretion. Defective electronic components will be delivered and changed by a KOMPAN ICON Professional installer free of charge.
 - b. The warranty applies only if products have been properly installed according to the instructions provided by KOMPAN, and maintained correctly according to the KOMPAN Maintenance Manual. The warranty for ICON electrical components is dependent on those products being installed by an ICON trained and approved installer.
 - c. The warranty does not cover damage caused by accident, improper care, negligence, normal wear and tear, surface corrosion on metal parts, discolored

surfaces and other cosmetic issues or failures due to misuse or vandalism. Natural changes in wood over time are considered cosmetic issues and are not covered.

- d. KOMPAN provides non-KOMPAN branded products and installation services performed by certified third party suppliers. The general KOMPAN warranty does not apply to such non-KOMPAN branded products and installation services, which may carry their own warranties. KOMPAN will pass on information about such warranties where possible.
- e. KOMPAN's Lifetime Warranty is in effect for the lifetime of the product until the product is uninstalled and / or taken out of use.
- f. KOMPAN's general terms and delivery conditions apply and supplement the warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain playground and fitness equipment from the following approved manufacturer:
 - 1. KOMPAN Inc.
Matt Burns, Principal Sales Representative
Mobile: 310-775-5082
Email: MatBur@Kompan.com
www.kompan.us
- B. Playground and fitness equipment and components shall have the IPEMA Certification Seal.

2.2 PERFORMANCE REQUIREMENTS

- A. Safety Standard: Provide playground equipment according to ASTM F1487.

2.3 PLAYGROUND EQUIPMENT

- A. Single-Bay Swing (Item A): KOMPAN Portal Swing, #KSW950458
 - 1. Height: 6 feet, 7 inches
 - 2. Legs & Connector: Hot-Dipped Galvanized Steel, Color: Yellow
 - 3. Crossbeam: Hot-Dipped Galvanized Steel, Color: Yellow
 - 4. Swing Hang: Galvanized and equipped with anti-wrap suspension
 - 5. Swing Seat (Item B): KOMPAN Swing Module Baby Seat, #SW990022
 - a. Color: Black
 - b. Chains: Stainless Steel
 - c. Quantity: Two (2) Swings

- B. Double-Bay Swing (Item C): KOMPAN Two-Bay Portal Swing. #KSW950457
 - 1. Height: Eight feet
 - 2. Legs & Connector: Hot-Dipped Galvanized Steel, Color: Yellow
 - 3. Crossbeam: Hot-Dipped Galvanized Steel, Color: Yellow
 - 4. Swing Hang: Galvanized and equipped with anti-wrap suspension
 - 5. Swing Seat, Standard (Item D): KOMPAN Belt Seat Eight Feet Height, #SW990011
 - a. Color: Black
 - b. Chains: Stainless Steel
 - c. Quantity: Two (2) Swings
 - 6. Swing Seat, ADA (Item E): KOMPAN Swing Seat ADA 5-12, #S67856
 - a. Color: Black
 - b. Chains: Stainless Steel
 - c. Quantity: One (1) Swing

- C. Toddler Parkour (Item F): KOMPAN Talk & Tumble with Net Under 2, #PCM712227
 - 1. Panel Colors: Custom, to be determined by Landscape Architect
 - 2. Submit Samples for Review.

- D. Toddler Slide (Item G): KOMPAN Playhouse Slide, #MSC620438
 - 1. Slide: Stainless Steel
 - 2. Panel Colors: Custom, to be determined by Landscape Architect
 - 3. Submit Samples for Review.

- E. Embankment Slide (Item H): KOMPAN Open-Straight Stainless-Steel Embankment Slide, #CCC712001-12300
 - 1. Slide: Stainless Steel
 - 2. Slide Width: 3'-4"
 - 3. Slide Length: 7'-11"

- F. Maxite Rope Climber (Item I): KOMPAN Maxite with Add-Ons, #COR105241
 - 1. Steel Color: Yellow
 - 2. Rope Color: Yellow
 - 3. Membranes: Black
 - 4. Panels: Yellow
 - 5. Aluminum Balls: Gray

2.4 FITNESS EQUIPMENT

- A. Suspension Trainer (Item J): KOMPAN Suspension Trainer, #FAZ40633
 - 1. Steel Posts: Blue

- B. Parallel Bars (Item K): KOMPAN Parallel Bars, #FSW30831
 - 1. Steel Posts: Blue

- C. Step, 8-In. (Item L): KOMPAN Step, 8-In., #FAZ40635
 - 1. Steel Posts: Blue

- D. Step, 16-In. (Item M): KOMPAN Step, 16-In., #FAZ40634
 - 1. Steel Posts: Blue

- E. Fitness Stencil (Item N): KOMPAN Agility Dots, #SUR11200-001
 - 1. Paint Color: Yellow
 - 2. The recommended paints for this application on EPDM rubber are UV and weather resistant two component polyurethane with good long-term elasticity and abrasion resistance. The material contains solvent and is a system especially suited for all synthetic sports and playing surfaces.
 - 3. See KOMPAN product manual for more information.

2.5 CAST-IN-PLACE CONCRETE

- A. Concrete Materials and Properties: Dry-packaged concrete mix complying with ASTM C387/C387M and mixed at site with potable water, according to manufacturer's written instructions, for normal-weight concrete with minimum 28-day compressive strength, slump, and aggregate size per manufacturer's instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for earthwork, subgrade elevations, surface and subgrade drainage, and other conditions affecting performance of the Work.
 - 1. Do not begin installation before final grading required for placing playground and fitness equipment and protective surfacing is completed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with KOMPAN's written installation instructions for each equipment type unless more stringent requirements are indicated. Anchor playground equipment securely, positioned at locations and elevations indicated.
 - 1. Maximum Equipment Height: Coordinate installed fall heights of equipment with finished elevations and critical-height values of protective surfacing. Set equipment so fall heights and elevation requirements for age group use and accessibility are within required limits. Verify that 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 ACI 301, dry-packaged concrete-mix manufacturer's written instructions for measuring, batching, mixing, transporting, forming, and placing concrete.
 - 1. Set equipment posts in or on concrete footing per equipment KOMPAN's instructions. 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: Follow equipment KOMPAN's written instructions and drawings to ensure correct installation of anchorages for equipment.
 - 3. Finishing Footings: Smooth top, and shape to shed water.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: CSPI-certified KOMPAN representative, or another qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections:
 - 1. Perform inspection and testing for each type of installed playground and fitness equipment according to ASTM F1487.
- C. Playground and fitness equipment items will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Notify Landscape Architect forty-eight (48) hours in advance of date(s) and time(s) of testing and inspection.

END OF SECTION 116800

SECTION 311000
SITE CLEARING & TREE PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Protecting existing vegetation to remain.
 - 2. Removing existing vegetation.
 - 3. Clearing and grubbing.
 - 4. Removing above- and below-grade site improvements.
 - 5. Disconnecting, capping or sealing, and removing site utilities.
 - 6. Temporary erosion and sedimentation control.

1.3 DEFINITIONS

- A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow.
- D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings.
- F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Hancock Playground, 147 Master Street, Philadelphia, PA 19122.

1.5 MATERIAL OWNERSHIP

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

1.6 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
 - 1. Use sufficiently detailed photographs or video recordings.
 - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.
- B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.7 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.
- B. Utility Locator Service: Notify PA One Call at least three (3) days before commencing site clearing operations.
- C. Do not commence site clearing operations until temporary erosion- and sedimentation-control and tree and plant-protection measures are in place.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
 - 1. Obtain approved borrow soil material off-site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner, at no cost to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

- A. Protect trees and plants designated to remain on-site as shown on Plans and Details.
- B. Repair or replace trees, shrubs, and other vegetation designated to remain or be relocated that are damaged by construction operations, at directed by Landscape Architect.

3.4 EXISTING UTILITIES

- A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
 - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.
- B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.

1. Arrange with utility companies to shut off indicated utilities.
- C. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 1. Notify Owner not less than three days in advance of proposed utility interruptions.
 2. Do not proceed with utility interruptions without Owner's written permission.
- D. Excavate for and remove underground utilities indicated to be removed.

3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 1. Do not remove trees, shrubs, and other vegetation designated to remain or to be relocated.
 2. Grind down stumps and remove roots larger than 2-inches in diameter, obstructions, and debris to a depth of 18-inches below exposed subgrade.
 3. Use only hand methods or air-spade for grubbing within protection zones.
 4. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 1. Place fill material in horizontal layers not exceeding a loose depth of 6 inches, and compact each layer to a density equal to adjacent original ground.

3.6 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
- B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 311000

**SECTION 312000
EARTH MOVING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for slabs-on-grade, pavements, turf and grasses, and plants.
3. Excavating and backfilling for structures.
4. Drainage course for concrete slabs-on-grade.
5. Subbase course for concrete pavements.
6. Subbase course for asphalt paving.

B. Related Requirements:

1. Section 024119 "Selective Demolition" for demolition and removal and/or salvage of select site elements.
2. Section 311000 "Site Clearing" for site stripping, grubbing, and removal of above- and below-grade improvements and utilities.
3. Section 329200 "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.
4. Section 329300 "Plants" for finish grading in planting areas and tree and shrub pit excavation and planting.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

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

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

- E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
 - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Landscape Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Landscape Architect. Unauthorized excavation, as well as remedial work directed by Landscape Architect, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Hancock Playground, 147 Master Street, Philadelphia, PA 19122.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
 - 1. Geotextiles.
- B. Samples for Verification: For the following products, in sizes indicated below:
 - 1. Geotextile: 12 by 12 inches.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.

- B. Material Test Reports: For each borrow soil material proposed for fill and backfill as follows:
 - 1. Classification according to ASTM D2487.
 - 2. Laboratory compaction curve according to ASTM D1557.
- C. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

1.7 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
 - 3. Owner will occupy building immediately adjacent to project area. Coordinate with Owner and conduct earth-moving operations so Owner's operations will not be disrupted.
- B. Utility Locator Service: Notify PA One Call at least three (3) days before beginning earth-moving operations.
- C. Do not commence earth-moving operations until temporary site fencing, erosion- and sedimentation-control measures specified in Section 311000 "Site Clearing" are in place.
- D. Do not commence earth-moving operations until tree protection measures are in place.
- E. The following practices are prohibited within tree protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water.
 - 6. Excavation or other digging unless otherwise indicated.
 - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- F. Do not direct vehicle or equipment exhaust towards protection zones.
- G. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

1.8 QUALITY ASSURANCE

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

- B. Codes and Standards: Perform work in compliance with applicable requirements of governing authorities having jurisdiction and follow geotechnical recommendations. 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.
1. The Standards for Soil Erosion and Sediment Control in Pennsylvania, as published by the PA Department of Environmental Protection, shall be applicable where the work is not specifically detailed on the Drawings or by local requirements.
- C. 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, or other mulches shall be held in readiness to deal immediately with emergency problems of erosion. All erosion control checks and structures shall be inspected weekly and after heavy rainfalls, and if damaged, repaired or replaced.
- D. A Geotechnical Testing Agency shall be retained by the Contractor to perform soil testing and inspection services for quality control during earthwork and site grading operations.
1. The Contractor shall submit data demonstrating the qualifications of the Geotechnical Testing Agency for approval by the Engineer.
 2. The Geotechnical Testing Agency shall be qualified according to ASTM E329 to conduct soil materials and rock definition testing as documented according to ASTM D3740 and ASTM E548.
 3. The Geotechnical testing agency shall have on staff a professional engineer who is legally authorized to practice in the jurisdiction where the Project is located and who is experienced in providing geotechnical engineering.
 4. The Geotechnical Testing Agency shall perform tests and provide the services specified below and submit test reports to the Owner and Landscape Architect. All test reports must be signed and sealed by the qualified professional engineer responsible for their preparation.
 5. Testing shall be performed in the presence of a county representation.
- E. Field Engineering: A Surveyor shall be retained by the Contractor to provide field engineering services required for proper completion of the work including, but not necessarily limited to, layout work and setting of grades, slopes, and levels.
1. The Contractor shall submit data demonstrating qualifications of persons proposed to be engaged for field engineering services for approval by the Landscape Architect.
 2. The Surveyor shall submit documentation verifying the layout, grades, slopes, and levels are in conformance with the drawings and specifications.
 3. The Contractor shall locate and protect control points and reference points throughout the progress of work.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide approved borrow soil materials for all site soils.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D2487
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D2487, or a combination of these groups.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and zero to 5 percent passing a No. 8 sieve.
- I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and zero to 5 percent passing a No. 4 sieve.
- J. Sand: ASTM C33/C33M; fine aggregate.
- K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 GEOTEXTILES

Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Apparent Opening Size: No. 60 sieve, maximum; ASTM D4751.
3. Permittivity: 0.02 per second, minimum; ASTM D4491.
4. UV Stability: 50 percent after 500 hours' exposure; ASTM D4355.

2.3 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:
 1. Red: Electric.
 2. Yellow: Gas, oil, steam, and dangerous materials.
 3. Orange: Telephone and other communications.
 4. Blue: Water systems.
 5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 DEWATERING

- A. Provide dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.
- B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

- D. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

3.3 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials. No additional compensation will be made for replacement of unsatisfactory soil materials.
 - 2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. 24 inches outside of concrete forms other than at footings.
 - b. 12 inches outside of concrete forms at footings.
 - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
 - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - e. 6 inches beneath bottom of concrete slabs-on-grade.
 - f. 6 inches beneath pipe in trenches and the greater of 24 inches wider than pipe or 42 wide.

3.4 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
- B. Excavations at Edges of Tree- and Plant-Protection Zones:
 - 1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

3.5 EXCAVATION FOR WALKS AND PAVEMENTS

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

3.6 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
 - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
 - 1. Clearance: 12 inches each side of pipe or conduit.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
- D. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
 - 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- E. Trenches in Tree- and Plant-Protection Zones:
 - 1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 - 2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

3.7 SUBGRADE INSPECTION

- A. Notify Landscape Architect when excavations have reached required subgrade.
- B. If Landscape Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Landscape Architect, without additional compensation.

3.8 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Landscape Architect.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Landscape Architect.

3.9 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 1. Stockpile soil materials away from edge of excavations. **Do not store within drip line of remaining trees.**

3.10 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 1. Construction below finish grade including, where applicable, sub drainage, damp proofing, waterproofing, and perimeter insulation.
 2. Surveying locations of underground utilities for Record Documents.
 3. Testing and inspecting underground utilities.
 4. Removing concrete formwork.
 5. Removing trash and debris.
 6. Removing temporary shoring, bracing, and sheeting.
 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.11 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings.
- D. Backfill voids with satisfactory soil while removing shoring and bracing.
- E. Initial Backfill:
 1. Soil Backfill: Place and compact initial backfill of subbase material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
 - a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- F. Final Backfill:

1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.
- G. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.12 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
1. Under grass and planted areas, use satisfactory soil material.
 2. Under walks and pavements, use satisfactory soil material.
 3. Under steps and ramps, use engineered fill.
 4. Under building slabs, use engineered fill.
 5. Under footings and foundations, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.13 SOIL MOISTURE CONTROL

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

3.14 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D1557:
1. Under structures, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95percent.

3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.15 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 1. Provide a smooth transition between adjacent existing grades and new grades.
 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
 1. Turf or Unpaved Areas: Plus or minus 1 inch
 2. Walks: Plus or minus 1 inch
 3. Pavements: Plus or minus 1/2 inch
- C. Finish Grading: Spreading of planting soil and finish grading shall be coordinated with the work of the Landscape Contractor and the seeding dates described in Section 329200 "Turf and Grasses". No work shall be performed until after verification of slopes and grades as described in this Section, and until after approval by the Landscape Architect.
- D. Any discrepancies which occur due to improper grading, disturbance, or erosion shall be regraded and re-rolled to the satisfaction of the Landscape Architect.

3.16 SUBBASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course under pavements and walks as follows:
 1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
 2. Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.
 3. When compacted subbase course is indicated to be 6-inches thick or less, place material in single layers. When indicated to be more than 6-inches thick, place material in equal layers, except no single layer more than 6-inches or less than 3-inches in thickness when compacted.

3.17 FIELD QUALITY CONTROL

- A. Notify Geotechnical Testing Agency for inspection and approval of subgrades and fill layers before subsequent construction is permitted thereon. Allow testing service to inspect and approve each subgrade and fill layer before further backfill or construction work is performed.
- B. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Landscape Architect.
- C. Testing agency will test compaction of soils in place according to ASTM D1556, ASTM D2167, ASTM D2937, and ASTM D6938, as applicable. Tests will be performed at the following locations and frequencies:
 - 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2,000 square feet or less of paved area or building slab but in no case fewer than three tests.
 - 2. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length but no fewer than two tests.
- D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.
- E. Certification: upon completion of this portion of the work, and as a condition of its acceptance, deliver to the Landscape Architect written reports from the Soils Engineer and the Surveyor.

3.18 PROTECTION

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

3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property. The Contractor is responsible for obtaining a legal disposal site and necessary permits, as required, for disposal of excess earthwork materials and debris. The Contractor also agrees to hold the Owner harmless from all damages, fines, etc. arising out of improper disposal, if not otherwise provided by law.
- B. Contractor is encouraged to recycle materials when possible.

END OF SECTION 312000

**SECTION 321723
PAVEMENT MARKINGS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Painted markings applied to asphalt paving.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Hancock Playground, 147 Master Street, Philadelphia, PA 19122.
 - 1. Review methods and procedures related to marking asphalt paving including, but not limited to:
 - a. Pavement aging period before application of pavements markings.
 - b. Review requirements for protecting pavement markings, including restriction of traffic during installation period.

1.4 ACTION SUBMITTALS

- A. Product Data: Include technical data and tested physical and performance properties.
- B. Shop Drawings:
 - 1. Indicate pavement markings, colors, and dimensions to adjacent work.
- C. Samples: For each exposed product and for each color and texture specified; on rigid backing, 8 inches square.

1.5 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Aexcel Inc.
 - 2. Dow Chemical Company (The)
 - 3. PPG Architectural Coatings
 - 4. Rust-Oleum Corporation
 - 5. Sherwin Williams

2.2 PAVEMENT-MARKING PAINT

- A. Pavement-Marking Paint, Alkyd: MP1 #32 alkyd traffic-marking paint. Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO M 248; colors complying with FS TT-P-1952F.
 - 1. Color: Yellow.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Landscape Architect.
- B. Allow asphalt paving to age for a minimum of 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.

- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

3.3 PROTECTING AND CLEANING

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

END OF SECTION 321723

SECTION 321816.13
PLAYGROUND PROTECTIVE SURFACING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Unitary, seamless surfacing.

1.3 DEFINITIONS

- A. Definitions in ASTM F2223 apply to Work of this Section.
- B. Critical Height: Standard measure of shock attenuation according to ASTM F2223; same as "critical fall height" in ASTM F1292. According to ASTM F1292, this approximates "the maximum fall height from which a life-threatening head injury would not be expected to occur."
- C. SBR: Styrene-butadiene rubber.
- D. Unitary Surfacing: A protective surfacing of one or more material components bound together to form a continuous surface; same as "unitary system" in ASTM F2223.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Color Sample Box
- C. Shop Drawings: For each type of protective surfacing.
 - 1. Include plans, sections, placement and penetration details, and attachment to substrates.
 - 2. Include accessories and edge terminations.
 - 3. Include patterns and colors as shown on the Drawings.
 - 4. Include fall heights and use zones for equipment and structures specified in Section 116800 "Play Equipment and Structures," coordinated with the critical heights for protective surfacing.

- D. Samples for Color Selection: TBD by Landscape Architect after review of Color Sample Box.
 - 1. Provide, at a minimum, 12 by 12-inch square or round samples of requested Color combinations for Color 1, Color 2 and Color 3 to Landscape Architect for color selection.
 - 2. Landscape Architect may request Color Combinations for Color 1, Color 2 and Color 3.
 - 3. Color 1, Color 2 and Color 3 shall not include Recycled black SBR particles.
 - 4. Color 1, Color 2 and Color 3 shall be composed of multiple colors.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of unitary surfacing product.
 - 1. Product Liability Insurance Certificate.
 - 2. IPEMA Certification.
- C. Field quality-control reports.
- D. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For playground protective surfacing to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer. The installer must have installed a minimum of ten (10) applications.
- B. Manufacturer Qualifications: Manufacturer must be in business for a minimum of five (5) years.
 - 1. Surface must be IPEMA certified.
- C. Approved Samples for Color 1, Color 2 and Color 3 shall be used as Quality Mock-Up for comparison with finished installation.
 - 1. Finished Installation shall match Approved Samples.

1.8 WARRANTY

- A. Special Warranty: Manufacturer and Installer agree to repair or replace components of protective surfacing that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Reduction in impact attenuation as measured by reduction of critical fall height.
 - b. Deterioration of protective surfacing and other materials beyond normal weathering.
2. Warranty Period: Five (5) years from date of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Materials must be delivered in good condition, in original unopened packages with labels intact.
- B. Store all materials protected from weather and at temperatures not less than 32 degrees F for any twelve (12) hour duration.

1.10 JOB CONDITIONS

- A. Ambient air temperatures shall be 45 degrees F or greater and rising at the time of installation of the surface and shall remain at 33 degrees F or greater for at least 24 hours after application.
- B. Adjacent materials and the surface shall be protected during installation, while curing and unattended, from weather and other damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain protective surfacing materials from single source and from single manufacturer.
 1. Provide geosynthetic accessories of each type of source recommended by manufacturer of protective surfacing materials.

2.2 PERFORMANCE REQUIREMENTS

- A. Impact Attenuation: Critical fall height tested according to ASTM F1292 for equipment as specified in the Drawings.
- B. Accessibility Standard: Minimum surfacing performance according to ASTM F1951.

2.3 UNITARY, DUAL-DENSITY, SEAMLESS SURFACING (Poured-in-Place (PIP) Rubber Safety Surface)

A. Description: Manufacturer's standard, site-mixed and applied, two-layer material with wearing layer over cushioning layer, with combined, overall thickness as required, tested for impact attenuation according to ASTM F1292 and for accessibility according to ASTM F1951.

1. Manufacturers: Subject to compliance with requirements, available manufacturer's offering products that may be incorporated into the Work include, but are not limited to the following:

a. DuraPlay, Inc.
150 Brownson Lane, Driftwood, TX 78619
Phone: 512-847-2473
www.duraplay.com

b. Surface America, Inc.
P.O. Box 157, Williamsville, NY 14231
Phone: 800-999-0555
www.surfaceamerica.com

1) Local Representative:
Recreation Resource USA, LLC
503 N. Walnut Road, #200, Kennett Square, PA 19348
Phone: 610-444-4402
www.recreation-resource.com

2. Wearing Layer: EPDM rubber or Thermoplastic Vulcanizate (TPV).

a. A manufactured rubber having density of 1mm to 4mm.

b. Colors: as approved by Landscape Architect based on samples provided by the Contractor.

c. Design: where colored pattern is required, provide as indicated on Drawings.

3. Cushioning Layer: Recycled black SBR particles.

a. Shall be cryogenically processed.

b. Shall be 3/8-inch shredded mesh or 6/20 mesh and contain less than 4% dust.

c. Shall be packed in suitable bags to protect SBR from moisture.

d. Base mat thickness: 1-inch to 4-3/4-inches, depending on critical fall height of playground and fitness equipment (see Drawings).

4. Binder: Elastic polyurethane pre-polymer, MDI based, low odor, capable of excellent weathering and binding characteristics. Binder shall contain no TDI Monomers.

5. Critical Height: As indicated on Drawings.
6. Overall Thickness: As indicated on Drawings.
7. Primer: A single-component moisture cured polyurethane primer.

2.4 TECHNICAL INFORMATION

A. Applicable Standards:

1. Shock attenuation under ASTM F1292: GMAX less than 200.
2. Head Injury Criteria: less than 1,000.
3. Non-slip characteristics under ASTM E303.
4. IPEMA Certified.
5. Flammability under 8S-5696 and ASTM D2859.
6. Tensile strength (ASTM D412): 60 psi.
7. Tear resistance (ASTM D624): 140%.

B. Chemical Properties:

1. Cushioning Layer: 85% SBR rubber buffings, 15% polyurethane binder.
2. Wearing Layer: 78% EPDM or TPV rubber granules, 22% polyurethane binder.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for subgrade elevations, slope, and drainage and for other conditions affecting performance of the Work.
 1. Verify that substrates are sound and without high spots, ridges, holes, and depressions.
- B. Hard-Surface Substrates: Verify that substrates are satisfactory for unitary, protective surfacing installation and that substrate surfaces are uniformly sloped to drain within recommended tolerances according to protective surfacing manufacturer's written requirements for cross-section profile.

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

3.2 PREPARATION

- A. Prepare substrates to receive surfacing products according to protective surfacing manufacturer's written instructions.

3.3 INSTALLATION OF SEAMLESS SURFACING

- A. Mix and apply components of seamless surfacing according to manufacturer's written instructions to produce uniform, monolithic, and impact-attenuating protective surfacing of required overall thickness.

1. Substrate Primer: Apply primer over prepared substrate with a short nap roller at the rate of 300 square feet per gallon, or at manufacturer's standard spreading rate.
 - a. Prime entire concrete surface of Play Mound.
 - b. Do not over saturate the substrate.
 - c. Prime adjacent vertical barriers such as playground and fitness equipment support legs, curbs, or other edging that will contact the surfacing system.
 - d. DO NOT APPLY PRIMER OVER COMPACTED STONE SUBSTRATE.
2. Poured Cushioning Layer: Spread evenly over compacted stone substrate and primed substrate to form a uniform layer applied at manufacturer's standard spreading rate in one continuous operation, with a minimum of cold joints.
 - a. Apply mixed binder / SBR at desired thickness 1/8-inch higher than measuring bar.
 - b. Using a steel pool trowel, even binder / SBR mixture. Be sure to continuously lubricate trowel with soapy water. Do not saturate surface with lubricant.
 - c. As the mixture is leveled, apply a downward pressure onto the surface so that the mixture compacts tightly.
 - d. Check surface to be level.
 - e. Allow to dry for ten (10) to twelve (12) hours, or until no indentations can be made by foot traffic.
3. Intercoat Primer: Over cured cushioning layer, apply primer at manufacturer's standard spreading rate.
4. Wearing Layer: 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.

- a. Apply mixed binder / granule at nominal 1/2-inch thickness.
 - b. Using a steel pool trowel, spread even rubber / granule mixture. Be sure to continuously lubricate trowel with soapy water.
 - c. As the mixture is leveled, apply a downward pressure onto the surface so that the mixture compacts tightly.
 - d. Check surface to be level.
 - e. Design: Where colored pattern is specified, place colored design material as soon as previously placed material is sufficiently cured, using primer specified by manufacturer.
 - 1) Cold joints must be cut and primed prior to installing a different color surface.
 - f. **Allow to cure for a minimum of twenty-four (24) to forty-eight (48) hours prior to usage. At the end of minimum curing period, verify that the top surface is sufficiently dry and firm to allow foot traffic and use without damage to the surface. DO NOT ALLOW FOOT TRAFFICE OR USE OF THE SURFACE UNTIL IT IS SUFFICIENTLY CURED.**
5. Edge Treatment: As indicated on Drawings. Fully adhere edges to substrate with full coverage of substrate. Maintain fully cushioned thickness required to comply with performance requirements.

3.4 PROTECTION

- A. It is the responsibility of the Contractor to provide security to protect the surface from foot traffic or vandalism during the forty-eight (48) cure period.

END OF SECTION 321816.13

SECTION 323300
SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Tree Grates.
2. Benches.
3. Tables.
4. Trash and Recycling Receptacles.
5. Bicycle Racks.
6. Removable Bollards.
7. Drinking Fountain / Bottle Filling Station.

B. Related Requirements:

1. Section 312000 "Earth Moving" for excavation for installing concrete footings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.
- C. Samples for Initial Selection: For units with factory-applied finishes.
- D. Samples for Verification: For each type of exposed finish, not less than 6-inch- long linear components and 4-inch- square sheet components.
- E. Product Schedule: For site furnishings, use same designations indicated on Drawings.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For site furnishings to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain site furnishings from the following approved manufacturers:

1. Ironsmith, Inc.
41-701 Corporate Way, Unit 3, Palm Desert, CA 92260
Phone: 800-338-4766
www.ironsmith.cc
2. DuMor, Inc.
P.O. Box 142, Mifflintown, PA 17059
Phone: 800-598-4018
www.dumor.com
 - a. Local Representative:
General Recreation, Inc.
P.O. Box 440, Newtown Square, PA 19073
Phone: 800-726-4793
www.generalrecreationinc.com
3. Elkay Manufacturing Company
2222 Camden Court, Oak Brook, IL 60523
Phone: 800-476-4106
www.elkay.com

2.2 TREE GRATES

A. Tree Grate: Market Street 36-Inch Square, #3630, manufactured by Ironsmith, Inc.

1. Grate:
 - a. Finish: Cast-iron
 - b. Size: 36-inches square
 - c. Tree Opening: 18-inches square
2. Frame: Galvanized Steel
3. Quantity: Six (6) units
4. Installation:
 - a. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
 - b. Install grates and frames where indicated on Drawings, flush and leveled with surrounding pavement surface.
 - c. Install steel angle frame:
 - 1) Flush and leveled with surrounding paving surfacing, always maintain flush and leveled. Frames MUST NOT slope in more than one direction.
 - 2) Use spreaders or stakes to keep frame from being distorted by pressure from surrounding pavements.
 - 3) Install frames per details on Drawings and per manufacturer's recommendations.

- d. Clean debris from frame prior to tree grate installation.
- e. If needed, grind pads on underside of tree grates to level and prevent rocking in frame.

2.3 BENCHES

- A. Backed Bench: Bench 500, #500-60HS, manufactured by DuMor, Inc.
 1. Frame: Steel
 2. Slats: Steel
 3. Frame and Slat Color: Argento
 4. Quantity: Seven (7) units
 5. Installation: Embedded or surface mount (see Drawings); install per manufacturer's recommendations and specifications.
- B. Backless Bench: Bench 501, #501-60HSNA, manufactured by DuMor, Inc.
 1. Frame: Steel
 2. Slats: Steel
 3. Frame and Slat Color: Argento
 4. No Arms
 5. Quantity: Ten (10) units
 6. Installation: Embedded or surface mount (see Drawings); install per manufacturer's recommendations and specifications.

2.4 TABLES

- A. Fixed Pedestal Table, 3 Seats: Table 76, #76-33PL, manufactured by DuMor, Inc.
 1. Frame: Steel
 - a. Frame Color: Black
 2. Slats: Recycled Plastic
 - a. Slat Color: Walnut
 3. Seats: Three (3)
 4. Quantity: Two (2) units
 5. Installation: Surface mount or sub-surface mount (see Drawings); install per manufacturer's recommendations and specifications.
- B. Fixed Pedestal Table, 4 Seats: Table 76, #76-34PL, manufactured by DuMor, Inc.
 1. Frame: Steel
 - a. Frame Color: Black
 2. Slats: Recycled Plastic
 - a. Slat Color: Walnut
 3. Seats: Four (4)
 4. Quantity: Three (3) units
 5. Installation: Surface Mount or sub-surface mount (see Drawings); install per manufacturer's recommendations and specifications.

2.5 TRASH AND RECYCLING RECEPTACLES

- A. Trash Receptacle: Receptacle 502, #502-32HS-BT, manufactured by DuMor, Inc.

1. Frame: Steel
 - a. Frame Color: Argento
2. Size: 32-Gallon
3. Lids and Tops: Bonnet-cover side deposit
4. Quantity: Two (2) units
5. Installation: Surface mount; install per manufacturer's recommendations and specifications.

B. Recycling Receptacle: Receptacle 502, #502-32HS-BT, manufactured by DuMor, Inc.

1. Frame: Steel
 - a. Frame Color: Recycle Blue
2. Size: 32-Gallon
3. Lids and Tops: Bonnet-cover side deposit
4. Quantity: Two (2) units
5. Installation: Surface mount; install per manufacturer's recommendations and specifications.

2.6 BICYCLE RACKS

A. Bicycle Rack: Bike Rack 292, #292-00/S-2, manufactured by DuMor, Inc.

1. Frame: Steel
 - a. Frame Color: Argento
2. Quantity: Four (4) units
3. Installation: Surface mount; install per manufacturer's recommendations and specifications.

2.7 REMOVABLE BOLLARD

A. Removable Bollard: Bollard 400, #400-36/S-15L, manufactured by DuMor, Inc.

1. Tubing: 4 ½" O.D. Steel
 - a. Color: Safety Yellow
2. Height: 36-inches
3. Accessories: Locking Tab, Ground Sleeve, Cap
4. Quantity: One (1) unit
5. Installation: Embedded with sleeve; install per manufacturer's recommendations and specifications.

2.8 DRINKING FOUNTAIN / BOTTLE FILLING STATION

A. Drinking Fountain / Bottle Filling Station: Outdoor EZH2O Bottle Filling Station, Bi-Level Pedestal, #LK4420BF1U, manufactured by Elkay Manufacturing Company.

1. Color: Blue
2. Quantity: One (1) unit
3. Installation: Surface Mount, install per manufacturer's instructions.
4. Water service connection *to be done by Others*, coordinate installation with Owner as required to install a complete and working system.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.
- B. Verify that substrates are stable and capable of supporting the weight of items covered under this section.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
- B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
- C. Install site furnishings level, plumb, true, and securely anchored positioned at locations indicated on Drawings.
- D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
- E. Install in conformance to applicable ADA guidelines and Owner's established accessibility policies.

END OF SECTION 323300

**SECTION 329113
SOIL PREPARATION**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes planting soils, including CU-Structural Soil, specified according to performance requirements of the mixes.
- B. Related Requirements:
 - 1. Section 329200 "Turf and Grasses" for placing planting soil for turf and grasses.
 - 2. Section 329300 "Plants" for placing planting soil for plantings.

1.3 DEFINITIONS

- A. AAPFCO: Association of American Plant Food Control Officials.
- B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or unamended soil as indicated.
- C. CEC: Cation exchange capacity.
- D. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.
- E. CU-Structural Soil: Engineered soil medium able to be compacted for pavement design and installation yet permits plant root growth. CU-Structural Soil is a proprietary material patented by Cornell University (US Patent #5,849,069) and marketed under the registered trademark, CU-Structural Soil. Only licensed companies are authorized to produce this material, meeting the specifications described in this text. For a list of licensed CU-Structural Soil producers, call AMEREQ, INC. at 800-832-8788.
- F. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.
- G. Imported Soil: Soil that is transported to Project site for use.
- H. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.

- I. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of analytical data.
- J. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."
- K. Planting Soil: Imported soil or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- L. RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.
- M. SSSA: Soil Science Society of America.
- N. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- O. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- P. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- Q. USCC: U.S. Composting Council.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Hancock Playground, 147 Master Street, Philadelphia, PA 19122.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. Include recommendations for application and use.
 2. Include test data substantiating that products comply with requirements.
 3. Include sieve analyses for aggregate materials.
 4. Material Certificates: For each type of imported soil and soil amendment and fertilizer before delivery to the site, according to the following:
 - a. Manufacturer's qualified testing agency's certified analysis of standard products.
 - b. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SUIP #25.
 - c. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.

B. Samples: For each bulk-supplied material, 1-quart (1-L) volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.

C. CU-Structural Soil:

1. At least thirty (30) days prior to ordering materials, the installing contractor shall submit to the Landscape Architect representative samples, certificates, manufacturer's literature and test results for materials specified below. No materials shall be ordered until the required samples, certificates, manufacturer's literature, producer's current license and test results have been reviewed and approved by the Landscape Architect. The Landscape Architect reserves the right to reject any material that does not meet CU-Structural Soil specifications. Delivered materials shall closely match the approved samples.
2. Submit from licensed producer, 1/2 cubic foot representative sample of clay loam, one cubic foot representative sample of crushed stone, and one cubic foot representative sample of CU-Structural Soil mix for approval. In the event of multiple source fields for clay loam, submit a minimum of one set of samples per source field or stockpile. The samples of all clay loam, crushed stone, and CU-Structural Soil shall be submitted to the engineer as a record of the soil color and texture.
3. Submit soil test analysis reports for sample of clay loam from an independent soil-testing laboratory. The testing laboratory for particle size and chemical analysis may include a public agricultural extension service agency.
 - a. Submit a mechanical analysis of the clay loam sample and particle size analysis including the following gradient of mineral content:

USDA Designation	Size in millimeters (mm)
Gravel	+2mm
Sand	0.05 – 2mm
Silt	0.002 – 0.05mm
Clay	minus 0.002mm

Sieve analysis shall be performed and compared to USDA Soil Classification System.

Sieve analysis shall be done by a combined hydrometer and wet sieving using sodium hexametaphosphate as a dispersant in compliance with ASTM D422 after destruction of organic matter by hydrogen peroxide.

- b. Submit a chemical analysis, performed in accordance with current AOAC Standards, including the following:
 - 1) pH and buffer pH.
 - 2) Percent organic matter as determined by the loss of ignition of oven dried samples. Test samples shall be oven dried to a constant weight at a temperature of 230 degrees F, plus or minus 9 degrees.
 - 3) Analysis for nutrient levels by parts per million.

- 4) Soluble salt by electrical conductivity of a 1:2 soil/water sample measured in Millimho per cm.
 - 5) Cation Exchange Capacity (CEC).
 - 6) Carbon/Nitrogen Ratio.
4. Submit one cubic foot sample of crushed stone which will be used in production of CU-Structural Soil.
- a. Provide particle size analysis:

USDA Designation	Size in millimeters (mm)
3"	+76mm
2-1/2"	63-76mm
2"	50-63mm
1-1/2"	37-50mm
1"	25-37mm
3/4"	19-25mm
Fine Gravel	2-19mm

- b. Provide the manufacturers analysis of the loose and rodded unit weight.
 - c. Losses from LA Abrasion tests- not to exceed 40%.
 - d. Minimum 90% with 2 or more fractured faces.
 - e. Percent pore space analysis.
5. At the Landscape Architect's discretion, the sample of CU-Structural Soil may be tested for the following:
- a. Compaction in accordance with ASTM D698 / AASHTO T99.
 - b. California Bearing Ratio in accordance with ASTM D1883: soaked CBR shall equal or exceed a value of 50.
 - c. Measured dry-weight percentage of stone in the mixture.
6. The approved CU-Structural Soil sample shall be the standard.
7. Any deviation from the specified crushed stone and clay loam specifications shall be approved by Amereq, Inc.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For each testing agency.
- B. Preconstruction Test Reports: For preconstruction soil analyses specified in "Preconstruction Testing" Article.
- C. Field quality-control reports.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.
 - 1. Laboratories: Subject to compliance with requirements, qualified independent soil testing services include, but are not limited to:
 - a. Penn State College of Agricultural Sciences, Agricultural Analytical Services Lab
111 Ag Analytical Services Lab, University Park, PA 16802
Phone: 814-863-0841
Email: aaslab@psu.edu
www.agsci.psu.edu
 - b. Rutgers Soil Testing Laboratory
Rutgers, The State University of New Jersey
57 US Highway 1, New Brunswick, NJ 08901-8554
Phone: 848-932-9295
Email: soiltest@njaes.rutgers.edu
<https://njaes.rutgers.edu/soil-testing-lab/>
 - 2. Multiple Laboratories: At Contractor's option, work may be divided among qualified testing laboratories specializing in physical testing, chemical testing, and fertility testing.

1.8 PRE-CONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction soil analyses on imported soil.
 - 1. Notify Landscape Architect at least seven (7) days in advance of the dates and times when laboratory samples will be taken.
- B. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.
 - 1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.9 PRE-CONSTRUCTION SOIL-SAMPLING REQUIREMENTS

- A. General: Extract soil samples according to requirements in this article.
- B. Sample Collection and Labeling: Have samples taken and labeled by Contractor in presence of Landscape Architect under the direction of the testing agency.

1. Number and Location of Samples: Minimum number of representative soil samples to be determined by testing agency for each soil to be used or amended for landscaping purposes.
2. Procedures and Depth of Samples: To be determined by testing agency.
3. Division of Samples: Split each sample into two, equal parts. Send half to the testing agency and half to Owner for its records.
4. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

1.10 PRE-CONSTRUCTION TESTING REQUIREMENTS

- A. General: Perform tests on soil samples according to requirements in this article.
- B. Physical Testing:
 1. Soil Texture: Soil-particle, size-distribution analysis by the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":
 - a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
 - b. Hydrometer Method: Report percentages of sand, silt, and clay.
 2. Bulk Density: Analysis according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 3. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 4. Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 5. Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods"; at 85 percent compaction according to ASTM D698 (Standard Proctor).
- C. Chemical Testing:
 1. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
 2. Clay Mineralogy: Analysis and estimated percentage of expandable clay minerals using CEC by ammonium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 3. Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and vanadium. If RCRA metals are present, include recommendations for corrective action.
 4. Phytotoxicity: Test for plant-available concentrations of phytotoxic minerals including aluminum, arsenic, barium, cadmium, chlorides, chromium, cobalt, copper, lead, lithium, mercury, nickel, selenium, silver, sodium, strontium, tin, titanium, vanadium, and zinc.
- D. Fertility Testing: Soil fertility analysis according to standard laboratory protocol of SSSA NAPT NEC-67, including the following:
 1. Percentage of organic matter.
 2. CEC, calcium percent of CEC, and magnesium percent of CEC.
 3. Soil reaction (acidity/alkalinity pH value).

4. Buffered acidity or alkalinity.
5. Nitrogen ppm.
6. Phosphorous ppm.
7. Potassium ppm.
8. Manganese ppm.
9. Manganese-availability ppm.
10. Zinc ppm.
11. Zinc availability ppm.
12. Copper ppm.
13. Sodium ppm.
14. Soluble-salts ppm.
15. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
16. Other deleterious materials, including their characteristics and content of each.

E. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3-Chemical Methods."

F. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.

1. Fertilizers and Soil Amendment Rates: State recommendations in weight per 1,000 sq. ft. for 6-inch depth of soil.
2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per 1000 sq. ft. for 6-inch depth of soil.

1.11 POST-CONSTRUCTION TESTING

A. Post-Construction Testing Service: Engage a qualified testing agency to perform post-construction analyses on amended planting bed soil with compost incorporated.

1. Notify Landscape Architect seven (7) days in advance of the dates and times when laboratory samples will be taken.

B. Post-Construction Soil Analyses: For each amended soil, perform testing on soil samples and furnish soil analysis and a written report by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.

1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.12 POST-CONSTRUCTION SOIL-SAMPLING REQUIREMENTS

A. General: Perform tests on soil samples according to the requirements in this article.

B. Fertility Testing:

1. Percentage of organic matter.

- a. Organic matter content must be 4% minimum.
 2. CEC, calcium percent of CEC, and magnesium percent of CEC
 3. Soil reaction (acidity / alkalinity pH value).
 - a. pH levels must be between 5.5 and 6.0. Lower pH by using elemental sulfur product. Peat moss or copper sulfate may not be used to lower pH.
 4. Buffered acidity or alkalinity.
 5. Nitrogen ppm.
 6. Phosphorus ppm.
 7. Potassium ppm.
 8. Manganese ppm.
 9. Manganese-availability ppm.
 10. Zinc ppm.
 11. Zinc-availability ppm.
 12. Copper ppm.
 13. Sodium ppm.
 14. Soluble-salts ppm.
 - a. Soluble-salts measurement must be less or equal to 2 mmho/cm.
 15. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
 16. Other deleterious materials, including their characteristics and content of each.
 17. Percolation test to ensure adequate drainage and proper mixing of compost.
- C. Recommendations: The analysis tests shall show recommendations for soil additives or fertilizers to correct soil mixes' deficiencies as necessary.
- D. Deficiencies: Nutrient deficiencies shall be corrected at time of installation.

1.13 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.
- B. Bulk Materials:
 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 3. Do not move or handle materials when they are wet or frozen.
 4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.
- C. CU-Structural Soil:
 1. Delivered CU-Structural Soil shall be at or near optimum compaction moisture content as determined by AASHTO T 99 (ASTM D 698) and should not be placed in frozen, wet or muddy sites.

2. Protect CU-Structural Soil from exposure to excess water and from erosion at all times. Do not store CU-Structural Soil unprotected. Do not allow excess water to enter site prior to compaction. If water is introduced into the CU-Structural Soil after grading, allow water to drain to optimum compaction moisture content.
3. All areas to receive CU-Structural Soil shall be inspected by the installing contractor before starting work and all defects such as incorrect grading, compaction, and inadequate drainage shall be reported to the engineer prior to beginning this work.
4. Qualifications of installing contractor: The work of this section should be performed by a contracting firm which has a minimum of five years' experience. Proof of this experience shall be submitted as per paragraph, SAMPLES and SUBMITTALS, of this section.

PART 2 - PRODUCTS

2.1 PLANTING SOILS SPECIFIED ACCORDING TO PERFORMANCE REQUIREMENTS

- A. Planting Soil: Imported, naturally formed or manufactured soil from off-site sources consisting of fertile, friable, naturally fine sandy loam, (USDA classification for soil consisting of 10-20 percent clay, 30-50 percent silt and 50-70 percent fine sand, particle 0.10-0.25 mm.) pH range of 5.5 to 6.5, 4 percent organic material minimum, and with sufficient structure to give good tilth and aeration.
 1. Sources: Take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches deep, not from agricultural land, bogs, or marshes; and that do not contain undesirable organisms or disease-causing plant pathogens.
 2. Soil shall not contain any noxious weeds or invasive plants, including, but not limited to, quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass.
 3. Clean Planting Soil shall not include any of the following:
 - a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
 - b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand 1-inch or larger.
 4. Amend imported soil with materials specified in other articles of this Section to become planting soil complying with the following requirements:
 - a. Particle Size Distribution by Separates:
 - Fine Sand: 50% to 70% percent by dry weight.
 - Silt: 30% to 50% percent by dry weight.
 - Clay: 10% to 20% percent by dry weight.
 - b. Percentage of Organic Matter: Minimum 4% by volume.
 - c. Soil Reaction: pH of 5.5 to 6.5.
 - d. CEC of Clay Fraction: Maximum 15 meq/100 mL at pH of 7.0.
 - e. Soluble-Salt Content: 5 to 1- dS/m measured by electrical conductivity.
 - f. RCRA Metals: Below maximum limits established by the EPA.
 - g. Phytotoxicity: Below phytotoxicity limits established by SSSA.
 5. Acceptable ranges for base saturation percentages are:

Element	Desired % Range	Ideal %
Ca	60-70%	68%
Mg	10-20%	12%
K	2-5%	5%
Na	0.5-3%	0.75%
Other bases (variable)	2-4%	3.75%
Exchangeable Hydrogen	10-15%	10.5%

- B. Topsoil: ASTM D5268, fertile, friable, naturally fine sandy loam (USDA classification for soil consisting of 10-20% clay, 30-50% silt, and 50-70% fine sand, particle 0.1-0.25mm), pH range of 5.5 to 6.5, 4% organic material minimum.
1. Topsoil Source: Reuse surface soil stockpiled on-site. Do not stockpile topsoil more than 6-feet high. Verify stability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stone, clay lumps, and other extraneous materials harmful to plant growth.
 2. Supplement with imported topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally, well-drained construction or mining site where topsoil occurs at least 4-inches deep; do not obtain from agricultural land, bogs, or marshes.
- C. Unacceptable Properties
1. Clean soil of the following:
 - a. Unacceptable Materials: concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, litter or other extraneous materials that are harmful to plant growth.
 - b. Unsuitable Materials: stones 1-inche or larger in any dimension, noxious seeds, sticks, brush, roots, plants, sod, clay lumps, and pockets of co

2.2 CU-STRUCTURAL SOIL

A. CLAY LOAM

1. Soil shall be a “loam” with a minimum clay content of 20% or a “clay loam” based on the “USDA classification system” as determined by mechanical analysis (ASTM D-422) and it shall be of uniform composition, without admixture of subsoil. It shall be free of stones, lumps, plants and their roots, debris and other extraneous matter. It shall not contain toxic substances harmful to plant growth. Clay loam shall contain not less than 2% or more than 5% organic matter as determined by the loss on ignition of oven-dried samples. Test samples shall be oven-dried to a constant weight at a temperature of 230 degrees F., plus or minus 9 degrees.
2. Mechanical analysis for the loam or clay loam shall be as follows:

Textural Class	% of Total Weight
Gravel	Less than 5%
Sand	20-45%
Silt	20-50%
Clay	20-40%

3. Chemical analysis: Meet, or be amended to meet the following criteria:
 - a. pH between 5.5 to 6.5.
 - b. Percent organic matter 2% - 5% by dry weight.
 - c. Adequate nutrient levels.
 - d. Soluble salt less than 1.0 mmho/cm.
 - e. Cation Exchange Capacity (CEC) greater than 10.
 - f. Carbon/Nitrogen ratio less than 33:1.
4. Loam or clay loam shall not come from USDA - classified prime farmland.

B. FERTILIZER

1. Should nutrient analysis suggest that the loam or clay loam need additional nutrients, it shall be amended in accordance with Soil Analysis **and for the specific plants specified on the Plant Schedule.**

C. SULFUR

1. Sulfur shall be a commercial granular, 96% pure sulfur, with material and analysis appearing on the labeled container.
2. Sulfur used to lower pH shall be a ferrous sulfate formulation.
3. Application rates shall be dependent on soil test results.

D. LIME

1. Agricultural lime containing a minimum of 85% carbonates.
2. Application rates shall be dependent on soil test results.

E. CRUSHED STONE

1. The size of the crushed stone shall be 0.75 inches to 1.5 inches allowing for 5% – 10% being greater than 1.5 inches, and 5% – 10% less than 0.75 inches.
2. Acceptable aggregate dimensions will not exceed 2.5:1.0 for any two dimensions.
3. Minimum 90% with two or more fractured faces.
4. Results of Aggregate Soundness Loss test shall not exceed 18%.
5. Losses from LA Abrasion tests shall not exceed 40%.

F. HYDROGEL

1. Hydrogel shall be a coated potassium propenoate-propenamide copolymer (Gelscape[®] Hydrogel Tackifier) as manufactured by Amereq, Inc. 800-832-8788.

G. WATER

1. The installing contractor shall be responsible to furnish his own supply of water (if needed) free of impurities, to the site.

H. CU-STRUCTURAL SOIL

1. A uniformly blended urban tree mixture of crushed stone, clay loam and Gelscape[®] Hydrogel Tackifier, as produced by an Amereq-licensed company, mixed in the following proportion:

Material	Unit of Weight
Specified Crushed Stone	100 units dry weight
Specified Clay Loam	20-25 units (to achieve min. CBR of 50)

Gelscape® Hydrogel Tackifier	0.035 units dry weight
Moisture	ASTM D698 / AASHTO T-99 optimum moisture

2.3 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
 - 1. Class: T, with a minimum of 99 percent passing through a No. 8 sieve and a minimum of 75 percent passing through a No. 60 sieve.
- B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Perlite: Horticultural perlite, soil amendment grade.
- E. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve.
- F. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C33/C33M.
- G. Diatomaceous Earth: Horticultural diatomaceous earth, soil amendment grade.

2.4 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:
 - 1. Feedstock: Compost may be derived from: agricultural, food, or industrial residuals; biosolids (treated sewage sludge); yard trimmings; source-separated or mixed solid 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. Do not use compost that has received the addition of liming agents or ash by-products. The product shall be certified through the U.S. Composting Council's (USCC) Seal of Testing Assurance (STA) Program.
 - 2. Reaction: pH of 5.5 to 8
 - 3. Soluble-Salt Concentration: Less than 5-10 dS/m.
 - 4. Moisture Content: 35 to 55 percent by weight.
 - 5. Particle Size: 100 percent passing through a 1/2-inch sieve.
 - 6. **The compost supplier shall test all compost products within 90 Calendar Days prior to application.** Samples shall be collected using the Seal of Testing Assurance (STA) sample collection protocol. The sample collection protocol can be obtained from the U.S.

Composting Council, 4250 Veterans Memorial Highway, Suite 275, Holbrook, NY 11741 Phone: (631) 737-4931, www.compostingcouncil.org.

- a. The sample shall be sent to an independent STA Program approved laboratory. The compost supplier shall pay for the test. A copy of the approved independent STA Program laboratory test report shall be submitted to the Landscape Architect prior to initial application of the compost. Seven days prior to application, the Contractor shall submit a sample of each type of compost to be used on the project to the Landscape Architect.
7. Compost not conforming to the above requirements or taken from a source other than those tested and accepted shall be immediately removed from the project and replaced at no cost to the Owner.
8. The Contractor shall submit the following information to the Landscape Architect for approval:
 - a. The supplier shall verify in writing and provide lab analyses that the Materials comply with the processes, testing, and standards specified in these Specifications. An independent STA Program certified laboratory shall perform the analysis.
 - b. A copy of the producer's STA certification as issued by the U.S. Composting Council.

2.5 FERTILIZERS

- A. As required by soil analysis and recommendations.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

PART 3 - EXECUTION

3.1 GENERAL

- A. Place planting soil and fertilizers according to requirements in other Specification Sections.
- B. 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 planting soil.
- C. Proceed with placement only after unsatisfactory conditions have been corrected.
- D. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff of airborne dust to adjacent properties and walkways.

3.2 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

- A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil, or apply manufactured soil on site in its final, blended condition. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Subgrade Preparation: Till subgrade to a minimum depth of 4 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 1. Apply, add soil amendments, and mix approximately half the thickness of unamended soil over prepared, loosened subgrade according to "Mixing" Paragraph below. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil.
- C. Mixing: If amending soil on-site, spread unamended soil to total depth indicated on Drawings, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.
 - 1. Amendments: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them with unamended soil to produce planting soil.
 - a. Mix lime and sulfur with dry soil before mixing fertilizer.
 - b. Mix fertilizer with planting soil no more than seven days before planting.
 - 2. Lifts: Apply and mix unamended soil and amendments in lifts not exceeding 8 inches in loose depth for material compacted by compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- D. Compaction: Compact each blended lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D698.
- E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.3 PLACING CU-STRUCTURAL SOIL OVER EXPOSED SUBGRADE

- A. Testing:
 - 1. All CU-Structural Soil mixing shall be performed at the licensed producer's yard using appropriate soil measuring, mixing and shredding equipment of sufficient capacity and capability to assure proper quality control and consistent mix ratios. No mixing of CU-Structural Soil at the project site shall be permitted.
 - 2. Maintain adequate moisture content during the mixing process. Soils and mix components shall easily shred and break down without clumping. Soil clods shall easily break down into a fine crumbly texture. Soils shall not be overly wet or dry. The licensed producer shall measure and monitor the amount of soil moisture at the mixing site periodically during the mixing process.
 - 3. Raw materials shall be mixed off-site, only at the licensed producer's facility, on a flat asphalt or concrete paved surface to avoid soil contamination.

4. Should the independent laboratory test results of the clay loam reveal a need to amend it, to meet specifications, the amending materials should be added to the clay loam following the rates and recommendations provided by the Soil Analysis **and for the specific plants specified on the Plant Schedule.**

B. UNDERGROUND UTILITIES AND SUBSURFACE CONDITIONS

1. The installing contractor shall notify the Landscape Architect of any subsurface conditions which will affect the contractor's ability to install the CU-Structural Soil.
2. The installing contractor shall locate and confirm the location of all underground utility lines and structures prior to the start of any excavation.
3. The installing contractor shall repair any underground utilities or foundations damaged during the progress of this work.

C. SITE PREPARATION

1. Do not proceed with the installation of the CU-Structural Soil material until all walls, curb footings and utility work in the area have been installed. For site elements dependent on CU-Structural Soil® for foundation support, postpone installation of such elements until immediately after the installation of CU-Structural Soil.
2. Install subsurface drain lines as shown on the plan drawings prior to installation of CU-Structural Soil material.
3. Excavate and compact the proposed subgrade to depths, slopes and widths as shown on the drawings. Maintain all required angles of repose of the adjacent materials as shown on the drawings. Do not over excavate compacted subgrades of adjacent pavement or structures.
4. Confirm that the subgrade is at the proper elevation and compacted as required. Subgrade elevations shall slope parallel to the finished grade and/or toward the subsurface drain lines as shown on the drawings.
5. Clear the excavation of all construction debris, trash, rubble and any foreign material. In the event that fuels, oils, concrete washout silts or other material harmful to plants have been spilled into the subgrade material, excavate the soil sufficiently to remove the harmful material. Fill any over excavation with approved fill and compact to the required subgrade compaction.
6. Do not proceed with the installation of CU-Structural Soil until all utility work in the area has been installed. All subsurface drainage systems shall be operational prior to installation of CU-Structural Soil.
7. Protect adjacent walls, walks and utilities from damage. Use ½" plywood and/or plastic sheeting as directed to cover existing concrete, metal and masonry work and other items as directed during the progress of the work.
 - a. Clean up all trash and any soil or dirt spilled on any paved surface at the end of each working day.
 - b. Any damage to the paving or architectural work caused by the installing contractor shall be repaired, as directed by the Landscape Architect.
8. Maintain all silt and sediment control devices required by applicable regulations.
9. Provide adequate methods to assure that trucks and other equipment do not track soil from the site onto adjacent property and the public right of way.

D. INSTALLATION OF CU-STRUCTURAL SOIL MATERIAL

1. Install CU-Structural Soil in 6-inch lifts and compact each lift.
2. Compact all materials to at least 95% Proctor Density from a standard compaction curve AASHTO T 99 (ASTM D 698). No compaction shall occur when moisture content exceeds maximum as listed herein. Delay compaction if moisture content exceeds maximum allowable and protect CU-Structural Soil during delays in compaction with plastic or plywood as directed by the Landscape Architect.
3. Bring CU-Structural Soil to finished grades as shown on the drawings. Immediately protect the CU-Structural Soil from contamination by toxic materials, trash, debris, water containing cement, clay, silt or materials that will alter the particle size distribution of the mix with plastic or plywood as directed by the Landscape Architect.
4. The Landscape Architect may periodically check the material being delivered, prior to installation for color and texture consistency with the approved sample provided by the installing contractor as part of the submittal for CU-Structural Soil. If the Landscape Architect determines that the delivered CU-Structural Soil varies significantly from the approved samples, the Landscape Architect shall contact the licensed producer.
5. Contractor shall maintain weight tickets showing source of material. Landscape Architect may review at its discretion that the delivered structural soil was produced by the approved CU-Structural Soil licensee by inspecting weight tickets showing source of material. If tickets are not provided or installed soil is found to be non-compliant, it shall be removed by the Contractor and replaced with approved soil material at no additional cost to Owner.
6. CU-Structural Soil should not be stockpiled long-term. Any CU-Structural Soil not installed immediately should be protected by a tarp or other waterproof covering.

E. FINE GRADING

1. After the initial placement and rough grading of the CU-Structural Soil but prior to the start of fine grading, the installing contractor shall request review of the rough grading by the Landscape Architect. The installing contractor shall set sufficient grade stakes for checking the finished grades.
2. Adjust the finish grades to meet field conditions as directed. Provide smooth transitions between slopes of different gradients and direction. Fill all dips with CU-Structural Soil and remove any bumps in the overall plane of the slope.
 - a. The tolerance for dips and bumps in CU-Structural Soil areas shall be a 3” deviation from the Drawings.
3. All other fine grading shall be inspected and approved by the Landscape Architect prior to the installation of other items to be placed on the CU-Structural Soil.

F. ACCEPTANCE STANDARDS

1. The Landscape Architect will inspect the work upon the request of the installing contractor. Request for inspection shall be received by the Landscape Architect at least 10 days before the anticipated date of inspection.

G. CLEAN-UP

1. Upon completion of the CU-Structural Soil installation operations, clean areas within the contract limits. Remove all excess fills, soils and mix stockpiles and legally dispose of all waste materials, trash and debris. Remove all tools and equipment and provide a clean, clear site. Sweep, do not wash, all paving and other exposed surfaces of dirt and mud until the paving has been installed over the CU-Structural Soil material. Do no washing until finished materials covering CU-Structural Soil material are in place.

3.4 PROTECTION

- A. Protection Zone: Identify protection zones as indicated on Drawings.
- B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:
 1. Storage of construction materials, debris, or excavated material.
 2. Parking vehicles or equipment.
 3. Vehicle traffic.
 4. Foot traffic.
 5. Erection of sheds or structures.
 6. Impoundment of water.
 7. Excavation or other digging unless otherwise indicated.
- C. If planting soil or subgrade is over-compacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Landscape Architect and replace contaminated planting soil with new planting soil.

3.5 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.
 1. Legally dispose of excess subsoil and unsuitable materials off-site.

END OF SECTION 329113

**SECTION 329113
SOIL PREPARATION**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes planting soils, including CU-Structural Soil, specified according to performance requirements of the mixes.
- B. Related Requirements:
 - 1. Section 329200 "Turf and Grasses" for placing planting soil for turf and grasses.
 - 2. Section 329300 "Plants" for placing planting soil for plantings.

1.3 DEFINITIONS

- A. AAPFCO: Association of American Plant Food Control Officials.
- B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or unamended soil as indicated.
- C. CEC: Cation exchange capacity.
- D. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.
- E. CU-Structural Soil: Engineered soil medium able to be compacted for pavement design and installation yet permits plant root growth. CU-Structural Soil is a proprietary material patented by Cornell University (US Patent #5,849,069) and marketed under the registered trademark, CU-Structural Soil. Only licensed companies are authorized to produce this material, meeting the specifications described in this text. For a list of licensed CU-Structural Soil producers, call AMEREQ, INC. at 800-832-8788.
- F. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.
- G. Imported Soil: Soil that is transported to Project site for use.
- H. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.

- I. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of analytical data.
- J. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."
- K. Planting Soil: Imported soil or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- L. RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.
- M. SSSA: Soil Science Society of America.
- N. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- O. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- P. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- Q. USCC: U.S. Composting Council.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Hancock Playground, 147 Master Street, Philadelphia, PA 19122.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. Include recommendations for application and use.
 2. Include test data substantiating that products comply with requirements.
 3. Include sieve analyses for aggregate materials.
 4. Material Certificates: For each type of imported soil and soil amendment and fertilizer before delivery to the site, according to the following:
 - a. Manufacturer's qualified testing agency's certified analysis of standard products.
 - b. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SUIP #25.
 - c. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.

B. Samples: For each bulk-supplied material, 1-quart (1-L) volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.

C. CU-Structural Soil:

1. At least thirty (30) days prior to ordering materials, the installing contractor shall submit to the Landscape Architect representative samples, certificates, manufacturer's literature and test results for materials specified below. No materials shall be ordered until the required samples, certificates, manufacturer's literature, producer's current license and test results have been reviewed and approved by the Landscape Architect. The Landscape Architect reserves the right to reject any material that does not meet CU-Structural Soil specifications. Delivered materials shall closely match the approved samples.
2. Submit from licensed producer, 1/2 cubic foot representative sample of clay loam, one cubic foot representative sample of crushed stone, and one cubic foot representative sample of CU-Structural Soil mix for approval. In the event of multiple source fields for clay loam, submit a minimum of one set of samples per source field or stockpile. The samples of all clay loam, crushed stone, and CU-Structural Soil shall be submitted to the engineer as a record of the soil color and texture.
3. Submit soil test analysis reports for sample of clay loam from an independent soil-testing laboratory. The testing laboratory for particle size and chemical analysis may include a public agricultural extension service agency.
 - a. Submit a mechanical analysis of the clay loam sample and particle size analysis including the following gradient of mineral content:

USDA Designation	Size in millimeters (mm)
Gravel	+2mm
Sand	0.05 – 2mm
Silt	0.002 – 0.05mm
Clay	minus 0.002mm

Sieve analysis shall be performed and compared to USDA Soil Classification System.

Sieve analysis shall be done by a combined hydrometer and wet sieving using sodium hexametaphosphate as a dispersant in compliance with ASTM D422 after destruction of organic matter by hydrogen peroxide.

- b. Submit a chemical analysis, performed in accordance with current AOAC Standards, including the following:
 - 1) pH and buffer pH.
 - 2) Percent organic matter as determined by the loss of ignition of oven dried samples. Test samples shall be oven dried to a constant weight at a temperature of 230 degrees F, plus or minus 9 degrees.
 - 3) Analysis for nutrient levels by parts per million.

- 4) Soluble salt by electrical conductivity of a 1:2 soil/water sample measured in Millimho per cm.
 - 5) Cation Exchange Capacity (CEC).
 - 6) Carbon/Nitrogen Ratio.
4. Submit one cubic foot sample of crushed stone which will be used in production of CU-Structural Soil.
- a. Provide particle size analysis:

USDA Designation	Size in millimeters (mm)
3"	+76mm
2-1/2"	63-76mm
2"	50-63mm
1-1/2"	37-50mm
1"	25-37mm
3/4"	19-25mm
Fine Gravel	2-19mm

- b. Provide the manufacturers analysis of the loose and rodded unit weight.
 - c. Losses from LA Abrasion tests- not to exceed 40%.
 - d. Minimum 90% with 2 or more fractured faces.
 - e. Percent pore space analysis.
5. At the Landscape Architect's discretion, the sample of CU-Structural Soil may be tested for the following:
- a. Compaction in accordance with ASTM D698 / AASHTO T99.
 - b. California Bearing Ratio in accordance with ASTM D1883: soaked CBR shall equal or exceed a value of 50.
 - c. Measured dry-weight percentage of stone in the mixture.
6. The approved CU-Structural Soil sample shall be the standard.
7. Any deviation from the specified crushed stone and clay loam specifications shall be approved by Amereq, Inc.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For each testing agency.
- B. Preconstruction Test Reports: For preconstruction soil analyses specified in "Preconstruction Testing" Article.
- C. Field quality-control reports.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.
1. Laboratories: Subject to compliance with requirements, qualified independent soil testing services include, but are not limited to:
 - a. Penn State College of Agricultural Sciences, Agricultural Analytical Services Lab
111 Ag Analytical Services Lab, University Park, PA 16802
Phone: 814-863-0841
Email: aaslab@psu.edu
www.agsci.psu.edu
 - b. Rutgers Soil Testing Laboratory
Rutgers, The State University of New Jersey
57 US Highway 1, New Brunswick, NJ 08901-8554
Phone: 848-932-9295
Email: soiltest@njaes.rutgers.edu
<https://njaes.rutgers.edu/soil-testing-lab/>
 2. Multiple Laboratories: At Contractor's option, work may be divided among qualified testing laboratories specializing in physical testing, chemical testing, and fertility testing.

1.8 PRE-CONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction soil analyses on imported soil.
1. Notify Landscape Architect at least seven (7) days in advance of the dates and times when laboratory samples will be taken.
- B. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.
1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.9 PRE-CONSTRUCTION SOIL-SAMPLING REQUIREMENTS

- A. General: Extract soil samples according to requirements in this article.
- B. Sample Collection and Labeling: Have samples taken and labeled by Contractor in presence of Landscape Architect under the direction of the testing agency.

1. Number and Location of Samples: Minimum number of representative soil samples to be determined by testing agency for each soil to be used or amended for landscaping purposes.
2. Procedures and Depth of Samples: To be determined by testing agency.
3. Division of Samples: Split each sample into two, equal parts. Send half to the testing agency and half to Owner for its records.
4. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

1.10 PRE-CONSTRUCTION TESTING REQUIREMENTS

- A. General: Perform tests on soil samples according to requirements in this article.
- B. Physical Testing:
 1. Soil Texture: Soil-particle, size-distribution analysis by the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":
 - a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
 - b. Hydrometer Method: Report percentages of sand, silt, and clay.
 2. Bulk Density: Analysis according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 3. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 4. Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 5. Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods"; at 85 percent compaction according to ASTM D698 (Standard Proctor).
- C. Chemical Testing:
 1. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
 2. Clay Mineralogy: Analysis and estimated percentage of expandable clay minerals using CEC by ammonium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
 3. Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and vanadium. If RCRA metals are present, include recommendations for corrective action.
 4. Phytotoxicity: Test for plant-available concentrations of phytotoxic minerals including aluminum, arsenic, barium, cadmium, chlorides, chromium, cobalt, copper, lead, lithium, mercury, nickel, selenium, silver, sodium, strontium, tin, titanium, vanadium, and zinc.
- D. Fertility Testing: Soil fertility analysis according to standard laboratory protocol of SSSA NAPT NEC-67, including the following:
 1. Percentage of organic matter.
 2. CEC, calcium percent of CEC, and magnesium percent of CEC.
 3. Soil reaction (acidity/alkalinity pH value).

4. Buffered acidity or alkalinity.
5. Nitrogen ppm.
6. Phosphorous ppm.
7. Potassium ppm.
8. Manganese ppm.
9. Manganese-availability ppm.
10. Zinc ppm.
11. Zinc availability ppm.
12. Copper ppm.
13. Sodium ppm.
14. Soluble-salts ppm.
15. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
16. Other deleterious materials, including their characteristics and content of each.

E. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3-Chemical Methods."

F. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.

1. Fertilizers and Soil Amendment Rates: State recommendations in weight per 1,000 sq. ft. for 6-inch depth of soil.
2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per 1000 sq. ft. for 6-inch depth of soil.

1.11 POST-CONSTRUCTION TESTING

A. Post-Construction Testing Service: Engage a qualified testing agency to perform post-construction analyses on amended planting bed soil with compost incorporated.

1. Notify Landscape Architect seven (7) days in advance of the dates and times when laboratory samples will be taken.

B. Post-Construction Soil Analyses: For each amended soil, perform testing on soil samples and furnish soil analysis and a written report by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.

1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.12 POST-CONSTRUCTION SOIL-SAMPLING REQUIREMENTS

A. General: Perform tests on soil samples according to the requirements in this article.

B. Fertility Testing:

1. Percentage of organic matter.

- a. Organic matter content must be 4% minimum.
 2. CEC, calcium percent of CEC, and magnesium percent of CEC
 3. Soil reaction (acidity / alkalinity pH value).
 - a. pH levels must be between 5.5 and 6.0. Lower pH by using elemental sulfur product. Peat moss or copper sulfate may not be used to lower pH.
 4. Buffered acidity or alkalinity.
 5. Nitrogen ppm.
 6. Phosphorus ppm.
 7. Potassium ppm.
 8. Manganese ppm.
 9. Manganese-availability ppm.
 10. Zinc ppm.
 11. Zinc-availability ppm.
 12. Copper ppm.
 13. Sodium ppm.
 14. Soluble-salts ppm.
 - a. Soluble-salts measurement must be less or equal to 2 mmho/cm.
 15. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
 16. Other deleterious materials, including their characteristics and content of each.
 17. Percolation test to ensure adequate drainage and proper mixing of compost.
- C. Recommendations: The analysis tests shall show recommendations for soil additives or fertilizers to correct soil mixes' deficiencies as necessary.
- D. Deficiencies: Nutrient deficiencies shall be corrected at time of installation.

1.13 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.
- B. Bulk Materials:
 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 3. Do not move or handle materials when they are wet or frozen.
 4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.
- C. CU-Structural Soil:
 1. Delivered CU-Structural Soil shall be at or near optimum compaction moisture content as determined by AASHTO T 99 (ASTM D 698) and should not be placed in frozen, wet or muddy sites.

2. Protect CU-Structural Soil from exposure to excess water and from erosion at all times. Do not store CU-Structural Soil unprotected. Do not allow excess water to enter site prior to compaction. If water is introduced into the CU-Structural Soil after grading, allow water to drain to optimum compaction moisture content.
3. All areas to receive CU-Structural Soil shall be inspected by the installing contractor before starting work and all defects such as incorrect grading, compaction, and inadequate drainage shall be reported to the engineer prior to beginning this work.
4. Qualifications of installing contractor: The work of this section should be performed by a contracting firm which has a minimum of five years' experience. Proof of this experience shall be submitted as per paragraph, SAMPLES and SUBMITTALS, of this section.

PART 2 - PRODUCTS

2.1 PLANTING SOILS SPECIFIED ACCORDING TO PERFORMANCE REQUIREMENTS

- A. Planting Soil: Imported, naturally formed or manufactured soil from off-site sources consisting of fertile, friable, naturally fine sandy loam, (USDA classification for soil consisting of 10-20 percent clay, 30-50 percent silt and 50-70 percent fine sand, particle 0.10-0.25 mm.) pH range of 5.5 to 6.5, 4 percent organic material minimum, and with sufficient structure to give good tilth and aeration.
 1. Sources: Take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches deep, not from agricultural land, bogs, or marshes; and that do not contain undesirable organisms or disease-causing plant pathogens.
 2. Soil shall not contain any noxious weeds or invasive plants, including, but not limited to, quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass.
 3. Clean Planting Soil shall not include any of the following:
 - a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
 - b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand 1-inch or larger.
 4. Amend imported soil with materials specified in other articles of this Section to become planting soil complying with the following requirements:
 - a. Particle Size Distribution by Separates:
 - Fine Sand: 50% to 70% percent by dry weight.
 - Silt: 30% to 50% percent by dry weight.
 - Clay: 10% to 20% percent by dry weight.
 - b. Percentage of Organic Matter: Minimum 4% by volume.
 - c. Soil Reaction: pH of 5.5 to 6.5.
 - d. CEC of Clay Fraction: Maximum 15 meq/100 mL at pH of 7.0.
 - e. Soluble-Salt Content: 5 to 1- dS/m measured by electrical conductivity.
 - f. RCRA Metals: Below maximum limits established by the EPA.
 - g. Phytotoxicity: Below phytotoxicity limits established by SSSA.
 5. Acceptable ranges for base saturation percentages are:

Element	Desired % Range	Ideal %
Ca	60-70%	68%
Mg	10-20%	12%
K	2-5%	5%
Na	0.5-3%	0.75%
Other bases (variable)	2-4%	3.75%
Exchangeable Hydrogen	10-15%	10.5%

- B. Topsoil: ASTM D5268, fertile, friable, naturally fine sandy loam (USDA classification for soil consisting of 10-20% clay, 30-50% silt, and 50-70% fine sand, particle 0.1-0.25mm), pH range of 5.5 to 6.5, 4% organic material minimum.
1. Topsoil Source: Reuse surface soil stockpiled on-site. Do not stockpile topsoil more than 6-feet high. Verify stability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stone, clay lumps, and other extraneous materials harmful to plant growth.
 2. Supplement with imported topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally, well-drained construction or mining site where topsoil occurs at least 4-inches deep; do not obtain from agricultural land, bogs, or marshes.
- C. Unacceptable Properties
1. Clean soil of the following:
 - a. Unacceptable Materials: concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, litter or other extraneous materials that are harmful to plant growth.
 - b. Unsuitable Materials: stones 1-inche or larger in any dimension, noxious seeds, sticks, brush, roots, plants, sod, clay lumps, and pockets of co

2.2 CU-STRUCTURAL SOIL

A. CLAY LOAM

1. Soil shall be a “loam” with a minimum clay content of 20% or a “clay loam” based on the “USDA classification system” as determined by mechanical analysis (ASTM D-422) and it shall be of uniform composition, without admixture of subsoil. It shall be free of stones, lumps, plants and their roots, debris and other extraneous matter. It shall not contain toxic substances harmful to plant growth. Clay loam shall contain not less than 2% or more than 5% organic matter as determined by the loss on ignition of oven-dried samples. Test samples shall be oven-dried to a constant weight at a temperature of 230 degrees F., plus or minus 9 degrees.
2. Mechanical analysis for the loam or clay loam shall be as follows:

Textural Class	% of Total Weight
Gravel	Less than 5%
Sand	20-45%
Silt	20-50%
Clay	20-40%

3. Chemical analysis: Meet, or be amended to meet the following criteria:
 - a. pH between 5.5 to 6.5.
 - b. Percent organic matter 2% - 5% by dry weight.
 - c. Adequate nutrient levels.
 - d. Soluble salt less than 1.0 mmho/cm.
 - e. Cation Exchange Capacity (CEC) greater than 10.
 - f. Carbon/Nitrogen ratio less than 33:1.
4. Loam or clay loam shall not come from USDA - classified prime farmland.

B. FERTILIZER

1. Should nutrient analysis suggest that the loam or clay loam need additional nutrients, it shall be amended in accordance with Soil Analysis **and for the specific plants specified on the Plant Schedule.**

C. SULFUR

1. Sulfur shall be a commercial granular, 96% pure sulfur, with material and analysis appearing on the labeled container.
2. Sulfur used to lower pH shall be a ferrous sulfate formulation.
3. Application rates shall be dependent on soil test results.

D. LIME

1. Agricultural lime containing a minimum of 85% carbonates.
2. Application rates shall be dependent on soil test results.

E. CRUSHED STONE

1. The size of the crushed stone shall be 0.75 inches to 1.5 inches allowing for 5% – 10% being greater than 1.5 inches, and 5% – 10% less than 0.75 inches.
2. Acceptable aggregate dimensions will not exceed 2.5:1.0 for any two dimensions.
3. Minimum 90% with two or more fractured faces.
4. Results of Aggregate Soundness Loss test shall not exceed 18%.
5. Losses from LA Abrasion tests shall not exceed 40%.

F. HYDROGEL

1. Hydrogel shall be a coated potassium propenoate-propenamide copolymer (Gelscape[®] Hydrogel Tackifier) as manufactured by Amereq, Inc. 800-832-8788.

G. WATER

1. The installing contractor shall be responsible to furnish his own supply of water (if needed) free of impurities, to the site.

H. CU-STRUCTURAL SOIL

1. A uniformly blended urban tree mixture of crushed stone, clay loam and Gelscape[®] Hydrogel Tackifier, as produced by an Amereq-licensed company, mixed in the following proportion:

Material	Unit of Weight
Specified Crushed Stone	100 units dry weight
Specified Clay Loam	20-25 units (to achieve min. CBR of 50)

Gelscape® Hydrogel Tackifier	0.035 units dry weight
Moisture	ASTM D698 / AASHTO T-99 optimum moisture

2.3 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
 - 1. Class: T, with a minimum of 99 percent passing through a No. 8 sieve and a minimum of 75 percent passing through a No. 60 sieve.
- B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Perlite: Horticultural perlite, soil amendment grade.
- E. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve.
- F. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C33/C33M.
- G. Diatomaceous Earth: Horticultural diatomaceous earth, soil amendment grade.

2.4 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:
 - 1. Feedstock: Compost may be derived from: agricultural, food, or industrial residuals; biosolids (treated sewage sludge); yard trimmings; source-separated or mixed solid 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. Do not use compost that has received the addition of liming agents or ash by-products. The product shall be certified through the U.S. Composting Council's (USCC) Seal of Testing Assurance (STA) Program.
 - 2. Reaction: pH of 5.5 to 8
 - 3. Soluble-Salt Concentration: Less than 5-10 dS/m.
 - 4. Moisture Content: 35 to 55 percent by weight.
 - 5. Particle Size: 100 percent passing through a 1/2-inch sieve.
 - 6. **The compost supplier shall test all compost products within 90 Calendar Days prior to application.** Samples shall be collected using the Seal of Testing Assurance (STA) sample collection protocol. The sample collection protocol can be obtained from the U.S.

Composting Council, 4250 Veterans Memorial Highway, Suite 275, Holbrook, NY 11741 Phone: (631) 737-4931, www.compostingcouncil.org.

- a. The sample shall be sent to an independent STA Program approved laboratory. The compost supplier shall pay for the test. A copy of the approved independent STA Program laboratory test report shall be submitted to the Landscape Architect prior to initial application of the compost. Seven days prior to application, the Contractor shall submit a sample of each type of compost to be used on the project to the Landscape Architect.
7. Compost not conforming to the above requirements or taken from a source other than those tested and accepted shall be immediately removed from the project and replaced at no cost to the Owner.
8. The Contractor shall submit the following information to the Landscape Architect for approval:
 - a. The supplier shall verify in writing and provide lab analyses that the Materials comply with the processes, testing, and standards specified in these Specifications. An independent STA Program certified laboratory shall perform the analysis.
 - b. A copy of the producer's STA certification as issued by the U.S. Composting Council.

2.5 FERTILIZERS

- A. As required by soil analysis and recommendations.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

PART 3 - EXECUTION

3.1 GENERAL

- A. Place planting soil and fertilizers according to requirements in other Specification Sections.
- B. 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 planting soil.
- C. Proceed with placement only after unsatisfactory conditions have been corrected.
- D. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff of airborne dust to adjacent properties and walkways.

3.2 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

- A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil, or apply manufactured soil on site in its final, blended condition. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Subgrade Preparation: Till subgrade to a minimum depth of 4 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 1. Apply, add soil amendments, and mix approximately half the thickness of unamended soil over prepared, loosened subgrade according to "Mixing" Paragraph below. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil.
- C. Mixing: If amending soil on-site, spread unamended soil to total depth indicated on Drawings, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.
 - 1. Amendments: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them with unamended soil to produce planting soil.
 - a. Mix lime and sulfur with dry soil before mixing fertilizer.
 - b. Mix fertilizer with planting soil no more than seven days before planting.
 - 2. Lifts: Apply and mix unamended soil and amendments in lifts not exceeding 8 inches in loose depth for material compacted by compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- D. Compaction: Compact each blended lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D698.
- E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.3 PLACING CU-STRUCTURAL SOIL OVER EXPOSED SUBGRADE

- A. Testing:
 - 1. All CU-Structural Soil mixing shall be performed at the licensed producer's yard using appropriate soil measuring, mixing and shredding equipment of sufficient capacity and capability to assure proper quality control and consistent mix ratios. No mixing of CU-Structural Soil at the project site shall be permitted.
 - 2. Maintain adequate moisture content during the mixing process. Soils and mix components shall easily shred and break down without clumping. Soil clods shall easily break down into a fine crumbly texture. Soils shall not be overly wet or dry. The licensed producer shall measure and monitor the amount of soil moisture at the mixing site periodically during the mixing process.
 - 3. Raw materials shall be mixed off-site, only at the licensed producer's facility, on a flat asphalt or concrete paved surface to avoid soil contamination.

4. Should the independent laboratory test results of the clay loam reveal a need to amend it, to meet specifications, the amending materials should be added to the clay loam following the rates and recommendations provided by the Soil Analysis **and for the specific plants specified on the Plant Schedule.**

B. UNDERGROUND UTILITIES AND SUBSURFACE CONDITIONS

1. The installing contractor shall notify the Landscape Architect of any subsurface conditions which will affect the contractor's ability to install the CU-Structural Soil.
2. The installing contractor shall locate and confirm the location of all underground utility lines and structures prior to the start of any excavation.
3. The installing contractor shall repair any underground utilities or foundations damaged during the progress of this work.

C. SITE PREPARATION

1. Do not proceed with the installation of the CU-Structural Soil material until all walls, curb footings and utility work in the area have been installed. For site elements dependent on CU-Structural Soil® for foundation support, postpone installation of such elements until immediately after the installation of CU-Structural Soil.
2. Install subsurface drain lines as shown on the plan drawings prior to installation of CU-Structural Soil material.
3. Excavate and compact the proposed subgrade to depths, slopes and widths as shown on the drawings. Maintain all required angles of repose of the adjacent materials as shown on the drawings. Do not over excavate compacted subgrades of adjacent pavement or structures.
4. Confirm that the subgrade is at the proper elevation and compacted as required. Subgrade elevations shall slope parallel to the finished grade and/or toward the subsurface drain lines as shown on the drawings.
5. Clear the excavation of all construction debris, trash, rubble and any foreign material. In the event that fuels, oils, concrete washout silts or other material harmful to plants have been spilled into the subgrade material, excavate the soil sufficiently to remove the harmful material. Fill any over excavation with approved fill and compact to the required subgrade compaction.
6. Do not proceed with the installation of CU-Structural Soil until all utility work in the area has been installed. All subsurface drainage systems shall be operational prior to installation of CU-Structural Soil.
7. Protect adjacent walls, walks and utilities from damage. Use ½" plywood and/or plastic sheeting as directed to cover existing concrete, metal and masonry work and other items as directed during the progress of the work.
 - a. Clean up all trash and any soil or dirt spilled on any paved surface at the end of each working day.
 - b. Any damage to the paving or architectural work caused by the installing contractor shall be repaired, as directed by the Landscape Architect.
8. Maintain all silt and sediment control devices required by applicable regulations.
9. Provide adequate methods to assure that trucks and other equipment do not track soil from the site onto adjacent property and the public right of way.

D. INSTALLATION OF CU-STRUCTURAL SOIL MATERIAL

1. Install CU-Structural Soil in 6-inch lifts and compact each lift.
2. Compact all materials to at least 95% Proctor Density from a standard compaction curve AASHTO T 99 (ASTM D 698). No compaction shall occur when moisture content exceeds maximum as listed herein. Delay compaction if moisture content exceeds maximum allowable and protect CU-Structural Soil during delays in compaction with plastic or plywood as directed by the Landscape Architect.
3. Bring CU-Structural Soil to finished grades as shown on the drawings. Immediately protect the CU-Structural Soil from contamination by toxic materials, trash, debris, water containing cement, clay, silt or materials that will alter the particle size distribution of the mix with plastic or plywood as directed by the Landscape Architect.
4. The Landscape Architect may periodically check the material being delivered, prior to installation for color and texture consistency with the approved sample provided by the installing contractor as part of the submittal for CU-Structural Soil. If the Landscape Architect determines that the delivered CU-Structural Soil varies significantly from the approved samples, the Landscape Architect shall contact the licensed producer.
5. Contractor shall maintain weight tickets showing source of material. Landscape Architect may review at its discretion that the delivered structural soil was produced by the approved CU-Structural Soil licensee by inspecting weight tickets showing source of material. If tickets are not provided or installed soil is found to be non-compliant, it shall be removed by the Contractor and replaced with approved soil material at no additional cost to Owner.
6. CU-Structural Soil should not be stockpiled long-term. Any CU-Structural Soil not installed immediately should be protected by a tarp or other waterproof covering.

E. FINE GRADING

1. After the initial placement and rough grading of the CU-Structural Soil but prior to the start of fine grading, the installing contractor shall request review of the rough grading by the Landscape Architect. The installing contractor shall set sufficient grade stakes for checking the finished grades.
2. Adjust the finish grades to meet field conditions as directed. Provide smooth transitions between slopes of different gradients and direction. Fill all dips with CU-Structural Soil and remove any bumps in the overall plane of the slope.
 - a. The tolerance for dips and bumps in CU-Structural Soil areas shall be a 3" deviation from the Drawings.
3. All other fine grading shall be inspected and approved by the Landscape Architect prior to the installation of other items to be placed on the CU-Structural Soil.

F. ACCEPTANCE STANDARDS

1. The Landscape Architect will inspect the work upon the request of the installing contractor. Request for inspection shall be received by the Landscape Architect at least 10 days before the anticipated date of inspection.

G. CLEAN-UP

1. Upon completion of the CU-Structural Soil installation operations, clean areas within the contract limits. Remove all excess fills, soils and mix stockpiles and legally dispose of all waste materials, trash and debris. Remove all tools and equipment and provide a clean, clear site. Sweep, do not wash, all paving and other exposed surfaces of dirt and mud until the paving has been installed over the CU-Structural Soil material. Do no washing until finished materials covering CU-Structural Soil material are in place.

3.4 PROTECTION

- A. Protection Zone: Identify protection zones as indicated on Drawings.
- B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:
 1. Storage of construction materials, debris, or excavated material.
 2. Parking vehicles or equipment.
 3. Vehicle traffic.
 4. Foot traffic.
 5. Erection of sheds or structures.
 6. Impoundment of water.
 7. Excavation or other digging unless otherwise indicated.
- C. If planting soil or subgrade is over-compacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Landscape Architect and replace contaminated planting soil with new planting soil.

3.5 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.
 1. Legally dispose of excess subsoil and unsuitable materials off-site.

END OF SECTION 329115

**SECTION 329200
TURF AND GRASSES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Sodding.
 - 2. Turf renovation.
- B. Related Requirements:
 - 1. Section 329115 "Soil Preparation (Performance Specification)" for information regarding planting soils.
 - 2. Section 329300 "Plants" for trees, shrubs, ground covers, and other plants.

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. 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.
- C. Planting 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. See Section 329115 "Soil Preparation (Performance Specification)" and drawing designations for planting soils.
- D. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Hancock Playground, 147 Master Street, Philadelphia, PA 19122.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For landscape Installer.

- B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
 - 1. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.
- C. Product Certificates: For fertilizers, from manufacturer.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required maintenance periods.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.
 - 1. Professional Membership: Installer shall be a member in good standing of either the National Association of Landscape Professionals or AmericanHort.
 - 2. Experience: Engage an experienced Installer who has completed turf installation to the extent indicated for this Project and with a record of successful lawn establishment for a minimum of three (3) years.
 - 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.
- B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in Turfgrass Producers International (TPI) "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.
- 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. 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.
 - 3. Accompany each delivery of bulk materials with appropriate certificates.

1.9 FIELD CONDITIONS

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of planting completion.
 - 1. Spring Planting: March 15 – June 15
 - 2. Fall Planting: September 1 – November 15
- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 TURFGRASS SOD

- A. Turfgrass Sod: Certified, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.
- B. Turfgrass Species, Cool-Season Grass: Sod of grass species as follows, with not less than 85 percent germination, not less than 95 percent pure seed, and not more than 0.5 percent weed seed:
 - 1. Full Sun: Kentucky bluegrass (*Poa pratensis*), a minimum of three cultivars.
 - 2. Sun and Partial Shade: Proportioned by weight as follows:
 - a. 50 percent Kentucky bluegrass (*Poa pratensis*).
 - b. 30 percent chewings red fescue (*Festuca rubra* variety).
 - c. 10 percent perennial ryegrass (*Lolium perenne*).
 - d. 10 percent redtop (*Agrostis alba*).

2.2 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition:
 - a. Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition:
 - a. Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.3 MULCHES

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 3. Uniformly moisten excessively dry soil that is not workable, or which is dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

- A. Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - 1. Protect grade stakes set by others until directed to remove them.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

- A. General: Prepare planting area for soil placement and mix planting soil according to Section 329115 "Soil Preparation (Performance Specification)."
- B. Placing Planting Soil: Place and mix planting soil in place over exposed subgrade.
 - 1. Reduce elevation of planting soil to allow for soil thickness of sod.
- C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

- D. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 SODDING

- A. Lay sod within 24 hours of harvesting unless a suitable preservation method is accepted by Landscape Architect prior to delivery time. Do not lay sod if dormant or if ground is frozen or muddy.
- B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to soil or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
 - 1. Lay sod across slopes exceeding 1:3.
 - 2. Anchor sod on slopes exceeding 1:6 with wood pegs spaced as recommended by sod manufacturer but not less than two anchors per sod strip to prevent slippage.
- C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

3.5 TURF RENOVATION

- A. Renovate existing turf where indicated or where existing turf is damaged due to construction activities.
- B. Renovate turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.
 - 1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
 - 2. Install new planting soil as required.
- C. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.
- D. Remove topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.
- E. Mow, dethatch, core aerate, and rake existing turf.
- F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.
- G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.
- H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

- I. Apply soil amendments and initial fertilizer required for establishing new turf and mix thoroughly into top 4-inches of existing soil. Install new planting soil to fill low spots and meet finish grades.
 - 1. Soil Amendment(s): Apply soil amendment(s) according to requirements of Section 329115 "Soil Preparation (Performance Specification)."
 - 2. Initial Fertilizer: Slow-release fertilizer applied according to manufacturer's recommendations.
- J. Apply sod as required for new turf.
- K. Water newly planted areas and keep moist until new turf is established.

3.6 TURF MAINTENANCE

- A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
 - 1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
 - 2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 - 3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.
 - 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 - 2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
- C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
 - 1. Mow installed sod to a height of 1-1/2 to 2 inches.
- D. Turf Postfertilization: Apply slow-release fertilizer after initial mowing and when grass is dry.
 - 1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.7 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Landscape Architect:

1. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
- B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.8 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.
- C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
- D. Remove nondegradable erosion-control measures after grass establishment period.

3.9 MAINTENANCE SERVICE

- A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Turf Maintenance" Article. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but for not less than the following periods:
 1. Sodded Turf: 30 days from date of Substantial Completion.
 - a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

END OF SECTION 329200

**SECTION 329300
PLANTS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Trees (Canopy and Understory).
 - 2. Shrubs.
 - 3. Herbaceous Plants (Ornamental Grasses, Perennials, and Groundcovers).
 - 4. Fertilizers.
 - 5. Mulches.
 - 6. Tree Watering Bags.
- B. Related Requirements:
 - 1. Section 323300 "Site Furnishings" for tree grates.
 - 2. Section 329115 "Soil Preparation (Performance Specification)" for information regarding planting and structural soils.
 - 3. Section 329200 "Turf and Grasses" for turf (lawn).

1.3 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, with a ball size not less than sizes indicated; 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. 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.
- D. Finish Grade: Elevation of finished surface of mulch.
- E. 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.

- F. Planting Area: Areas to be planted.
- G. Planting Soil: Imported soil or manufactured soil that has been modified with soil amendments and/or fertilizers to produce a soil mixture best for plant growth. See Section 329115 "Soil Preparation (Performance Specification)" for drawing designations for planting soils.
- H. 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.
- I. 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.
- J. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
- K. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 REFERENCES

- A. Comply with the following Reference Codes and Standards in accordance with Division 1:
 - 1. American National Standards Institute (ANSI):
 - a. Z60.1 – American Standards for Nursery Stock
 - b. A300 – Standards for Tree Care Operations
 - 2. United States Department of Agriculture (USDA):
 - a. Plant Hardiness Zone Map

1.5 COORDINATION

- A. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
 - 1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.6 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Hancock Playground, 147 Master Street, Philadelphia, PA 19122.

1.7 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Plant Materials: Contractor shall provide a confirmed Plant Schedule verifying quantities, sizes, quality, and sources for all specified plant materials.

2. Contractor shall provide confirmed Plant Schedule to Landscape Architect a minimum of six (6) weeks prior to anticipated Plant Installation and shall coordinate with Landscape Architect for Tree Tagging.

B. Samples for Verification: For each of the following:

1. Plant Material: Bill of sale indicating full scientific name, quantity, plant size, and name of growing nursery for all plant material.
2. Organic and Compost Mulch: 1-quart (1-L) 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.

C. Planting & Installation Schedule: Submit proposed planting and installation schedule, indicating dates for completion of work items, as coordinated with Construction Manager, plant tagging, soil testing, digging of woody plants, and installation of each type of landscape work during normal seasons for such work in area of site.

D. Correlate Plant & Installation Schedule with specified maintenance periods to provide maintenance from date of Substantial Completion. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.

1. Submit letter notifying Owner and Landscape Architect of completion of planting work and requesting inspection to determine acceptability for Substantial Completion and beginning of Warranty Period.
2. Submit letter to Owner and Landscape Architect requesting a final inspection of planting work for Final Acceptance at end of Warranty Period.

E. Plant Maintenance Schedule: Submit proposed plant maintenance schedule, indicating frequency of maintenance visits and scheduled maintenance activities to occur during visits.

1. Plant maintenance shall include watering of plants. Loss of plants due to inadequate watering will be considered negligence of maintenance services and will require plant replacement at no cost to Owner.
2. A one-year watering plan shall be submitted as part of Plant Maintenance Schedule.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis of standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

C. Sample Warranty: For special warranty.

1.9 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

1.10 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.
 - 1. Professional Membership: Installer shall be a member in good standing of either the National Association of Landscape Professionals or AmericanHort.
 - 2. Experience: Engage an experienced Installer who has completed planting work similar in material, design, and extent to that indicated for this Project and with a record of successful plant establishment for a minimum of three (3) years.
 - 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
- B. Nursery Qualifications: A nursery specializing in growing and cultivating the plant specified in this Section with a minimum of six (6) years' experience.
- C. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
- D. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
 - 1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
 - 2. Other Plants: Measure with stems, petioles, and foliage in their normal position.
- E. Plant Material Observation: Landscape Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality.
 - 1. Landscape Architect may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
 - 2. Notify Landscape Architect of sources of herbaceous planting materials at least seven days in advance of delivery to site.
- F. Substitutions: Substitutions will only be considered after review of plant availability with Landscape Architect. Submit request for substitutions in writing to Landscape Architect. **Substitutions will only be accepted with written approval by Landscape Architect.**

1.11 HARVESTING, DELIVERY, STORAGE, AND HANDLING

- A. Landscape Architect shall accompany Contractor to nursery to select and tag Trees. Landscape Architect may choose to select and tag Shrubs.
- B. Landscape Architect shall select plants for proper visual formation. Contractor shall inspect selected plants for disease and other requirements of Contract Documents. **Prior to nursery trip, Contractor shall have pre-selected Nursery(s) to ascertain the sufficient plants in size and species required, and provided the confirmed Plant Schedule to Landscape Architect.**
- C. The Landscape Architect shall tag all trees and at least five (5) shrubs of each species as a representative sample. **Trees delivered to the Project site without tags, and shrubs that do not equally match the quality of tagged samples, shall be rejected.**
- D. 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.
- E. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - 3. Accompany each delivery of bulk materials with appropriate certificates.
- F. Deliver bare-root stock plants within 24 hours of digging. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting. Transport in covered, temperature-controlled vehicles, and keep plants cool and protected from sun and wind at all times.
- G. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- H. Handle planting stock by root ball.
- I. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.
- J. The contractor must verify that one of the following methods is used to protect plant material in transit:
 - 1. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
 - a. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
 - 2. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

- K. Deliver plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
 - 1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
 - 2. Do not remove container-grown stock from containers before time of planting.
 - 3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.
- L. **All plant material must have labels showing botanical name on each individual plant. Plants without labels will be noted by Landscape Architect and shall be removed immediately from the Project Site.**
- M. Notify the Landscape Architect at least three (3) business days in advance of start of Work.
- N. The Landscape Architect reserves the right to reject plant materials not meeting the above requirements.

1.12 FIELD CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work. Hand excavate, as required. Maintain grade stakes until parties concerned mutually agree upon removal.
- B. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
 - 1. Spring Planting: March 15 – June 15
 - 2. Fall Planting: September 1 – November 15
 - 3. Planting outside of designated timeframes above may only occur with written approval from Landscape Architect.
 - 4. Planting between June 16 to August 31 is not permitted.
- C. Plant trees after finished grades are established and before planting lawns, unless approved otherwise by Landscape Architect.
 - 1. When planting trees after lawn, protect lawn areas and promptly repair damage caused by planting operations.
- D. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.
- E. Utilities: Determine location of above-grade and underground utilities and perform Work in a manner which will avoid damage. Hand excavate, as required. Maintain grade stakes until parties concerned mutually agree upon removal.

- F. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or other obstructions, notify Landscape Architect before planting.

1.13 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Death and unsatisfactory growth, including resulting from lack of adequate maintenance during warranty period.
 - b. Structural failures including plantings falling or blowing over.
 - c. Faulty performance of tree stabilization edgings and tree grates.
 - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Periods: From date of Substantial Completion and acceptance of Work by Owner.
 - a. Trees, Shrubs, Vines, and Ornamental Grasses: Eighteen (18) months.
 - b. Ground Covers, Biennials, Perennials, and Other Plants: Eighteen (18) months.
 - 3. Include the following remedial actions as a minimum:
 - a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
 - b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
 - c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.
 - d. Provide extended warranty for period equal to original warranty period, for replaced plant material.
 - e. At end of Warranty Period, cut bindings around base of trunks and remove loose materials. Redistribute, add, and/or replace mulch as needed.

PART 2 - PRODUCTS

2.1 NURSERIES

- A. Nurseries shall be members of the American Association of Nurserymen and Pennsylvania Landscape and Nurserymen's Association, or equivalent State organization(s).
- B. Nurseries shall be within same plant hardiness zone and having similar climate conditions as Project Site. Zone shall be as defined on United States Department of Agriculture Plant Hardiness Zone Map.

2.2 PLANT MATERIAL

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by

transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable and will be rejected and shall be removed from the project site immediately.
 2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
- B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.
- C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- D. Labeling: Label each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.

2.3 TREES

- A. Provided balled and burlapped trees, unless container-grown trees are specified on Plant Schedule.
- B. Canopy Trees: Provide canopy trees with well-balanced crowns, straight trunks with intact main leaders, undamaged and uncut, and of height and caliper indicated on Plant Schedule, and conforming to ANSI Z60.1.
1. Tree sizes and conditions shall meet or exceed requirements as specified on Plant Schedule.
- C. Understory Trees: Provide understory trees that are upright and spreading, branched naturally according to species and type, and of height and container size indicated on Plant Schedule, and conforming to ANSI Z60.1.
1. Understory trees should have two to three main stems. Understory trees with more four or more main stems may be rejected upon inspection by Landscape Architect.

2.4 SHRUBS

- A. Provide deciduous shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub. See Plant Schedule.

2.5 HERBACEOUS PLANTS

- A. Provide ornamental grasses, perennials, and groundcovers that are established and well-rooted in removable containers or integral pots and with not less than the minimum number and length of runners required by ANSI Z60.1 for the pot size indicated. See Plant Schedule.

2.6 FERTILIZERS

- A. Feeder Packs: Organic, biodegradable packs containing a measured dose of fertilizer (4-2-2), mycorrhizae, biochar, azomite, and micronized oyster shell (5% calcium and 1% Sulphur).
 - 1. *Fuhgeddaboudit!* Root Zone Feeder Packs, manufactured by Organic Mechanics Soil Company, LLC
P.O. Box 272, Modena, PA 19358
Phone: 610-380-4598
www.organicmechanicsoil.com

2.7 MULCHES

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of the following:
 - 1. Type: Triple-Shredded hardwood bark.
 - 2. Size Range: 3-inch maximum, 1/2-inch minimum.
 - 3. Color: Natural and undyed.
- B. Leaf Litter: Chopped or shredded leaves, free of weeds, seeds, loam, sand, clay, and other foreign substances. Acquire leaf litter locally from a source approved by Landscape Architect.

2.8 TREE-WATERING BAGS

- A. Slow-Release Watering Bags: Standard product manufactured for drip irrigation of plants and emptying its water contents over an extended time period; manufactured from UV-light-stabilized nylon-reinforced polyethylene sheet, PVC, or HDPE plastic. Obtain from source below or approved equal.
 - 1. Treegator Original, manufactured by Spectrum Products, Inc.
153 Mosswood Boulevard, Youngsville, NC 27596
Phone: 1-866-873-3428
www.treegator.com

2.9 MISCELLANEOUS PRODUCTS

- A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.
- B. Burlap: Non-synthetic, biodegradable.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
 - 3. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 4. Uniformly moisten excessively dry soil that is not workable 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 Architect and replace with new planting soil.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Landscape Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.

3.3 PLANTING AREA ESTABLISHMENT

- A. General: Prepare planting area for soil placement and mix planting soil according to Section 329115 "Soil Preparation (Performance Specification)."
- B. Placing Planting Soil: Place and mix planting soil in-place over exposed subgrade.
- C. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.
- D. Around Existing Trees:
 - 1. Loosen existing soil surface by hand to a depth required to plant shrubs and / or herbaceous plants.

2. Do not place more than 10" of planting soil under dripline of existing trees.
 3. Spread two-inch deep layer of compost over soil. Mix thoroughly into top six inches of soil. Excavate and remove existing soil as required to maintain existing grades of landscape beds.
- E. Newly Graded Subgrades:
1. Loosen compacted subgrade with a subsoil ripping tool to a depth of 18-inches and with vertical trenches 24-inches apart. Run subsoil-ripping tool in two directions at right angles to each other.
 2. Spread 2-inch deep layer of topsoil or planting mix over loosened subgrade. Mix thoroughly into top 4-inches of subgrade.
 3. Spread topsoil or planting mix to depths indicated, but not less than required, to meet finish grades after addition of amendments, light rolling, and natural settlement. Do not spread if topsoil or subgrade is frozen, muddy, or excessively wet. Apply soil amendments and fertilizer on surface and mix thoroughly into topsoil.
 4. Spread 2-inch deep layer of compost over topsoil. Mix thoroughly into top 6-inches of soil.
 5. After light rolling and settlement, compact in 6-inch lifts and compact to 85% of maximum dry weight according to ASTM D698, to depth required to meet grades and elevations as indicated on Drawings.
- F. Finish Grade: Grade planting beds to a smooth, even surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.
- G. Stage installation of topsoil or planting mix to avoid travel by equipment over placed topsoil or planting mix.
- H. Restore planting beds if eroded or otherwise disturbed

3.4 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits and Trenches: Excavate circular planting pits.
1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Scarify subgrade 2-inches, and trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Scarify sides of planting pit smeared or smoothed during excavation.
 2. Excavate approximately three times as wide as ball diameter for balled and burlapped and container-grown stock.
 3. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
 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.
 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 after working hours or when unattended by Installer's personnel.

- B. Backfill Soil: Subsoil and topsoil removed from excavations may not be used as backfill soil unless otherwise indicated.
- C. Obstructions: Notify Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
- D. Drainage: Notify Landscape Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

3.5 TREE AND SHRUB PLANTING

- A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.
- B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- C. Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with top of root ball at same elevation relative to ground level as in the nursery.
 1. If soil is dry, moisten prepared planting areas before planting. Do not create muddy soil conditions.
 2. Backfill: Approved planting soil.
 3. Do not remove burlap from balls. After placing some backfill around root ball to stabilize plant, carefully cut and remove rope and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
 4. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 5. Place fertilizer feeder packs equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball per manufacturer's instructions.
 - a. Quantity: Three (3) per canopy and understory tree.
 6. Continue backfilling process. Water again after placing and tamping final layer of soil.
- D. Container-Grown Stock: Set each plant plumb and in center of planting pit or trench with top of root ball level with adjacent finish grades of planting soil.
 1. Backfill: Approved planting soil.
 2. Carefully remove root ball from container without damaging root ball or plant.
 3. Cut pot bound roots to prevent future root girdling.
 4. Place stock on setting layer of compacted planting soil.
 5. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 6. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball per manufacturer's instructions.

- a. Quantity: One (1) per shrub.
- 7. Continue backfilling process. Water again after placing and tamping final layer of soil.
- E. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.
- F. Install CU-Structural Soil in areas identified on the Drawings as indicated in Section 329115 – Soil Preparation – Performance Specification.

3.6 TREE AND SHRUB PRUNING

- A. Remove only dead, dying, or broken branches. Do not prune otherwise unless directed by Landscape Architect
- B. Unless directed by Landscape Architect, do not cut tree leaders.
- C. Do not apply pruning paint to wounds.

3.7 HERBACEOUS PLANT PLANTING

- A. Set out and space ground cover and plants other than trees and shrubs as indicated on Drawings in even rows with triangular spacing. Do not remove plants from containers until immediately before planting.
- B. Use planting soil for backfill.
- C. Dig holes large enough to allow spreading of roots.
- D. Immediately before setting plants, dip plant rootball into solution of root dip gel and water as recommended by manufacturer.
- E. For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root system but to a depth not less than two nodes.
- F. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- G. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- H. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.8 PLANTING AREA MULCHING

- A. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Trees in Turf Areas: Apply organic mulch ring of 1-1/2" thick layer of leaf litter, followed by 1-1/2" thick layer of triple-shredded hardwood mulch on top of leaf litter layer, with 18-inch radius around trunks or stems. Do not place mulch within 3 inches of trunks or stems.
2. Organic Mulch in Planting Areas: Apply 1-1/2" thick layer of leaf litter, followed by 1-1/2" thick layer of triple-shredded hardwood mulch on top of leaf litter layer, over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

3.9 INSTALLATION OF TREE GRATES

- A. Tree Grates: Install according to manufacturer's written instructions. Set grate segments flush with adjoining surfaces. Shim from supporting substrate with soil-resistant plastic. Casting shall contain 18" tree opening upon installation.

3.10 INSTALLATION OF TREE WATERING BAGS

- A. Provide one device for each tree.
- B. Place device on top of the mulch at base of tree stem and fill with water according to manufacturer's written instructions.

3.11 PLANT MAINTENANCE

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.
- B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.
- D. Plant maintenance shall include watering of plants. Loss of plants due to inadequate watering will be considered negligence of maintenance services and will require plant replacement at no cost to Owner. A one-year watering plan shall be submitted as part of Plant Submittals.
- E. Fertilize trees approximately one year after installation between October and December, or between February and April. Unless otherwise indicated by soil test results, apply at a rate of 2 pounds of actual nitrogen per 1,000 square feet. Make insertion points approximately 2'-6" apart, at a depth of 6 inches. Apply fertilized in the ball and backfill area, and to approximately 1 foot outside of the planting hole.

3.12 REPAIR AND REPLACEMENT

- A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Landscape Architect.
 - 1. Submit details of proposed pruning and repairs.
 - 2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
 - 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Landscape Architect.
- B. Remove and replace trees that are more than 25 percent dead or in an unhealthy condition or are damaged during construction operations that Landscape Architect determines are incapable of restoring to normal growth pattern.
 - 1. Provide new trees of same size as those being replaced for each tree.
 - 2. Species of Replacement Trees: Species selected by Landscape Architect.

3.13 CLEANING AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.
- C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- D. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.
- E. At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

3.14 MAINTENANCE SERVICE

- A. Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:
 - 1. Maintenance Period: Until date of Substantial Completion and acceptance of work by Owner.
- B. Maintenance Service for Herbaceous Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:
 - 1. Maintenance Period: Until date of Substantial Completion and acceptance of work by Owner.

3.15 FINAL INSPECTION

1. Inspection to determine completion and acceptance of planted areas will be made by the Landscape Architect, upon Contractor's request. Provide notification at least ten (10) business days before requested inspection date. Inspection comments will be submitted to the Contractor in writing.
2. Planted areas will be accepted provided all requirements, including the maintenance period have been complied with and plant materials are alive and in a healthy, vigorous condition.
3. Upon acceptance of Work, the Owner will assume plant maintenance and the plant material Warranty period will begin.
4. An additional inspection will be made near the end of the Warranty period to determine if plant materials need to be replaced. Plants shall be in a health, vigorous growing state and free of disease and insects.

END OF SECTION 329300