SECTION 02 41 01 - SELECTIVE SITE 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 SECTION INCLUDES

A. Selective demolition of built site elements.

B. Milling of existing bituminous surfaces.

C Sawcutting of existing concrete surfaces to neat edge of unknown depth. D.

Disposal of removed material.

E. Obtaining of waste areas for disposal of material as required.

1.3 RELATED REQUIREMENTS

A. Section 311000 - Site Clearing.

B. Section 311310 – Tree Protection and Arboriculture

C. Section 312200 – Grading.

D. Section 312316 – Excavation

E. Section 312316.13 - Trenching

F. Section 312323 – Fill and Backfill.

G. Section 312500- Temporary Erosion and Sedimentation Control

H. Philadelphia Parks and Recreation, Design Rebuild Specifications, General Earthwork Requirements: Regulated Fill Management.

1.4 REFERENCE STANDARDS

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

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

C. PennDOT Publication 408, Section 491- Milling of Bituminous Pavement Surface

1.5 SUBMITTALS

A. Site Plan, showing:

1. Vegetation to be protected.

2. Areas for temporary construction and field offices.

3. Areas for temporary and permanent placement of removed materials.

B. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.

1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.

2. Include a summary of safety procedures.

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

PART 2 PRODUCTS

2.1 MATERIALS

A. Fill Material: As specified in Section 312323 - Fill and Backfill

PART 3 EXECUTION

3.1 SCOPE

A. Remove sidewalks, paving and curbs as required to accomplish new work.

B. Remove fences and gates.

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

D. Remove or protect vegetation and tree(s) as shown on the drawings and in Section 311310 of these Specifications.

E. Maintain protection-zones free of weeds and trash.

F. Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner acceptable to the Architect.

G. Maintain protection-zone fencing in good condition as acceptable to the Architect and remove when construction operations are complete and equipment has been removed from the site.

H. Remove or abandon utilities and utility structures as indicated in the Construction Drawings.

I. Fill depressions caused by clearing, grubbing and demolition operations with satisfactory soil material, unless further excavation or earthwork is indicated. Place fill consisting of materials as specified in Section 312323 of the specifications.

3.2 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.

1. Obtain required permits.

2. Comply with applicable requirements of NFPA 241.

3. Use of explosives is not permitted.

4. Provide, erect, and maintain temporary barriers and security devices.

5. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.

6. Conduct operations to minimize effects on and interference with adjacent structures and occupants.

7. Do not close or obstruct roadways or sidewalks without permit.

8. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.

9. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

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

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

D. Protect existing structures and other elements that are not to be removed.

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

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

3.3 EXISTING UTILITIES

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

B. Protect existing utilities to remain from damage.

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

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

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

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

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

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

3.4 SELECTIVE DEMOLITION FOR ALTERATIONS OF UTILITIES

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.

1. Verify that construction and utility arrangements are as shown.

2. Report discrepancies to Architect before disturbing existing installation.

3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Remove existing work as indicated and as required to accomplish new work.

1. Remove items indicated on drawings. C.

Protect existing work to remain.

1. Prevent movement of structure; provide shoring and bracing if necessary.

2. Perform cutting to accomplish removals neatly and as specified for cutting new work.

3. Repair adjacent construction and finishes damaged during removal work.

4. Patch as specified for patching new work.

3.5 DEBRIS AND WASTE REMOVAL

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

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

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

END OF SECTION 024101

SECTION 07 92 10 - SITEWORK JOINT SEALANTS

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 Elastomeric Joint Sealants:

1. Silicone joint sealants.
2. Related items including backing materials. B. Related Sections:

1. Division 32 Section “Concrete Paving”.

1.3 PRECONSTRUCTION TESTING

A. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows.

1. Locate test joints where indicated on Project or, if not indicated, as directed by Landscape Architect.
2. Conduct field tests for each application indicated below.

a. Each kind of sealant and joint substrate indicated.

3. Field tests are to be performed on-site, either on field-constructed mock-ups or on actual construction, but far enough in advance of sealant work to allow curing of sealants and retesting if necessary.
4. Notify Landscape Architect seven days in advance of dates and times when test joints will be erected.
5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
7. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.4 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each type and color of joint sealant required, provide up to eight Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants. Final colors shall be selected from actual field mock-ups only. D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

C. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

D. Field-Adhesion Test Reports: For each sealant application tested.

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

H. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

D. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section. Provide eight mockups of joints, each with different color sealant, as selected by Landscape Architect.

Final colors shall be selected from actual field mock-ups only. E.

Pre-installation Conference: Conduct conference at Project site.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with General Conditions and Division 01 Section 'Product Requirements'.

B. Products shall be delivered to the Project site in the original, unopened containers bearing the manufacturer's name, product designation, batch number and applicable precaution labels, national standards with which the product complies and the application instructions.

1. Store in a cool, dry environment in a manner to prevent damage.

1.8 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by jointsealant manufacturer or are below 40 deg F (5 deg C).
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.9 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2- PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

D. Colors of Exposed Joint Sealants: As selected by Landscape Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. DOWSIL 795 Silicone Building Sealant (100 Percent Silicone; neutral cure ASTM C 920, Type S, Grade NS, Class 50, for Use Tor NT; suitable for exterior use; suitable to bond to joint surface materials indicated; with ASTM D 2240 or ASTM C661 Shore A Hardness of 35; or approved equal.

A. Single-Component, Nonsag, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use T.
1. Products: Subject to compliance with requirements, provide one of the following:

a. Pecora; Product: 890FTS.
b. Tremco; Product: Spectrem 800/900 SL.

2.3 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.4 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing

optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

a. Concrete.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

a. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.

3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Using tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows

1. Extent of Testing: Test completed and cured sealant joints as follows:

a. Perform [5] tests for the first 500 feet of joint length for each kind of sealant and joint substrate.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint

Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

3. Inspect tested joints and report on the following

a. Whether sealants filled joint cavities and are free of voids.
b. Whether sealant dimensions and configurations comply with specified requirements.
c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.

4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.

5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079210

SECTION 099113 – EXTERIOR PAINTING

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. Acrylic water based emulsion for asphalt pavement. B.

Related Sections:

1. Division 32 Section "Asphalt Paving”

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include preparation requirements and application instructions.
2. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.
5. Topcoat sample shall be cured for minimum 7 days.

D. Product Schedule: Use same designations indicated on Drawings and in the Exterior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

1.4 MAINTENANCE MATERIAL SUBMITTALS

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

1. Paint Products: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

Landscape Architect will select one surface to represent surfaces and conditions for application of each paint system.

a. Horizontal Surfaces: Provide samples of at least 100 sq. ft..

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C). Temperature shall not drop below 50°F in a 24 hour period following application. New asphalt surfaces shall be completely free of oils prior to coating.

B. Do not apply when surface or ambient temperature is below 50°F. If temperature is expected to drop below 50°F at any time within a 24 hour period after application dry times may be longer. DO NOT apply to previously coated surfaces that have been sealed with asphalt type sealers. This product can only be applied to concrete or regular asphalt that was not previously sealed, or was sealed with an acrylic sealer.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide ArmorPoxy Surface Bond HD Asphalt and Concrete Coating; Products as designated in "Exterior Painting Schedule" or comparable products approved by Landscape Architect:

B. Source Limitations: Obtain each paint product from single source from single manufacturer.

2.2 PAINT PRODUCTS, GENERAL

A. Material Compatibility:

Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer based on testing and field experience.

2. For each coat in a paint system, provide products recommended in writing by topcoat manufacturer for use in paint system and on substrate indicated.

B. Colors: As selected by Landscape Architect from manufacturer's full range.

2.3 FINISH COATINGS

A. Exterior Acrylic water based emulsion: exterior, 100% acrylic, low odor, waterborne floor coating. This dries rapidly to a tough, alkali resistant finish which will withstand hard wear, abrasion, grease, oils, and cleaning equipment. Then paint mix is fortified with sand for slip resistance.

1. ArmorPoxy, Inc
   1260 North Ave
   Plainfield, NJ 07062 armorpoxy.com
   E: info@armorpoxy.com
   P: 888-755-7361
2. Product: Surface Bond HD Asphalt and Concrete Coating
3. Color: As indicated in Drawing. Selected from the manufacturer’s standard color range.
   a. SB Yellow SB Orange
      SB Powder Blue
      SB Light Blue

B. Exterior Methyl Methacrylate (MMA) resin system coating.

1. Transpo Industries
   20 Jones Street New
   Rochelle, NY 1080
   https://www.transpo.com
   E: info@transpo.com
   P: 914.636.1000
2. Product: Color-Safe MMA Color Pavement Marking
3. Color: As indicated in Drawing. Selected from the manufacturer’s standard color range.
   a. White

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

Asphalt: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility, with finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

D. All surfaces must be clean, dry and free of loose particles. The coating can be applied with standard nap roller or our special textured surface bond roller. Pavement surface repairs should be made with a suitable hot or cold asphalt mix. Cracks should be filled with acrylic base crack filling products. Do not use hot applied crack filling materials.

3.3 MIXING

A. The Surface Bond HD is a one part ready to use coating with tint additive. Add 1 pint of color per 5 gal unit. Once pigment is added mix up the 5 gal pail with a metal/slurry mixer for 5 minutes before use to ensure even color consistency and aggregate disbursement. If needed, a small amount of water can be added to facilitate application.

3.4 INSTALLATION

A. Apply paints in accordance with manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.

3. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Apply first coat of Surface Bond HD to substrate. Wait for first coat to dry (25-45 mins depending on temperature and RH). Once the first coat is dry proceed with applying a second coat of the Surface Bond HD. 2 coat minimum recommended however if substrate us heavily damaged pitted, corroded or needs additional coats follow the same procedure as described above.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.5 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written instructions, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written instructions.

3.6 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
3. Allow empty paint cans to dry before disposal.
4. Collect waste paint by type and deliver to recycling or collection facility.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces

3.7 EXTERIOR PAINTING SCHEDULE

A. Asphalt Substrates, Traffic Surfaces:

1. Prime Coat: Matching topcoat.
2. Topcoat: Surface Bond HD

3.8 CLEANUP

A. Do NOT dispose of excess concrete and water-borne debris from cleaning out equipment in adjacent areas designated to be future planting beds.

B. Legally dispose of off-site all refuse and debris from these operations. Remove or neatly store material at the end of each day's work. Burning of material or dumping on the site is prohibited.

C. Maintain the site in an orderly condition during the progress of Work. Continuously and promptly remove excess and waste materials; keep lawn areas, walks and roads clear. Store materials and equipment where directed. Immediately remove rejected materials from the property. Promptly remove equipment, surplus material, and debris and trash resulting from operations under this Contract upon completion and prior to initial acceptance of Work. Leave the site in a neat, orderly condition, "broom clean".

END OF SECTION 099113

SECTION 116813 – PLAYGROUND EQUIPMENT

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 Playground Equipment as follows:

1. Custom Community Swing
2. Climbing Structure
3. Arch Ladder
4. Spinner Bowl
5. Universal Carousel
6. Freestanding Spray
7. Ground Spray B. Related Sections:

1. Section 321816 Protective Playground Surfacing
2. Section 321823 Asphalt Athletic Court Exterior Painting
3. Section 033000 Cast in Place Concrete

1.3 DEFINITIONS

A. Definitions in ASTM F 1487 and CPSC #325 apply to Work of this Section.

B. IPEMA: international Play Equipment Manufacturers Association.

1.4 ACTION SUBMITTALS

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

B. 3”x3” minimum sample of each custom color indicated

B. Shop Drawings:

1. Surfacing Include plans, elevations, sections, and attachment details.

3. Include fall heights and use zones for playground equipment, coordinated with the critical-height values of protective surfacing specified in Section 321816 Protective Playground Surfacing.

C. Qualification Data: For installer and testing agency.

D. Product Certificates: For each type of playground equipment.

E. Field quality-control reports.

F. Sample Warranty: For manufacturer's special warranties.

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

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

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

1.6 REGULATORY REQUIREMENTS

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

B. Investigate the conditions of public thoroughfares and roads as to availability, clearances, loads, limits, restrictions, and other limitations affecting transportation to and ingress and egress at the site. Conform to all governmental regulations regarding the transportation of materials and secure, in advance, any necessary permits.

C. Procure and pay for permits and licenses required for Work.

1.7 QUALITY ASSURANCE

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

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

1.8 PROJECT CONDITIONS

A. Carefully examine the site before submitting a bid. Be informed as to the nature and location of the Work, general and local conditions including climate, adjacent properties and utilities, conformation of the ground, the nature of subsurface conditions, the character of equipment and facilities needed prior to and during execution of the Work.

B. Should the Contractor, in the course of Work, find any discrepancies between Drawings and physical conditions or any omissions or errors in Drawings, or in layout as furnished by the Landscape Architect, it will be his duty to inform the Landscape Architect immediately in writing for clarification. Work done after such discovery, unless authorized by the Landscape Architect,

shall be done at the Contractor's risk.

C. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

1.9 DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packages materials n clearly marked containers showing net weight, guaranteed analysis and name of manufacturer. Specified requirements for packaged materials apply to bulk shipments. Protect materials from deterioration during delivery and during storage at site.

B. Deliver, store, and handle materials in accordance with manufacturer’s instructions to prevent damage.

1.10 WARRANTY

A. Special Warranty: Play equipment manufacturer agrees to repair or replace components of playground equipment that fail in materials or workmanship within specified warranty period.

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

1. Structural failures.
2. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

B. Warranty Period as follows:

1. 10 Years Warranty: Support posts of metal or wood.
2. 8 Years Warranty: Support posts of concrete.
3. 2 Years Warranty: Movable parts & ropes.
4. 3 Years Warranty: All other parts.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by the following:

1. Will Hemler
   General Recreation (local representative for Landscape Structures Inc.)
   (M) 800.726.4793
   (E) will@gen-rec.com

2. Kompan
   Matt Burns
   Territory Manager
   (M) 310.775.5082 (E)
   BurMat@kompan.com

3. Waterplay Solutions Corp.
   Recreation Resource
   Kevin Umbreit

President
(M) 610.444.4402
(E) kevinu@recreation-resource.com

4. Approved equal

2.2 PERFORMACE REQUIREMENTS

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

B. Field Quality Control: Playground equipment manufacturer's technical personnel or authorized representative shall be onsite during installation of equipment and inspect playground equipment at final completion.

2.3 PLAYGROUND EQUIPMENT

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

1. Custom Community Swing
   a. Manufacturer: Landscape Structures Inc.
   b. Equipment: Two tot buckets, two ADA seats, and four belt swings
   c. Color: Powder coated steel RAL 1006
   d. Or approved equal

2. Galaxy Draco Climber
   a. Manufacturer: Kompan
   b. Equipment: #GXY943
   c. Color Scheme: Solaris Yellow, Powder coated steel RAL 1006, Black Rope, HDPE Gray
   d. Or approved equal

3. Arch Ladder Climber
   a. Manufacturer: Kompan
   b. Equipment: #COR20200
   c. Color: Galvanized Steel, Black Rope, Yellow Steppers
   d. Or approved equal

4. Spinner Bowl
   a. Manufacturer: Kompan
   b. Equipment: #ELE400024
   c. Color: Yellow Recycled PE
   d. Or approved equal

5. Universal Carousel
   a. Manufacturer: Kompan
   b. Equipment: #PCM157
   c. Color: Powdered Coated Steel Yellow
   d. Or approved equal

6. Helices Freestanding Spray
   a. Manufacturer: Waterplay

   b. Color: Powder coated steel RAL 1006
   c. Or approved equal

7. Ground Spray
   a. Manufacturer: Waterplay
   b. Color: Stainless Steel
   c. Or approved equal

2.4 FABRICATION

A. Provide sizes, strengths, thicknesses, wall thickness, and weights of components as required to comply with requirements in ASTM F1487. Factory drill components for field assembly. Unnecessary holes in components, not required for field assembly, are not permitted. Provide complete play structures, including supporting members and connections, means of access and egress, designated play surfaces, handholds, and other components indicated or required for equipment indicated.

2.5 CAST-IN-PLACE CONCRETE

A. Concrete Materials and Properties: Comply with requirements in Section 033000 - Cast-in-Place Concrete for normal-weight, air-entrained concrete with minimum 28-day compressive strength of 3000 PSI, 3 IN slump, and 1 IN maximum-size aggregate.

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. Do not begin installation before final grading required for placing playground equipment and protective surfacing is completed.

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

3.2 INSTALLATION

A. Comply with manufacturer's written installation instructions for each equipment type unless more stringent requirements are indicated. Anchor playground equipment securely, positioned at locations and elevations indicated.

B. 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 playground equipment elevations comply with requirements for each type and component of equipment.

C. Post and Footing Excavation: Excavate holes for posts and footings as indicated in firm, undisturbed or compacted subgrade soil. Set equipment posts in concrete footing. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at the correct angle, alignment, height, and spacing. Follow equipment manufacturer's written instructions and drawings to ensure correct installation of anchorages for equipment.

3.3 CLEANUP

A. Do NOT dispose of excess concrete and water-borne debris from cleaning out equipment in adjacent areas designated to be future planting beds.

B. Legally dispose of off-site all refuse and debris from these operations. Remove or neatly store material at the end of each day's work. Burning of material or dumping on the site is prohibited.

C. Maintain the site in an orderly condition during the progress of Work. Continuously and promptly remove excess and waste materials; keep lawn areas, walks and roads clear. Store materials and equipment where directed. Immediately remove rejected materials from the property. Promptly remove equipment, surplus material, and debris and trash resulting from operations under this Contract upon completion and prior to initial acceptance of Work. Leave the site in a neat, orderly condition, "broom clean".

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Certified Playground Safety Inspector to perform tests and inspections.

B. Perform inspection and testing for each type of installed playground equipment according to ASTM F1487 and CPSC #325.

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

D. Prepare test and inspection reports.

END OF SECTION 116813

SECTION 116833 – ATHLETIC FIELD AND SPORTS EQUIPMENT

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. Outdoor Volleyball Package with Ground Sleeves and Accessories.
2. Embedded Outdoor Triple Shoot and Accessories.
3. Embedded Outdoor Basketball Goals, Hoops and Backboards (Add Alternate) B.

Related Sections:

1. Division 32 "Concrete Paving"

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 Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Initial Selection: For each type of exposed finish.

1. Manufacturer's color charts.
2. Include Samples of accessories involving color selection.

C. Samples for Verification: For each type of exposed finish on the following products:

1. Include Samples of accessories to verify color and finish selection.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of athletic field and sports equipment.

C. Material Certificates: For the following items:

1. Shop finishes.

D. Sample Warranty: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

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

1.8 QUALITY ASSURANCE

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

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 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. Warranty Period: from date of delivery.

a. Outdoor Volleyball Package: One Year
b. Outdoor Triple Shoot: One Year

PART 2 - PRODUCTS

2.1 OUTDOOR VOLLEYBALL PACKAGE

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

Manufacturer:	Athletic Connection 1901 Diplomat Dr. Farmers Branch, TX 75234 Tel: 1-800-527-0871, Fax: 1-888-858-8337 www.athleticconnection.com
Product Name:	Outdoor Volleyball Package, Steel Top Cable Net/Steel Ground Sleeves/With Cap
Model Number/Size:	SKU# VBPK2
Pole:	10' H x 2 3/8" O.D. 0.095” Wall, Galvanized Steel pole

Ground Sleeves:	2.875” dia. x 0.203” Wall x 24” deep, Steel Ground Sleeves with Cap

2.2 OUTDOOR TRIPLE SHOOT

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

Manufacturer:	Action Play Systems, LLC 18535 Old Statesville Rd, Suite C, Cornelius, NC 28031 Tel: (855) 752-9277, Fax: (704) 439-4566 www.actionplaysystems.com
Product Name:	APS TripleShoot
Color:	To be selected by Landscape Architect
Pole:	8' long steel
Mounting:	Embedded to concrete footing
Age Range:	5 – 12 Years Old

2.3 OUTDOOR TRIPLE SHOOT POLE PROTECTION PAD

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

Manufacturer:	AK Athletic Equipment, Inc. 8015 Howe Industrial Pkwy, Canal Winchester, OH 43110 Tel: (614) 920-3069 https://akathletics.com/
Product Name:	4’ tall pole pad, 3” diameter fabric flap closure
Material:	Polyurethane foam with 14 oz vinyl fabric
Color:	To be selected by Landscape Architect

2.4 EMBEDDED OUTDOOR BASKETBALL GOALS, HOOPS AND BACKBOARDS (ADD ALTERNATE)

A. Basketball Goals, Hoops and Backboards:

1. Polls shall be 6 inch by 6 inches square steel and embedded into a concrete footing. Poles and frame shall be powder coated black in color. If designer/contractor wishes to use a different color for the post they shall obtain approval from Philadelphia Parks and Recreation.

2. Footings shall be per manufacturer’s minimum recommendations for size. Concrete strength shall be a minimum of 3,500psi at 28 days. Designer/contractor shall evaluate on-site in-situ soil conditions to determine if footing size needs to be increased.

3. Backboards shall be clear acrylic or polycarbonate type backboard with powder coated steel frame with color to match pole. Backboard shall be 42 inches by 72 inches.

4. Basketball rims shall be heavy-duty flex goals with nylon nets. Rim to be orange in color. Break-away rims are not permitted.

5. Basketball poles and backboard can be either single or double mounted per manufacturer’s recommendations.

6. Adjustable basketball hoop systems are not permitted.

7. Approved manufacturers and models:

B. Products: Subject to compliance with requirements, provide one of the following approved products:

1. Manufacturer:	Bison Inc. 603 L Street, Lincoln, NE 68508 Tel: 800-247-7668 https://bisoninc.com/
Product Name:	Single Backboard: Ultimate Polycarbonate Playground Basketball System – Model Number BA873U-BK
2. Manufacturer:	JayPro Sports, LLC 976 Hartford Turnpike, Waterford, CT 06385 Tel: (800) 243-0533 https://jayprosports.com/
Product Name:	Single Backboard: Model Number LS-200

2.5 ACCESSORIES

A. Anchors, Fasteners, Fittings, and Hardware: Manufacturer's standard, corrosion-resistantcoated or noncorrodible materials; commercial quality, tamperproof, vandal and theft resistant, concealed, recessed, and capped or plugged.

B. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M; recommended in writing by manufacturer, for exterior applications.

2.6 CAST-IN-PLACE CONCRETE

A. Concrete Materials and Properties: Comply with requirements in Division 32 Section "Concrete Paving” for normal-weight, air-entrained concrete with minimum 28-day compressive strength of 3500 psi, 3-inch (76-mm) slump, and 1-inch- (25-mm-) maximum-size aggregate.

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 equipment and protective surfacing is completed.

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

3.2 INSTALLATION

A. Comply with manufacturer's written installation instructions for each equipment type unless more stringent requirements are indicated. Anchor 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 Division 32 Section "Concrete Paving" for measuring, batching, mixing, transporting, forming, and placing concrete.

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

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

2. Embedded Items: Follow equipment manufacturer'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 CLEANUP

A. Legally dispose of off-site all refuse and debris from these operations. Remove or neatly store material at the end of each day’s work. Burning of material or dumping on the site is prohibited.

B. Maintain the site in an orderly condition during the progress of Work. Continuously and promptly remove excess and waste materials; keep lawn areas, walks and roads clear. Store materials and equipment where directed. Immediately remove rejected materials from the property. Promptly remove equipment, surplus material, and debris and trash resulting from operations under this Contract upon completion and prior to initial acceptance of Work. Leave the site in a neat, orderly condition, "broom clean".

END OF SECTION 116833 – ATHLETIC FIELD AND SPORTS EQUIPMENT

SECTION 31 10 00 - SITE CLEARING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Clearing and protection of vegetation.

B. Removal of topsoil and organic material such as trees, brush, roots and other vegetation within the limits of grading, including ditches and channels. Where indicated, perform tree trimming and selective tree removal outside of the limits of grading

C. Removal of objectionable material, rubbish and junk within the project limits.

D. Disposal of removed material.

E. Obtaining of waste areas for disposal of material.

F. Salvaging and temporarily storing, and delivering of material.

1.3 RELATED REQUIREMENTS

A. Section 024101 – Selective Site Demolition

B. Section 311310 – Tree Protection and Arboriculture

C. Section 312200 - Grading

D. Section 312323 – Fill and Backfill.

E. Section 312500 - Temporary Erosion and Sediment Control.

F. Philadelphia Parks and Recreation, Design Rebuild Specifications, General Earthwork Requirements: Regulated Fill Management.

1.4 SUBMITTALS

A. Site Plan,showing:

1. Vegetation removal limits.

2. Mature trees to be maintained and protected during construction.

PART 2 PRODUCTS

2.1 MATERIALS

A. Topsoil: Acceptable friable loam that is reasonably free of subsoil, clay lumps, brush, roots, weeds, other objectionable vegetation, stones, other foreign material larger than 2 inches in any dimension, litter, and/or other material unsuitable or harmful to plant growth.

B. Topsoil Mixture. Designated top 8 inches to 12 inches of existing soil collected and combined with organic plant matter such as vegetative slashings consisting of crushed or shredded branches, stems, bark, leaves, seeds, and roots.

C. Fill Material: As specified in Section 312323 - Fill and Backfill

PART 3 EXECUTION

3.1 SITE CLEARING

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

B. Topsoil: After clearing and grubbing the area and before starting other construction operations, remove topsoil from areas, as indicated or directed. Adjust equipment and methods of operation to avoid mixing subsoil with topsoil. Separate the topsoil from other excavated material and stockpile at acceptable locations within the right of way. Do not compact and do not stockpile topsoil in a wet or frozen condition. Satisfactorily and uniformly grade stockpiled topsoil not required for the project. Apply seeding and soil supplements to these stockpiles, as specified in Section 312500 - Temporary Erosion and Sediment Control.

C. Topsoil Mixture. During clearing and grubbing operations and before other construction operations, shred all designated vegetation under 4 inches caliper in size using a crawler or loader mounted, selfpowered, land clearing shredder capable of shredding vegetation to a desired maximum rough size of 12 inches long and 2 inches in diameter. Collect and mix the organic slashings with the top 8 inches to 12 inches of soil to be salvaged, as indicated or directed.

D. Stockpile topsoil mixture at acceptable locations to Owner. Do not compact material. Water stockpile as necessary to control dust and stabilize with temporary seed mix provided in the Erosion & Sedimentation Control plans.

3.2 EXISTING UTILITIES AND BUILT ELEMENTS

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

B. Protect existing utilities to remain from damage.

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

D. Protect existing structures and other elements that are not to be removed.

3.3 VEGETATION

A. Remove trees, shrubs, brush, and stumps in areas to be covered by building structure, paving, lawns, and planting beds.

B. Tree Protection Zone Fencing: see Section 311310 - Tree Protection and Arboriculture.

C. Maintain protection zones free of weeds and trash.

D. In areas where vegetation must be removed but no construction will occur other than pervious paving, remove vegetation with minimum disturbance of the subsoil.

E. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by the Architect.

F. Maintain protection-zone fencing in good condition as acceptable to the Architect and remove when construction operations are complete and equipment has been removed from the site.

G. Tree Removal: Remove stumps, roots, and other debris protruding through the ground surface. Remove and dispose of shrubs, stumps and roots larger than 1-1/2" in diameter to a depth of 20". Fill depressions caused by clearing, grubbing and demolition operations with satisfactory soil material, unless further excavation or earthwork is indicated. Place fill consisting of materials as specified in Section 31 23 23 of the specifications.

H. Tree Trimming: Trim living branches, dead and dying limbs and branches 1 inch or more in diameter growing within the legal Right of Way. Trim branches to the branch collar as shown on the PennDOT Standard Drawing RC-92M.

I. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.

1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.

2. Trees: Remove stumps and roots to depth of 20 inches.

3. Existing Stumps: Treat as specified for other vegetation removed; remove stumps and roots to depth of 20 inches.

4. Fill holes left by removal of stumps and roots, using suitable fill material, with top surface neat in appearance and smooth enough not to constitute a hazard to pedestrians.

J. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner.

3.4 DEBRIS

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

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

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

3.5 MATERIAL DISPOSAL

A. Dispose of removed material in an off-site an approved waste area.

1. Comply with the requirements of the Air Pollution Control Act (Act 245-1972, or as amended), the Solid Waste Management Act (Act 97-1980, or as amended)

2. Fill material that does not qualify as clean fill is regulated fill. Regulated fill is waste and must be managed in accordance with the regulations in Pennsylvania Code Title 25: Article VII (Hazardous Waste), Article VIII (Municipal Waste), Article IX (Residual Waste), and any other applicable articles or chapter.

END OF SECTION 311000

311310 – TREE PROTECTION AND ARBORICULTURE

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. Establishment of Tree Preservation Areas.
2. Procedures for tree preservation
3. Construction coordination within tree preservation areas
4. Remedial maintenance for trees damaged during construction
5. Planting coordination within tree preservation areas
6. Pruning of Existing Trees

B. Related Sections:

2. Division 31 Section – “Site Clearing”.
4. Division 32 Section – “Soil Preparation and Mixes”.
5. Division 32 Section – “Turf and Grasses”. 3. Division 32 Section – “Exterior Planting”.

1.3 REFERENCE STANDARDS

A. ASTM: American Society of Testing Materials

A. American National Standards Institute, Inc. (ANSI)

1. ANSI A300 (Part 1) – 2001 Pruning
2. ANSI A300 (Part 2) – 2004 Fertilization
3. ANSI A300 (Part 3) – 2000 Support Systems

a. Cabling, Bracing, and Guying

4. ANSI A300 (Part 4) – 2002 Lightning Protection Systems

B. International Society of Arboriculture (ISA)

C. Tree Care Industry Association (TCIA)

1.4 DEFINITIONS

A. CALIPER shall be defined as the diameter of the trunk at 6" above the soil for trees up to 6" in caliper and diameter at 12" above the soil for trees up to 12" caliper.

B. DAMAGE shall be defined as any unauthorized encroachment into the Tree Preservation Areas or failure to comply with Specifications and Drawings, whether fencing is present or not, and, at any time during the construction process including the installation of plants and fine grading operations.

C. DIAMETER shall be defined as diameter at breast height (dbh) which is the average tree diameter at 4.5 feet from the ground on the uphill side of the tree.

D. NUISANCE SPECIES shall be defined as exotic plant species that create negative impacts on the environment and user safety.

E. ROOT ZONE shall be defined as 1 foot of radius around trunk for every inch of trunk diameter at four feet six inches above ground level on the uphill side of the tree.

F. TREE PRESERVATION AREA shall be defined as all areas outside limits of construction which contain trees and all areas within the limits of construction which are designated as tree preservation areas on the plans and/or in the field by fencing and signage.

1.5 QUALITY ASSURANCE

A. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

B. Arborist: Contractor shall provide an arborist with current certification from the International Society of Arboriculture (ISA). All work shall be performed to standards in a safe, professional, and timely manner.

C. Arboriculture: Comply with all applicable standards of the Tree Care Industry Association (TCIA) and American National Standards Institute, Inc. (ANSI) for pruning, guying, fertilizing and installation of lightning protection systems.

1. All arboricultural work under this section shall be performed by personnel totally familiar with arboricultural work and under the supervision of an experienced professional arborist and foreman at all times. Both arborist and foreman shall have a minimum 5 years experience in the field. An arborist certified by the International Society of Arboriculture (ISA) must be on site either completing or directly supervising all work being performed and to communicate with foreman.
2. Pruning shall be performed by tree workers who, through a minimum of five years related training and on-the-job experience, are familiar with the techniques and hazards of this work.

D. Preconstruction meeting: Arrange a preconstruction meeting between the Owner's representative, the Landscape Architect, the Civil Engineer, and the General Contractor.

1. Such meeting shall seek to review:

a. Proposed schedule.
b. Tree Protection Plans and Details.
c. Limits of work.

d. Coordination for construction required within Tree Preservation Areas.
e. Coordination with soil reconnaissance efforts.
f. Coordination for Sound Wall installation.
g. Other areas and structures to be protected.
h. Soil stockpiling.
i. Tree Removal Methods.

j. Existing Irrigation System and Points of Connection.

2. Any conflicts between construction and Tree Protection shall be brought to the attention of the Owner and the Landscape Architect at that time.
3. General Contractor shall be responsible for insuring that all Subcontractors are aware of Tree Protection Specifications, and shall be responsible for any damage to trees by Subcontractors.
4. Clearing limits shall be clearly marked in the field with flagging prior to beginning of any clearing and grading operations. Following marking in the field, limits shall be walked with Landscape Architect, site superintendent, and clearing contractor to make minor adjustments as necessary to preserve trees listed in tree preservation activity schedule.

E. Tree Preservation Areas as identified on Drawings and as designated in the field by Tree Protection Fencing are off limits to construction activities except finished grading and seeding operations: Trees in Tree Preservation Areas shall not be damaged during any phase of site work and/or construction. No removals, clearing, stripping of soils, driving or parking of vehicles, storage of materials, or other construction activity is to take place within areas of existing trees or newly planted on-site trees. Exceptions see 3.4 Protection of Existing Trees in Tree Protection Areas.

F. Analysis and testing of materials required under these specifications shall be in accordance with the current methods of the Association of Official Agricultural Chemists (AOAC) and ASTM.

G. Equipment and Safety:

1. Equipment shall be modern and well maintained. Applicable state and federal regulations shall be adhered to. Contractor shall be responsible for damage to property resulting from equipment, including fluid leakage or damage resulting from equipment failure. Incidents of this type shall be reported immediately to the Owner's Representative.
2. Safety shall be a primary concern while working on the site. Contractor shall have an established safety program and adhere to NAA, OSHA, and ANSI standards applicable to the tree care industry. This includes electrical and utility requirements as well as personal equipment and safe work procedures. Accidents resulting in property damage or personal injury shall be reported immediately to the Owner's Representative. H. Pesticide Applications:

1. Certified Pesticide Applicator shall be responsible for supervision of all applications of fertilizer or pesticides on the site. The name and certification number of certified applicator(s) assigned to this project shall be included with the Contractor's submittal.
2. Pesticides shall be applied in strict compliance with label instructions and applicable federal, state, and local requirements. The Owner's Representative prior to application shall approve pesticide applications. Material Safety Data Sheets for pesticides shall be available from and in the Contractor's possession while on the site.

3. Contractor shall notify the Owner's Representative of conditions at time of application that may reduce effectiveness of treatments.

1.6 ACTION SUBMITTALS

A. General: Make submittals in accordance with the provisions and procedures of Division 01 Section "Submittal Procedures". Render submittals and receive approval prior to delivery or installation.

1. Approval by the Landscape Architect of submitted product data, samples, test reports, and certificates, or material inspected at source of supply, does not constitute final acceptance.

B. Product Data: Submit product literature or tear sheets giving name of product, manufacturer's name and compliance with Specifications.

1. Submit a list of materials and equipment specified or otherwise required to complete the work of this Section.
2. Submit manufacturer's technical data for each item specified or otherwise required to complete the work of this Section including, but not limited to the following:

a. Tree Protection Fencing and orange flag
b. Silt Fencing
c. Fertilizer
d. Mulch
e. Tree wrap, as needed
f. Other materials, as needed C. Shop Drawings:

1. Include plans, elevations, and locations of protection-zone fencing and signage.
2. Detail fabrication and assembly of protection-zone fencing and signage. D.

Samples: For each type of the following:

1. Protection-Zone Fencing: Assembled Samples of manufacturer's standard size made from full-size components.
2. Protection-Zone Signage: Full-size Samples of each size and text, ready for installation.
3. Mulch, 2 pound bag
4. Tree wrap, as needed

1.7 INFORMATIONAL SUBMITTALS

A. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

B. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during demolition and after completing the Work.

C. Existing Conditions: Documentation of existing trees indicated to remain, which establishes pre-demolition and temporary weather protection conditions that might be misconstrued as damage caused by scheduled demolition/construction activities.

1. Use sufficiently detailed photographs or video recordings.
2. Include plans and notations to indicate specific damages to each tree or other plants designated to remain.

D. Provide schedules for performance of work.

1.8 GUARANTEE

A. Contractor shall replace any trees scheduled to remain and damaged by demolition and construction operations, as determined by Landscape Architect. Contractor shall be responsible for all expenses related to their replacement including: locating, tagging, additional fees required for the Owner's consultants, purchasing, transporting, installing and any other associated expenses.

1. Damaged trees less than or equal to 10" in diameter shall be replaced with a tree of equal caliper or the largest commercially available tree of the same species (and variety if applicable) and habit.
2. Damaged trees greater than ten inches in diameter shall be compensated for by the contractor at $1,000.00 per inch of diameter. i.e. damaged 50" tree = $50,000.00.
3. Since age and size of some existing trees prohibit replacement of the same size tree, the difference in caliper size between damaged tree and replacement tree shall be compensated by Contractor. If replacement tree found is not greater or equal to the caliper of the damaged tree, the Contractor shall be responsible for replacing (including all expenses mentioned above) with the largest size available at no additional cost to Owner and shall be determined in accordance with the Tree Evaluation Formula as described in "A Guide to the Professional Evaluation of Trees, Shrubs, and Evergreens" published by the International Society of Arboriculture.
4. If the same species of tree is not commercially available at the necessary size, but is available at the necessary size of another species, the Contractor may request a species substitution to the Landscape Architect. The Landscape Architect must approve any species substitutions.

B. Damaged trees less than ten inches in diameter shall be replaced with trees of equal caliper or the largest commercially available trees of the same species. Trees will be replaced by the owner. Contractor will be responsible for all expenses related to their replacement including: locating, tagging, purchasing, transporting, installing, and any other associated expenses.

C. Diameters of all trees to be preserved have been recorded by Contractor’s arborist prior to construction and shall be the basis for assessment of damages.

D. At Owner’s option, remedial activity to repair damage may be substituted for per inch penalty.

1.9 REGULATORY REQUIREMENTS

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

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

site. Conform to all governmental regulations regarding the transportation of materials and secure, in advance, any necessary permits.

C. Procure and pay for permits and licenses required for Work.

1.10 DELIVERY, STORAGE AND HANDLING

A. In accordance with Division 01.

B. Packaged Materials: Deliver packaged materials in clearly marked unopened containers showing net weight, guaranteed analysis and name of manufacturer. Specified requirements for packaged materials apply to bulk shipments. Protect materials from deterioration during delivery and during storage at site. Upon delivery to the site, request, in writing, inspection of materials by Owner's representative or by Landscape Architect.

C. Bulk Materials: Do not dump or store bulk materials near active structures, walkways, utilities or on existing trees or planted areas. Provide erosion-control measures to prevent erosion or displacement of bulk materials. Accompany each delivery with appropriate certificates.

1.11 PROJECT CONDITIONS

A. Existing Conditions

1. Carefully examine the site before submitting a bid. Be informed as to the nature and location of the Work, general and local conditions including climate, adjacent properties and utilities, conformation of the ground, the nature of subsurface conditions, the character of equipment and facilities needed prior to and during execution of the Work.

    a. Perform review of site conditions, research public utility records and or check manholes as necessary to verify existing utility locations, inverts and conditions. Contact utility locating service for area where project is located.
    b. Locate existing structures and piping to be closed and abandoned.
    c. Do not interrupt existing utilities serving facilities occupied by the Owner or others, except following notification to the Owner and Landscape Architect, and providing acceptable temporary utility services. Do not proceed with utility interruptions without receiving Landscape Architect's approval to proceed.

2. Should the Contractor, in the course of Work, find any discrepancies between Drawings and physical conditions or any omissions or errors in Drawings, or in layout as furnished by the Landscape Architect, it will be his duty to inform the Landscape Architect immediately in writing for clarification. Work done after such discovery, unless authorized by the Landscape Architect, shall be done at the Contractor's risk.

1.12 SEQUENCING AND SCHEDULING

A. Coordinate Work of this Section with Work of all other Contractors working on site including but not limited to:

1. General Contractor
2. Soil Consultant

3. Mock-Up Contractor
4. Demolition / Site Clearing Contractor
5. Tree Preservation Area Landscape Maintenance Contractor

1.13 CLOSEOUT REQUIREMENTS

A. Project Record Documents: Submit in accordance with Division 01 Section “Closeout Procedures”.

PART 2 PRODUCTS

2.1 TREE PROTECTION FENCE WITH ORANGE SAFETY FABRIC

A. Fence Materials

1. Framework: dimensional lumber for exterior use.
2. Fabric: High-Density polyethylene, Orange Color, Mesh size not to exceed 4” opening.

B. Fence Components
1. Posts: 4 inches by 4 inches wood posts, maximum 8 feet on center driven into the ground to a depth of 1/3 of the height of the post
2. Horizontal Rails: 2 inches by 6 inches wood boards
3. Fabric: Maximum 4 inch openings, minimum 4 feet height.
4. Fittings: secure fencing to post using a nylon cable ties

2.2 SIGNS

A. Signs prohibiting access to Tree Protection Areas shall be 10" x 12", made of weatherproof materials, color bright yellow with red letters reading "TREE PROTECTION AREA - KEEP OUT".

B. Signs shall be placed along each visible face of fence.

2.3 BACKFILL SOIL

A. Install backfill soil as needed in event of damage or arboriculture maintenance procedures within Tree Preservation Area. Backfill soil location must be approved by Landscape Architect prior to application. Backfill soil shall be free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, debris and other extraneous materials harmful to plant growth.

2.4 COMMERCIAL FERTILIZERS

A. Every effort shall be made to utilize chemicals of an organic or biodegradable nature in order to offer least impact to the natural environment. Contractor is responsible for mixing, applying and disposal of all chemicals in accordance with strict adherence to manufacturers' directions.

B. General: As specified below, all fertilizer shall conform to applicable state fertilizer laws. It shall be uniform in composition, free-flowing, and shall be delivered to the site in the original,

unopened containers, each bearing the manufacturer's guaranteed analysis. Any fertilizer which is unsuitable for use will be rejected.

2.5 MULCH

A. Install mulch only if damage occurs and replacement mulch is needed. General mulching within Tree Preservation Area to be done by Contractor. If additional mulch is needed, Contractor to provide ground woodchips similar in texture and composition to mulch applied throughout Tree Preservation Area.

PART 3 EXECUTION

3.1 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones. B. Prepare written report, listing conditions detrimental to tree and plant protection.

3.2 VERIFICATIONS

A. Obtain limits of excavation and filling work, sequencing, limits of work, and verify areas of load limitations.

3.3 PROTECTIVE MEASURES

A. Use every precaution to prevent damage to, and provide protection as necessary of, areas outside of the contract limit line and existing features, improvements, and utilities indicated to remain within the contract limit line. Repair or replace to original condition, as acceptable to the Landscape Architect and at no cost to the Owner, any material or Work damaged or destroyed while performing Work.

B. Prior to the start of any site disturbance, including Demolition and Site Preparation, install protective fencing for Tree Protection Areas. Landscape Architect shall approve layout before any work shall begin.

C. Preservation of Property From Damage: Existing structures, site improvements, adjacent property, utilities, walls, gates, curbs, statues and other facilities; and trees that are not to be removed shall be protected from injury or damage. There are many historic elements that are irreplaceable, it is absolutely critical that these elements are protected and stored in a safe theftproof location.

1. Provide protection of existing curbs and sidewalks at locations with crossing construction traffic. Use materials that are suitable for details of installation and that protect surface finishes and resist imposed loads, as approved by Landscape Architect.
2. Exercise extreme care in demolition or excavation atop underground structures. Protect existing waterproofing and protection board.
3. The surface of the required excavations or grading work may expose soft grades during the course of the Work. The Contractor shall take whatever actions necessary to allow

the progress of the Work to continue and to make the site accessible to its equipment. These actions may require the furnishing and temporary placement of rock, crushed stone, or other materials. Conditioning of the site shall be at the Contractor's expense with no additional cost to Owner.

4. Contractor shall follow all City Ordinances to prevent mud tracking onto City Streets.

D. Installation of Tree Protection Area Protective Fencing.

1. General: Verify depth to top of existing structures, including utilities, do not damage waterproofing, protection board, etc. during installation or maintenance procedures.
2. Tree Protection Area Fencing: Do not proceed with any site work until Tree Protection Fencing has been set and approved by Landscape Architect. Once set and approved, do not remove or relocate without written approval of Landscape Architect. Fencing shall be maintained in good repair throughout contract period.
5. Fencing shall be secured and driven into the ground to a depth of 1/3 of the height of the post.
6. Fencing shall be located as indicated on the Drawings.
7. Where root zones overlap, one continuous ring of fencing shall be placed around the group of trees to form a single preservation area.
8. All debris including brush and trash shall be removed prior to fencing.

3.4 PROTECTION OF EXISTING TREES IN TREE PROTECTION AREAS

A. General

1. The existing trees designated to remain at the site are valued by the Owner and the community for environmental, aesthetic, historical and educational reasons. It is of utmost importance to the success of the project that they remain in healthy, undamaged condition during the Work.

B. Tree Protection fencing shown on drawings are minimum required for Work. The Contractor shall be responsible for providing additional temporary fencing or barricades during the Work, as necessary, to protect existing elements to remain, control pedestrian traffic, and maintain safe conditions at all times.

C. Timing and Duration of Construction and Tree Protection Measures:

1. No demolition, removals or other site preparation work, or any construction work shall commence prior to the installation and approval of the Tree Protection fencing and tree trunk planking specified herein.

2. Tree Protection Fence shall remain in place until area adjacent to and within fence is ready for final surface treatment and permission to remove fence is requested by the Contractor and granted in writing, by Landscape Architect.

D. Excavation and trenching within Tree Protection Areas shall be prohibited, except under the following conditions:

1. For all work to be done within the Tree Protection Areas (including demolition, trenching for utilities, etc.) Landscape Architect will be present, and shall be given ten (10) days

notice. Work shall not occur without a professional Arborist present to perform compensatory root and branch pruning, as required.

2. Exercise extreme care during excavation to prevent damage to roots of tree, which are to remain. When excavating or grading within the critical root zone of the trees to remain, do so in an approved manner which will cause minimum damage to the root system. Injured roots will be pruned cleanly and the excavation area backfilled (with soil or mulch) as soon as possible to provide cover for the exposed roots. Make all attempts to preserve roots two inches (2") in diameter and larger.

3. All removals, trenching, and excavation within the Tree Protection Areas shall be performed by hand, unless otherwise approved by Landscape Architect. All work shall be performed in a manner to prevent compaction, siltation, and disturbance of the root mat of all trees in the area.

    a. Do not remove pavement with powered machines or operate equipment within Tree Protection Areas without written approval of Landscape Architect. If approved, Landscape Architect will be present during such operations. All demolition of paved surfaces by equipment within Tree Preservation Areas shall be performed from the paved surface. At no time shall equipment be operated on unbuffered ground within the root zone of trees to be preserved. If approved in advance, equipment may be operated within root zone of trees only if buffered with 1/2-inch plywood with a eight-inch (8") layer of mulch underneath.

    b. Excavate and open utility trenches only when utility work can be installed immediately, so that excavation can be backfilled as soon as possible.

4. Replace tree protection fencing immediately after work within Tree Protection Area is done.

E. The following activities are prohibited during demolition and construction within the Tree Protection Area:

1. Placing backfill - except as approved for re-grading, and under the observation of Landscape Architect.

2. Swinging backhoes or cranes into the canopies of the trees.

3. Storing or dumping of supplies and materials, including stockpiling, excavation or fill.

4. Changing site grades (raising or lowering), which could cause drainage to flow onto or to collect near protected trees - except as approved for re-grading.

5. Driving or parking equipment, machinery, or vehicles of any type.

6. Using trees for crane stays, guy anchors, or other fastenings.

7. Dumping of any chemicals, (i.e. paint thinner from cleaning brushes), wash out materials from cleaning equipment, concrete or mortar remainder, trash, garbage, or debris of any kind

F. Contractor shall replace any trees scheduled to remain and damaged beyond repair by demolition and construction activities, as determined by Landscape Architect. Replacement shall be as per 1.5 - Quality Assurance.

G. Fell trees to be removed (if any) in such a manner as not to injure trees to remain. Carefully remove branches which endanger life or property.

3.5 PRUNING

A. Pruning shall conform to American National Standards Institute A300 pruning standards for maintenance pruning or hazard pruning.

B. Maintenance pruning shall consist of crown cleaning to remove all deadwood 1.5 inches or larger at their point of attachment. Diseased limbs shall be removed or treated at the discretion of the arborist. While pruning, the arborist shall make note of any conditions which affect the

health or condition of the tree and recommend corrective treatment for these conditions.

C. Hazard pruning shall consist of the removal of all dead or dangerous limbs 2.5 inches or greater in diameter at their point of attachment. Large masses of smaller dead limbs which significantly detract from the trees aesthetics shall be crown cleaned.

3.6 ROOT PRUNING

A. Conduct root pruning of Existing Trees to Remain only under direct supervision of Landscape Architect. If any root pruning is determined to be needed, root pruning shall be completed under the guidance of Landscape Architect.

3.7 MAINTENANCE

A. Trees indicated for preservation shall have the maintenance activities completed by arborist as necessary.

B. Fencing: Maintain fencing for the duration of the project in a condition to prevent unauthorized access to the Tree Protection Areas. Do not remove or relocate fencing without approval of Landscape Architect.

3.8 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the Tree Preservation Area. Maintain existing grades within the Tree Preservation Area.

B. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the Tree Preservation Area. Maintain existing grades within the Tree Preservation Area.

C. Minor Fill within Tree Preservation Area: Where existing grade is 2 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.

1. Raising grade within a protection zone should be minimal in area and depth and can be fatal to trees.
2. Any change in grade required within the documented tree protection zone requires approval of Landscape Architect.

3.9 CLEAN UP

A. Legally dispose of off-site all refuse and debris from these operations. Remove or neatly store material at the end of each day's work. Burning of material or dumping on the site is prohibited.

B. Maintain the site in an orderly condition during the progress of Work. Continuously and promptly remove excess and waste materials; keep lawn areas, walks and roads clear. Store materials and equipment where directed. Immediately remove rejected materials from the property. Promptly remove equipment, surplus material, and debris and trash resulting from operations under this Contract upon completion and prior to initial acceptance of Work. Leave

the site in a neat, orderly condition, "broom clean".

END OF SECTION 311310

SECTION 31 22 00 - GRADING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Rough grading the site.

B. Finish grading.

C. Placing topsoil.

1.3 RELATED REQUIREMENTS

A. Section 311000 - Site Clearing.

B. Section 312316 - Excavation.

C. Section 312316.13 - Trenching.

D. Section 312323 – Fill and Backfill.

E. Section 312500 – Temporary Erosion and Sediment Control.

F. Section 329115 – Soil Preparation and Mixes

G. Philadelphia Parks and Recreation, Design Rebuild Specifications, General Earthwork Requirements: Regulated Fill Management.

1.4 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

PART 2 PRODUCTS

2.1 MATERIALS

A. Fill Materials: See Section 312323 - Fill and Backfill.

B. Topsoil and Planting Mixes: See Section 329115 – Soil Preparation and Mixes

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Verify the absence of standing water or ponding water.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Contact PA One Call at least three (3) working days in advance before excavation begins.

C. Stake and flag locations of known utilities.

D. Locate, identify, and protect from damage above- and below-grade utilities to remain.

E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.

F. Protect site features to remain, including but not limited to benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs, from damage by grading equipment and vehicular traffic.

G. Protect trees to remain by providing substantial fencing around entire tree at the outer tips of its branches; only hand excavation or air-spading will be permitted inside tree protection zones.

3.3 ROUGH GRADING

A. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.

B. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.

C. Stockpile in area designated on site not exceeding 8 feet and protect from erosion.

D. Due to environmental conditions, excess subsoil is not to be removed from the site.

E. See Section 31 23 23 for filling procedures.

F. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

3.4 SOIL REMOVAL

A. In the case that topsoil or subsoil must be removed from the site, dispose of only at a designated and permitted landfill.

3.5 SUBGRADING FOR PAVING

A. Grade to established subgrade elevations and compact subgrade.

B. Maintain and protect subgrade, reshape and recompact or remove and replace damaged or unsatisfactory areas before placement of paving.

C. Check subgrade for grade and slope.

D. Correct surface irregularities exceeding 1/2 inch by loosening the surface and removing or adding material as required. Compact the corrected area and surrounding surface by rolling. Recheck the corrected subgrade area for grade and slope.

3.6 COMPACT SUBGRADE

A. Establish subgrade elevation and compact to specified density requirements.

B. Density Requirements:

1. Compaction Density Unless Otherwise Specified or Indicated:

    a. Under asphalt or concrete paving, slabs on grade or similar construction: 95 percent of maximum dry density, based on Modified Proctor or relative density.

    b. At other locations: 95 percent of maximum dry density based on Modified Proctor.

2. When material is too coarse (more than 20% retained on the 19 mm (3/4-inch) sieve and less than 35% passing the 75-micro-m (No. 200) sieve, or more than 30% retained on the 19 mm (3/4-inch) sieve) to use these methods, compaction will be determined based on non-movement of material under compaction equipment,

    a. Compact until embankment does not rut under a loaded triaxle (GVW 34 tonne (75,000 pounds)).

3. Maintain material to within 3% of the optimum moisture content at the time of compaction. For subgrades displaying pronounced elasticity or deformation under rolling, maintain a moisture content not greater than optimum at the time of compaction or at the time of placing the overlaying construction. When unable to obtain the specified stability, excavate material in the area to a depth that, when replaced and recompacted with a moisture content not exceeding optimum, the subgrade will have required stability.

3.7 FINISH GRADING

A. Before Finish Grading:

1. Verify building and trench backfilling have been inspected.

2. Verify subgrade has been contoured and compacted.

B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.

C. Where topsoil and planting mixes are to be placed, follow Section 329115 – Soil Preparation and Mixes

3.8 REPAIR AND RESTORATION

A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

B. Trees to Remain: If damaged due to this work, trim broken branches and repair bark wounds; if root damage has occurred, obtain instructions from Architect as to remedy.

C. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.

3.9 CLEANING

A. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.

B. Leave site clean and raked, ready to receive landscaping or paving.

END OF SECTION 312200

SECTION 31 23 16 - EXCAVATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Excavating for footings, slabs-on-grade, paving, and site structures.

1.3 RELATED REQUIREMENTS

A. Section 024101 – Selective Site Demolition

B. Section 312200 - Grading.

C. Section 312316.13 – Trenching.

D. Section 312323 – Fill and Backfill.

E. Section 312500 - Temporary Erosion and Sediment Control.

F. Philadelphia Parks and Recreation, Design Rebuild Specifications, General Earthwork Requirements: Regulated Fill Management.

1.4 REFERENCE STANDARDS

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

1.5 SUBMITTALS

A. See Division 01 for submittal procedures.

1.6 QUALITY ASSURANCE

A. Temporary Support and Excavation Protection Plan.

B. Designer Qualifications: For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that survey bench mark and intended elevations for the work are as indicated.

B. Any available data concerning environmental conditions, subsurface materials or conditions based on soundings, test pits or test borings, has been obtained by the Design Team for its own use in designing this Project. The Test Boring location drawings and the Test Boring Logs, as well as the Laboratory Test Results, contained within the Geotechnical Report, plus the Environmental Site Assessment Reports, are incorporated into the construction contract as a Contract Document. The remainder of the Geotechnical Report, with all other exhibits, is available for informational/guidance purposes only; it is not to be relied on by prospective Bidders. The Geotechnical Report and Environmental Site Assessment Reports are available to Bidders but the Bidders must agree and acknowledge that the information and recommendations in these reports are not warranted for accuracy, correctness or completeness.

C. Test Boring logs reflect the conditions at the specific locations of each Test Boring only. The Contractor accepts full responsibility for any conclusions drawn with respect to conditions between Test Borings. Excavation for the Project is “Unclassified”, as fully described in Part 3.3 of this section. Determine the prevailing groundwater level prior to excavation. If the proposed excavation extends less than 1 foot (305 mm) into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by Architect. If the proposed excavation extends more than 1 foot (305 mm) into the prevailing groundwater, control groundwater intrusion with a comprehensive dewatering procedures, or as directed by Geotechnical Engineer.

3.2 TEMPORARY EXCAVATION SUPPORT AND PROTECTION

A. Excavation Safety: Comply with OSHA92s Excavation Standard, 29 CFR 1926, Subpart P.

1. Depending upon excavation depth, time that excavation is open, soil classification, configuration and slope of excavation sidewalls, design and provide an excavation support and protection system that meets the requirements of 29 CFR 1926, Subpart P:

a. Sloping and benching systems.
b. Support systems, shield systems, and other protective systems.

B. Excavation support and protection systems not required to remain in place may be removed subject to approval of the Owner.

a. Remove temporary shoring and bracing in a manner to avoid harmful disturbance to underlying soils and damage to buildings, structures, pavements, facilities and utilities.

3.3 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 312200 Grading for additional requirements.

C. Locate, identify, and protect utilities that remain and protect from damage.

D. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.4 EXCAVATING

A. Excavate to accommodate paving and site structures as shown on the Drawings.

   a. Excavate to the specified elevations.

   b. Should natural soils, as determined by the Foundation Consultant's Representative, be encountered at depths shallower than indicated on Drawings, consult the Professional.

   c. Should embankment fill material, as determined by the Foundation Consultant's Representative, be present at the excavation elevations shown on Drawings, consult the Professional for additional excavation requirements.

B. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

C. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.

D. Do not interfere with 45 degree bearing splay of foundations.

E. Cut utility trenches wide enough to allow inspection of installed utilities.

F. Hand trim excavations. Remove loose matter.

G. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume.

H. Correct areas that are overexcavated and load-bearing surfaces that are disturbed. See Section 312323 Fill and Backfill.

I. Grade top perimeter of excavation to prevent surface water from draining into excavation.

J. Remove excavated material that is unsuitable for re-use from site to an approved waste site.

K. Remove excess excavated material from site to an approved waste site.

3.5 SUBGRADE PREPARATION

A. See Section 312323 for subgrade preparation at general excavations.

B. The Contractor shall furnish adequate advance notification to the Owner and the Design Team of times when footing excavations or paving subgrades are to be completed, so that the Construction Stage Geotechnical Quality Assurance Agent can verify that the bearing quality of the soil has been properly inspected and/or tested by the Contractor. Formwork and concreting shall follow only after approval by the Construction Stage Geotechnical Quality Assurance Agent.

C. Should the bearing at the levels indicated be found by the Design Team and Owner to be inadequate, they may order the excavation carried down to sound bearing. Such excavation shall be classed as additional work and payment be made on the basis of an agreed price according to the General Conditions. Should suitable bearing be found at a lesser depth than indicated, the Design Team and the Owner may order the reduction of excavation specified or shown on the drawings, and the Contractor shall allow a credit for excavation thus omitted on the same basis.

D. Subgrades shall be protected from softening, undermining, washout, and damage by rain or water accumulation. In no case shall the site be left open and unsealed at the end of the work day.

3.6 FILLING AND BACKFILLING

A. Do not fill or backfill until all debris, water, unsatisfactory soil materials, obstructions, and deleterious materials have been removed from excavation.

B. See Section 312323 for fill, backfill, and compaction requirements at general excavations.

3.7 REMOVAL OF WATER

A. General Dewatering

1. Provide all materials, equipment, labor, and services necessary for care of water removal and erosion control.

    a. Implement the Erosion and Sedimentation Control Plan, do not begin excavation work until the Erosion and Sedimentation Controls are in place and operational.

    b. Dewater excavations, including seepage and precipitation.

2. Remove water which accumulates in excavations during the progress of work so that all work can be done in the dry. Keep excavated areas free from water while underground utilities or structures are constructed, while concrete is setting and until backfill or elements of the structure have been placed to a sufficient height to anchor the work against possible leakage or buoyant uplift forces.

    a. A height to anchor the work against buoyant uplift forces shall be considered sufficient when the dead load weight of the backfill or elements of the structure exceeds the uplift forces by a minimum factor-of-safety of 1.5.

B. Dewatering the construction site

1. Foundations, cutoff trenches, and all other parts of the construction site shall be dewatered and kept free of standing water and muddy conditions as necessary for the proper execution of the work.

    a. Provide all facilities required to divert, collect, control, and remove water from all construction work areas and excavations.

    b. Provide drainage features having sufficient capacity to avoid flooding of work areas.

c. Arrange and alter drainage features as required to avoid degradation of the final excavated surface(s).

2. Prevent loss of fines, seepage, boils, quick conditions or softening of foundation subgrade.

3. Maintain stability of sides and bottom of excavation.

C. Disposal of Water

1. Discharge water through a sediment control device prior to it entering receiving water course.

2. Discharge does not endanger portions of work under construction or completed.

3.8 FIELD QUALITY CONTROL

A. Provide for visual inspection of load-bearing excavated surfaces before placement of paving or site structures.

3.9 PROTECTION

A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

END OF SECTION 312316

SECTION 31 23 16.13 - TRENCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Trenching, backfill, and compaction of soils for all site utilities outside of buildings.

1.3 RELATED REQUIREMENTS

A. Section 312200 - Grading.

B. Section 312316 – Excavation.

C. Section 312323 - Fill and Backfill.

D. Section 329115 – Soil Preparation and Mixes

E. Philadelphia Parks and Recreation, Design Rebuild Specifications, General Earthwork Requirements: Regulated Fill Management.

1.4 SUBMITTALS

A. Materials Sources: Submit name of imported materials source.

B. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

1.5 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where indicated on site per contract drawings including required E&S controls; pile depth not to exceed 10 feet; protect from wind and water erosion.

1. Separate differing materials with dividers or stockpile separately to prevent intermixing.

2. Prevent contamination.

3. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. General Fill: Subsoil excavated on-site.

1. Graded.

2. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.

B. Structural Fill: Coarse Aggregate - Type 2A

1. Per Pennsylvania Department of Transportation, Publication 408, Section 703 Aggregate.

2. Provided per Pennsylvania Department of Transportation, Publication 35, Bulletin 15.

C. Granular Fill: Coarse Aggregate - AASHTO #57

1. Per Pennsylvania Department of Transportation, Publication 408, Section 703 Aggregate.

2. Provided per Pennsylvania Department of Transportation, Publication 35, Bulletin 15.

D. Drainage Fill: Coarse Aggregate - AASHTO #57 or AASHTO #8

1. Per Pennsylvania Department of Transportation, Publication 408, Section 703 Aggregate.

2. Provided per Pennsylvania Department of Transportation, Publication 35, Bulletin 15. E.

Topsoil: Refer to Section 329115 – Soil Preparation and Mixes

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

B. Any available data concerning environmental conditions, subsurface materials or conditions based on soundings, test pits or test borings, has been obtained by the Design Team for its own use in designing this Project. The Test Boring location drawings and the Test Boring Logs, as well as the Laboratory Test Results, contained within the Geotechnical Report, plus the Environmental Site Assessment Reports, are incorporated into the construction contract as a Contract Document. The remainder of the Geotechnical Report, with all other exhibits, is available for informational/guidance purposes only; it is not to be relied on by prospective Bidders. The Geotechnical Report and Environmental Site Assessment Reports are available to Bidders but the Bidders must agree and acknowledge that the information and recommendations in these reports are not warranted for accuracy, correctness or completeness.

C. Test Boring logs reflect the conditions at the specific locations of each Test Boring only. The Contractor accepts full responsibility for any conclusions drawn with respect to conditions between Test Borings. Excavation for the Project is “Unclassified”, as fully described in Part 3.3 of this section.

Determine the prevailing groundwater level prior to excavation. If the proposed excavation extends less than 1 foot (305 mm) into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by Architect. If the proposed excavation extends more than 1 foot (305 mm) into the prevailing groundwater, control groundwater intrusion with comprehensive dewatering procedures, or as directed by Geotechnical Engineer.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Grade top perimeter of trenching area to prevent surface water from draining into trench. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by the Architect.

3.3 TRENCHING

A. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

B. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.

C. Do not interfere with 45 degree bearing splay of foundations.

D. Cut trenches wide enough to allow inspection of installed utilities.

E. Hand trim excavations. Remove loose matter.

F. Remove excavated material that is unsuitable for re-use from site.

G. Remove excess excavated material from site.

H. Provide temporary means and methods, as required, to remove all water from trenching until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

I. Determine the prevailing groundwater level prior to trenching. If the proposed trench extends less than 1 foot (305 mm) into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the Architect.

3.4 PREPARATION FOR UTILITY PLACEMENT

A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with engineered fill material.

B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.5 BACKFILLING

A. Backfill to contours and elevations indicated using unfrozen materials.

B. Employ a placement method that does not disturb or damage other work.

C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

D. Maintain optimum moisture content of fill materials to attain required compaction density.

E. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas. F. Correct areas that are over-excavated.

1. Other areas: Use general fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density (Modified Proctor).

G. Compaction Density Unless Otherwise Specified or Indicated:

1. Under paving, slabs-on-grade, and similar construction: compact to minimum 95 percent of maximum dry density (Modified Proctor).

H. Reshape and re-compact fills subjected to vehicular traffic.

3.7 CLEANING

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION 312316.13

SECTION 31 23 23 - FILL AND BACKFILL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Filling, backfilling, and compacting for footings, slabs-on-grade, paving, site structures, and sidewalks.

B. Backfilling and compacting for utilities outside the building to utility main connections.

C. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.3 RELATED REQUIREMENTS

A. Section 312200 - Grading.

B. Section 312316 - Excavation.

C. Section 312316.13 - Trenching.

D. Section 312500 - Temporary Erosion and Sedimentation Control.

E. Section 329115 – Soil Preparation and Mixes

F. Philadelphia Parks and Recreation, Design Rebuild Specifications, General Earthwork Requirements: Regulated Fill Management.

1.4 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

1.5 REFERENCE STANDARDS

A. AASHTO M 6 - Standard Specification for Fine aggregate for Hydraulic Cement Concrete; 2013.

B. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses; 1965 (2012).

C. ASTM C33 – Standard Specification for Concrete Aggregates.

D. ASTM C128 – Standard Test Method for Density, Relative Density (Specific Gravity, and Absorption of Fine Aggregate.

E. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2014.

F. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.

G. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

H. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.

I. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

J. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.

K. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2010.

L. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and SoilAggregate by Nuclear Methods (Shallow Depth); 2010.

1.6 SUBMITTALS

A. Soil Samples: 10 pounds sample of each type of fill; submit in air-tight containers to testing laboratory.

B. Materials Sources: Submit name of imported materials source.

C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including manufactured fill. Reports must be submitted at least 48 hours prior to delivery of material to the site.

D. Compaction Density Test Reports.

E. Testing Agency Qualification Statement.

1.07 QUALITY ASSURANCE

A. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.08 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need. Location of material storage area must be approved by the Owner at least 48 hours prior to delivery of materials.

B. When fill materials need to be stored on site, locate stockpiles where designated on site per contract drawings including required E&S controls; pile depth not to exceed 4 feet; protect from erosion.

a. Separate differing materials with dividers or stockpile separately to prevent intermixing. b.

Prevent contamination.

c. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. General Fill: Subsoil excavated on-site.

1. Graded.

2. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.

B. Structural Fill: Coarse Aggregate - Type 2A

1. Per Pennsylvania Department of Transportation, Publication 408, Section 703 Aggregate.

2. Provided per Pennsylvania Department of Transportation, Publication 35, Bulletin 15.

C. Granular Fill: Coarse Aggregate - AASHTO #57

1. Per Pennsylvania Department of Transportation, Publication 408, Section 703 Aggregate.

2. Provided per Pennsylvania Department of Transportation, Publication 35, Bulletin 15.

D. Drainage Fill: Coarse Aggregate - AASHTO #57 or AASHTO #8

1. Per Pennsylvania Department of Transportation, Publication 408, Section 703 Aggregate.

2. Provided per Pennsylvania Department of Transportation, Publication 35, Bulletin 15. E.

Topsoil and Planting Mixes: See Section 329115 – Soil Preparation and Mixes

2.2 SOIL AMENDMENTS

A. Lime: In accordance with the soil test recommendations, lime shall be natural dolomitic limestone containing not less than 85% of total carbonates with a minimum of 30% magnesium carbonates; ground so that not less than 90% passes a 20-mesh sieve and not less than 50% passes a 100-mesh

sieve. Application rates for liming materials shall be determined by soil tests or dolometric lime with Owner's Representative's approval.

B. Organic Matter: If required by the soil test, organic matter shall be polymer dewatered recycled composted leaf and/or bark mulch.

C. Peat Humus: Decomposed peat free of disease and fungus with no identifiable fibers and with pH range suitable for intended use.

D. Bonemeal: Commercial, raw, finely ground; 4% nitrogen and 20% phosphoric acid.

E. Superphosphate: Soluble mixture of treated minerals; 20% available phosphoric acid.

F. Sand: Clean, washed sand, free of toxic materials and in accordance with ASTM C33-81.

G. Manure: Well rotted, unbleached stable or cattle manure containing not more than 25% by volume of straw, sawdust or other bedding materials and containing no chemicals or ingredients harmful to plants.

H. Commercial Fertilizer: Complete high grade fertilizer of neutral character, with some elements derived from organic sources and conforming to the requirements of all federal, state, and local laws. Provide proper fertilizer to remedy deficiencies found in the soil tests. Provide nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.3 SOURCE QUALITY CONTROL

A. Where fill materials are specified by reference to a specific standard, testing of samples for compliance will be provided before delivery to site.

B. If tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that survey bench marks and intended elevations for the Work are as indicated.

B. Identify required lines, levels, contours, and datum locations.

C. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.

D. Verify areas to be filled are not compromised with surface or ground water.

3.2 PREPARATION

A. Scarify subgrade to a depth of 6 inches and proof roll to identify soft spots.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

E. Subgrade preparation shall be performed in the presence of the Foundation Consultant's Representative.

3.3 FILLING

A. Fill up to subgrade elevations unless otherwise indicated.

B. Employ a placement method that does not disturb or damage other work.

C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

D. Maintain optimum moisture content of fill materials within plus/minus two percent of optimum moisture content as determined by the Modified Proctor (ASTM-D1557) to attain required compaction density.

E. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches (150 mm) compacted depth. Compact Granular Fill to a minimum of seventy-five percent relative density as determined by ASTM-D4253 and ASTM-D4254.

F. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches (200 mm) compacted depth.

G. Slope grade away from building and playground pads minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas. H. Correct areas that are over-excavated.

1. Other areas: Use structural fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density based on Modified Proctor.

I. Compaction Density Unless Otherwise Specified or Indicated:

1. Under paving, slabs-on-grade, and similar construction: 95 percent of maximum dry density, based on Modified Proctor or relative density.

2. At other locations: 95 percent of maximum dry density based on Modified Proctor. J.

Reshape and re-compact fills subjected to vehicular traffic.

K. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.4 FILL AT SPECIFIC LOCATIONS

A. Use general fill unless otherwise specified or indicated. B.

Over Buried Utility Piping in Trenches

1. Bedding: Use granular fill.

2. Cover with granular and general fill as shown on the construction details.

3. Fill up to subgrade elevation.

4. Compact in maximum 6 inch lifts to 95 percent of maximum dry density based on Modified Proctor.

C. At Lawn Areas:

1. Use general fill.

2. Compact to 90 percent of maximum dry density based on Modified Proctor.

3. See Section 329115 for topsoil placement. D. At Planting Areas Other Than Lawns :

1. Use general fill.

2. Compact to 90 percent of maximum dry density.

3. See Section 329115 for topsoil and planting mix placement.

3.5 TOLERANCES

A. Top Surface of General Filling: Plus or minus 1 inch from required elevations.

B. Top Surface of Filling Under Paved Areas: Plus or minus 1 inch from required elevations.

3.6 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.

B Perform compaction density testing on compacted fill in accordance with ASTM D6938.

C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor"), ASTM D1557 ("modified Proctor"), or AASHTO T 180.

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Frequency of Tests: Perform a minimum of one in-place compaction density test per lift per 2500 square feet of compacted material, with a minimum of one test for any day that soil material is compacted.

F. Proof roll compacted fill at surfaces that will be under slabs-on-grade.

3.7 CLEANING

A. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION 312323

SECTION 31 25 00 - TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Compost filter sock.

B. Inlet protection.

C. Pumped water filter bag.

D. Concrete Washout.

E. Construction Entances Trackout Control Devices (FODS).

F. Temporary Seed Mixtures.

G. Erosion Control Blanket.

1.03 RELATED REQUIREMENTS

A. Section 312200 - Grading.

B. Section 312316 - Excavation.

C. Section 312316.13 - Trenching.

D. Section 312323 – Fill and Backfill

1.04 REFERENCE STANDARDS

A. Commonwealth of Pennsylvania Department of Transportation (PennDOT):

1. PA DOT Publication 408, latest edition.
   a. PennDOT Section 804 - Seeding and Soil Supplements
   b. PennDOT Section 855 - Pumped Water Filter Bag
   c. PennDOT Section 860 - Storm Inlet Protection
   d. PennDOT Section 867 - Compost Filter Sock
   e. PennDOT Section 868 – Erosion Control Blanket

2. PennDOT Publication 35, Bulletin 15 – Approved Construction Materials

B. Commonwealth of Pennsylvania, Department of Environmental Protection, Bureau of Soil and Water Conservation
   1. Technical Guidance Number 363-2134-008, Erosion and Sediment Pollution Control Program Manual, March 2012 edition.

C. The Pennsylvania State University, College of Agriculture
   1. "Erosion Control & Conservation Plantings on Noncropland", 1997 (PSU).

D. Approved Erosion and Sedimentation Control Plan

PART 2 - PRODUCTS

2.01 INLET PROTECTION

A. Inlet Filter Bag:

a. Construct bag from woven polypropylene material with the properties listed below:

Property	Test Method	Units	Value
Grab Tensile Strength	ASTM D-4632	(lbs)	300
Grab Tensile Elongation	ASTM D-4632	%	20
Seam Strength	ASTM D-4632	%	90
Wide Width Tensile	ASTM D-4595	lbs/ft	2400
Puncture Resistance	ASTM D-4833	lbs	120
Mullen Burst Strength	ASTM D-3786	psi	800
Trapezoidal Tear Strength	ASTM D-4533	lbs	120
UV Resistance	ASTM D-4355	% @150 hrs	80
Apparent Opening Size	ASTM D-4751	Sieve No.	40
Flow Rate	ASTM D-4491	gal/min/sf	1630 (40)
Permitivity	ASTM D-4491	Sec -1	0.55

b. All seams to consist of double rows of 401 chain stitch, spaced evenly, 0.5 inch apart maximum.

c. The bag to have an expansion restraint inserted through the center of the bag consisting of a 0.25inch cord and two 2-inch by 2-inch by 0.75-inch rubber blocks.

d. Provide No. 8 rebar for bag removal.

B. Inlet Filter Mat:

a. As specified on the contract drawings.

1) Manufacturer: MKB Company, www.mkbcompany.com; Triumph Geo-Synthetics, Inc, www.triumphgeo.com; Triangular Silt Dike Company, https://tri-siltdike.com; or equal as approved by the Professional.

2.02 WATER

A. Suitable clean water may be used without testing.

2.03 COMPOST FILTER SOCK

A. Filter Sock

a. As Specified on Contract Drawings:

1) Manufacturer: Filtrexx, www.FILTREXX.COM ; MKB Stormwater Innovation, www.mkbcompany.com; MVI Environmental, www.mwienv.com; or equal as approved by the Professional.

2) High density polyethylene (HDPE) expandable, tubular, biodegradable or photodegradable, 3 mil to 5 mil, 9.5 mm (3/8 inch) (nominal) mesh netting fabric sock of 300 mm (12 inches) and 450 mm (18 inches) diameters.

B. Compost

a. As Specified on Contract Drawings:

1) Manufacturer: Filtrexxwww.FILTREXX.COM ; MKB Stormwater Innovation, www.mkbcompany.com; MVI Environmental, www.mwienv.com; or equal as approved by the Professional.

2) Well-decomposed, stable, weed-free, organic compost meeting AASHTO MP-9, Standard Specification for Compost for Erosion/Sediment Control (Filter Berms) derived from a variety

of feedstocks including agricultural, forestry, food, or industrial residuals; bio-solids (treated sewage sludge); leaf and yard trimmings; manure; or tree wood with no objectionable odors or substances toxic to plants. Material aerobically composted at a DEP, Bureau of Waste Management permitted site and conforming to CFR 503. Test in accordance with U.S. Composting Council's Test Methods for Examining of Composting and Compost (TMECC). Provide compost with the U.S. Composting Council's Seal of Testing Assurance Program (STA) certification and STA product label. Compost having the following physical properties:

TMECC Test Methodologies -
Organic Matter Content dry mass (weight) basis: 80% - 100%
Organic Portion: Fibrous and Elongated
Moisture content, dry mass (weight) basis < 60%
pH: 5.5 - 8.0
Soluble salt concentration (electrical conductivity): 5.0 dS/m
Max. Particle size, % passing mesh size, dry mass (weight) basis:
99% material passing 2 inch Screen

3) High density polyethylene (HDPE) expandable, tubular, biodegradable or photodegradable, 3 mil to 5 mil, 9.5 mm (3/8 inch) (nominal) mesh netting fabric sock or 300 mm (12 inches) and 450 mm (18 inches) diameters

2.04 PUMPED WATER FILTER BAG

A. Filter Bag

1. Construct bag from non-woven geotextile material with the properties listed below:

	Property:	Test Method	Units	Value
b.	Weight:	ASTM D-3776	g/m2 (oz/sy)	340 (10)
c.	Grab Tensile Strength:	ASTM D-4632	kg (lbs)	113 (250)
d.	Trapezoidal Tear Strength:	ASTM D-4533	kg (lbs)	45 (100)
e.	Puncture Resistance:	ASTM D-4833	kg (lbs)	69 (155)
f.	Mullen Burst Strength:	ASTM D-3786	kPa (psi)	2965 (430)
g.	UV Resistance:	ASTM D-4355	% @ 500 hrs	70
h.	*Apparent Opening Size (max): ASTM D-4751 Sieve No.*			*100*

2. Bag size: 15 feet by 15 feet ± 3 inches.
3. Provide bags with a double 401 chain lock stitch or double needle stitch with a minimum strength of 100 pounds per inch as per ASTM D-4884.
4. Provide an adjustable sewn in spout capable of handling a maximum hose size of 6 inches.

B. Lifting Straps

a. Of sufficient strength to support load of bag.

C. Aggregate: AASHTO No. 57

a. Per PennDOT, Section 703 Aggregate

D. Geotextile: Class 4, Type A.

a. Per PennDOT, Section 735 Geotextiles

2.05 CONCRETE WASHOUT

A. As specified on the contract drawings, or approved equal.

2.06 CONSTRUCTION ENTRANCES (TRACKOUT CONTROL SYSTEM)

A. Construction Entrances (Trackout Control System):
a. As specified on the contract drawings.
1) Manufacturer: FODS, LLC, www.getfods.com; Rubberform Recycled Products, LLC, https://rubberform.com; RubbErosion, www.rubberosion.com; or approved equal.

2.07 TEMPORARY SEED MIXTURES

A. Temporary seed mixture for all earthwork areas:

a. As specified on the contract drawings.
b. In accordance with PA DOT Specification Section 804.

2.08 EROSION CONTROL BLANKET

A. Erosion control blanket for earthwork areas:
a. As specified on the contract drawings.
b. In accordance with PA DOT Specification Section 868.

PART 3 - EXECUTION

3.01 EROSION AND SEDIMENT POLLUTION CONTROL

A. Construction operations shall be carried out in such a manner so that erosion, air and water pollution will be minimized. State and local laws concerning pollution abatement shall be followed.

B. An Erosion and Sedimentation Control Plan has been completed by the Design Team. This plan contains a detailed staging of construction activities that the Contractor must follow throughout the period of its construction contract

3.02 INLET PROTECTION

A. Remove grate in catch basin/inlet, place sack in opening. Hold out approximately 6 inches outside the frame. Replace the grate to hold the sack in place.

B. Per Contract Drawings and Approved E&S Permit:

C. Install bag in accordance with manufacturer's recommendation.

D. Construct downstream earthen or sandbag berm as indicated and directed.

E. Replace or remove and clean bag when sediment has accumulated above the expansion restraint cord.

F. Upon final stabilization of tributary area, when directed, remove bag and downstream earthen or sandbag berm in a manner satisfactory to the Representative.

G. Dispose of bag and sediment in a manner satisfactory to the Representative.

H. Maintenance
a. Per Contract Drawings

3.03 COMPOST FILTER SOCK

A. Per Contract Drawings and Approved E&S Permit:

B. Compost Filter Sock

a. Fill sock with compost blend at the designated erosion control area or fill and transport to the project site.
b. Fill sock with compost using pneumatic (blower) equipment.
c. Tie off ends and fill socks to the lengths required.

C. Place Filter Socks
a. On level contour or surface as indicated. Position the sock around the structure or surface to be protected to create a complete physical barrier to intercept any sheet flow of drainage water and allowing sediment to collect on the outside of the sock. Ensure a minimal overlap of at least 12 inches on either side of the area to be protected. Anchor sock with approved stakes or other devices capable of holding the sock in place.

b. For bottom of slope installations, position sock parallel to the base of the slope to be protected in order to intercept sheet flow of drainage water. Place sock at least 5 feet distance from the toe of slope if possible. Do not place the sock where it will concentrate drainage runoff or channel water to another location. Position each closed end of the sock pointing upslope so that the ends are at a higher elevation than the overall sock body.

D. Maintenance
a. Per Contract Drawings

3.04 PUMPED WATER FILTER BAG

A. Per Contract Drawings and Approved E&S Permit:

B. Location of Filter Bag:
a. Place bag on a well vegetated (stabilized) area such that discharge from bag will not flow over any disturbed areas or back into project area.
b. Locate bag on level area. When level area is not available, place AASHTO No. 57 Coarse Aggregate to level bag. Do not install bags in areas with slopes steeper than 5%.

C. Provide geotextile underlayment (Class 4, Type A) lined flow path if a stabilized flow path is not possible.

D. Do not exceed a pump rate of 750 gallons per minute or half the maximum specified by the manufacturer, whichever is less.

E. Insert hose into sewn-in spout and double clamp bag firmly to pump discharge hose. Do not install more than one pump hose into a single bag.

F. Monitor and evaluate entire pumping operation to assure that bag continues to function properly. Replace bag when contained silt reduces flow to approximately 50% of rate of initial bag discharge, or when directed.

G. Dispose of bag and sediment in a manner satisfactory to the Representative.
a. Do not cut open bags and seed.

H. Maintenance
a. Per Contract Drawings

3.05 CONCRETE WASHOUT

A. Per the contract drawings and the approved E&S Permit.

3.06 CONSTRUCTION ENTRANCES (TRACKOUT CONTROL SYSTEM)

A. Per Contract Drawings and Approved E&S Permit:

B. Installation
   a. Each site must be evaluated to determine the proper layout, width, and duration for the application of the trackout control system based on site conditions, entry and exit egress, traffic levels, site soil conditions, and ability to the maintain trackout system.
   b. Install tracking pad to the approximate lines and grades indicated on the Drawings. Size shall be as indicated on the Drawings, or, if no size is indicated:
      1) Pad length shall be the greater of: 35 feet; or 3 times the circumference of the largest tire that will cross it during the project.
   c. Provide number of individual panels of tracking pad to make up the size required. Adjacent panels shall be butted together and be at approximately the same elevation. Anchor panels against sliding according to manufacturer' s recommendations.
   d. Place H-Bracket between first and second mat, and all adjacent mats.
   e. Connect mats together using Long-Steel Straps per manufactures instructions.
   f. Anchors mats to surface per manufactures specification per substrate.
   g. Provide extra panels for turning radii, if needed to prevent trucks from running off the pad during turns.

C. Connecting Mats
   a. Mats are connected together using hardware to achieve the required size to meet local jurisdictions specifications.
   b. Anchor mats to asphalt, concrete, or directly to the dirt substrate.

D. Anchor In Place
   a. Track out system must be anchored in place.
   b. Proper anchoring procedure will vary depending on use and substrate condition.
   c. Anchor according to manufacturer's recommendations. When installing the anchors, it is recommended that the contractor select anchor holes where mat is most flush with the ground.
   e. To anchor mats to asphalt or concrete, a concrete sleeved anchor should be used.

E. Maintenance
   a. Clean per manufacturer's recommendations.
   b. Cleaning methods vary depending on soil type and available equipment.
   c. It is recommended that sediment should be cleaned out horizontally across the length of the mat. Other options may include a street sweeper (requires adjusted bristle head), pressure washer (must have ability to contain water), or a water truck (must have ability to contain water)..

3.07 TEMPORARY SEED MIXTURES

A. Within 5 days following grading activities, seed all earthwork areas with seed mixture to prevent erosion; maintain until "final grading and seeding" is performed.

B. Site Preparation
   a. Install needed surface water control measures. Perform all cultural operations at right angles to the slope. Apply ground limestone uniformly at 800 lbs. per 1000 square yards.

b. Apply uniformly a 10-20-10 analysis fertilizer at the rate of 140 pounds per 1,000 square yards. Work in lime and fertilizer to a depth of 4 inches using any suitable equipment.

C. Apply grass seed at a rate of 10 lbs. per 1,000 square yards. Cover annual rye grass with about ½ inch of soil

D. Additional seeding will be required until substantial catch of grass can be acquired and maintained.

3.08 EROSION CONTROL BLANKET

A. Per the contract drawings and the approved E&S Permit.

B. Per PA DOT Specification Section 868.

3.09 MAINTENANCE

A. General:

a. The Contractor shall monitor performance of sediment control measures. The Contractor shall inspect weekly or following each rainfall, whichever is sooner. The Contractor shall remove all silt accumulation in the sediment control structures.

b. Lawn and critical slope areas shall be monitored at weekly intervals. Any bare or eroded areas will be re-established as required. Should isolated areas repeatedly resist stabilization, Contractor shall contact local County Conservation District for assistance.

c. The Contractor shall follow the maintenance schedule as shown on the erosion and sediment pollution control detail sheet.

END OF SECTION 312500

SECTION 32 11 23 - AGGREGATE BASE COURSES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Aggregate base course.

B. Paving aggregates.

1.3 RELATED REQUIREMENTS

A. Section 312200 - Grading.

B. Section 312316.13 Trenching.

C. Section 312323 – Fill and Backfill.

D. Section 321216 - Asphalt Paving.

E. Section 321313 - Concrete Paving.

F. Philadelphia Parks and Recreation, Design Rebuild Specifications, General Earthwork Requirements: Regulated Fill Management.

1.4 REFERENCE STANDARDS

A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses; 1965 (2004).

B. ASTM C128 – Standard Test Method for Density, Relative Density (Specific Gravity, and Absorption of Fine Aggregate.

C. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2014.

D. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.

E. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.

F. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

G. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.

H. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

I. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

J. ASTM D3017 - Standard Test Methods for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2017

K. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and SoilAggregate by Nuclear Methods (Shallow Depth); 2021.

1.5 SUBMITTALS

A. Materials Sources: Submit name of imported materials source.

1. Pennsylvania Department of Transportation, Publication 35, Bulletin 15.

B. Aggregate Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

C. Compaction Density Test Reports.

1.6 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. Aggregate Storage, General:

a. Separate differing materials with dividers or stockpile separately to prevent intermixing. b.

Prevent contamination.

c. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.1 MATERIALS

A. Coarse Aggregate: Type 2A:

a. Per Pennsylvania Department of Transportation, Publication 408, Section 703 Aggregate.

b. Provided per Pennsylvania Department of Transportation, Publication 35, Bulletin 15. c. Depths:

1) For Asphalt Pavement: As shown on the Contract Drawings.

2) For Concrete Pavement: As shown on the Contract Drawings.

PART 3 EXECUTION

3.1 GENERAL

A. Pennsylvania Department of Transportation, Publication 408, Section 350 Subbase.

3.2 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

3.3 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place aggregate on soft, muddy, or frozen surfaces.

3.4 INSTALLATION

A. Under Bituminous Concrete Paving:

1. Compact to 75 percent of relative density.

B. Under Portland Cement Concrete Paving:

1. Compact to 75 percent of relative density.

C. Place aggregate in maximum 6 inch layers and roller compact to specified density.

D. Level and contour surfaces to elevations and gradients indicated.

E. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

F. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

G. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.5 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation From Design Elevation: Within 1/2 inch.

3.6 FIELD QUALITY CONTROL

A. Compaction density testing will be performed on compacted aggregate base course in accordance with ASTM D2167, ASTM D3017 or ASTM D6938.

   a. At each density test location and after completing the density test, carefully dig one test hole to the full depth of the completed subbase and measure the depth of the finished base course.

B. Results will be evaluated in relation to compaction curve determined by testing material in accordance with ASTM C128 (relative density).

C. If tests indicate work does not meet specified requirements, remove work, replace and retest.

D. If the subbase depth is deficient by 1/2 inch or more from the depth indicated, the base course is defective and may require additional test holes to determine the limits of the defective area.

   a. Scarify the base to a depth of 3 inches, blend in additional material, and recompact. After recompacting, retesting may be required to verify the base course depth is within 1/2 inch of the indicated depth.

E. Backfill the test holes with base course material and compact.

F. Proof roll compacted aggregate at surfaces that will be under asphalt or concrete paving. Compaction density testing will be performed on compacted aggregate base course in accordance with ASTM D3017 and ASTM C6938.

3.7 CLEANING

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION 321123

SECTION 32 12 16 - ASPHALT PAVING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Bituminous concrete paving wearing course.

B. Bituminous concrete paving binder course.

1.3 RELATED REQUIREMENTS

A. Section 312200 - Grading.

B. Section 312323 – Fill and Backfill.

C. Section 321123 - Aggregate Base Courses.

D. Section 321723 - Painted Pavement Markings.

E. Specifications - Pennsylvania Department of Transportation, Publication 408; current edition; Section 409 – Superpave Mixture Design, Standard and RPS Construction of Plant-Mixed HMA Courses.

F. Specifications - Pennsylvania Department of Transportation, Publication 408; current edition; Section 460 – Bituminous Tack Coat.

G. Philadelphia Parks and Recreation, Design Rebuild Specifications, General Earthwork Requirements: Regulated Fill Management.

1.4 REFERENCE STANDARDS

A. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot-mix Types; 1997.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with State of Pennsylvania Highways standard.

B. Mixing Plant: Conform to State of Pennsylvania Highways standard.

C. Obtain materials from same source throughout.

1.6 SUBMITTALS

A. Materials Sources: Submit name of materials source.

a. Pennsylvania Department of Transportation, Publication 35, Bulletin 15.

1.7 FIELD CONDITIONS

A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 PRODUCTS

2.1 MATERIALS

A. Bituminous Binder Course: Superpave Asphalt Mixture Design, HMA Base Course, PG 64-22, <0.3 Million ESALS, 19 MM Mix

a. Depth: as shown on the Contract Drawings.

b. Per Pennsylvania Department of Transportation, Publication 408, Section 409 – Superpave Mixture Design, Standard and RPS Construction of Plant-Mixed HMA Courses.

c. Provided per Pennsylvania Department of Transportation, Publication 35, Bulletin 15.

B. Bituminous Wearing Course: Superpave Asphalt Mixture Design, HMA Wearing Course, PG 64-22, <0.3 Million ESALS, 9.5 MM Mix

a. Depth: 1.5 inches or as shown on the Contract Drawings.

b. SRL Type: SRL-M

c. Per Pennsylvania Department of Transportation, Publication 408, Section 409 – Superpave Mixture Design, Standard and RPS Construction of Plant-Mixed HMA Courses.

d. Provided per Pennsylvania Department of Transportation, Publication 35, Bulletin 15.

PART 3 EXECUTION

3.1 GENERAL

A. Pennsylvania Department of Transportation, Publication 408, Section 409 Superpave Mixture Design, Standard And RPS Construction of Plant-Mixed HMA Courses.

B. Pennsylvania Department of Transportation, Publication 408, Section 410 Superpave Mixture Design, Standard and RPS Construction of Plant-Mixed HMA Fine-Graded Courses.

3.2 EXAMINATION

A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.3 SUBBASE COURSE

A. See Section 321123.

3.4 PREPARATION - PRIMER

A. Apply primer in accordance with manufacturer's instructions.

B. Use clean sand to blot excess primer.

3.5 PREPARATION - TACK COAT

A. Apply tack coat in accordance with manufacturer's instructions.

B. Apply tack coat to contact surfaces of curbs, gutters and bituminous pavement.

C. Coat surfaces of manhole frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.

3.6 PLACING ASPHALT PAVEMENT - DOUBLE COURSE

A. Place asphalt binder course within 24 hours of applying primer or tack coat.

B. Place binder course to four (4) inch compacted thickness.

C. Place wearing course to one and one-half (1-1/2) inch compacted thickness.

D. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

E. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.7 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Compacted Thickness: Within 1/4 inch of specified or indicated thickness.

C. Variation from True Elevation: Within 1/2 inch.

3.8 FIELD QUALITY CONTROL

A. Provide field inspection and testing. Take samples and perform tests in accordance with AI MS-2.

3.9 PROTECTION

A. Immediately after placement, protect pavement from vehicular traffic or loads for one day or until surface temperature is less than 140 degrees F.

END OF SECTION 321216

SECTION 32 13 13 - CONCRETE PAVING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Concrete sidewalks, landings, and service area pads.

1.3 RELATED REQUIREMENTS

A. Section 079210 – Sitework Joint Sealants

B. Section 312200 - Grading.

C. Section 312323 – Fill and Backfill.

D. Section 321123 - Aggregate Base Courses.

E. Philadelphia Parks and Recreation, Design Rebuild Specifications, General Earthwork Requirements: Regulated Fill Management.

1.4 REFERENCE STANDARDS

A. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).

B. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.

C. ACI 305R - Hot Weather Concreting; 2010.

D. ACI 306R - Cold Weather Concreting; 2010.

E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.

G. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.

H. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.

I. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.

J. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.

K. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2014.

L. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

M. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.

N. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.

O. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types); 2004 (Reapproved 2013).

P. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2013).

Q. PennDOT 408 – Construction Specifications

R. PennDOT RC-67M – Curb Ramp and Sidewalk Construction Details

1.5 SUBMITTALS

A. Product Data: Provide data on joint filler, admixtures, and curing compound.

B. Design Mixes: For each concrete pavement mix.

a. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments. C. Laboratory test reports for concrete mix design tests.

D. Material certificates signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

E. Samples: Submit two sample panels, 12 inch by 12 inch in size illustrating exposed aggregate finish.

F. Design Data: Indicate pavement thickness, designed concrete strength, reinforcement, and typical details.

1.6 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. Follow recommendations of ACI 305R when concreting during hot weather.

C. Follow recommendations of ACI 306R when concreting during cold weather.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

a. Reinforcement shall be stored above the ground on platforms, skids or other supports and shall be protected from mechanical injury and surface deterioration caused by exposure to conditions producing rust.

1.9 WARRANTY

A. Special Warranty for Lifting/Cracking: Submit, for acceptance, a warranty document executed by authorized company official. Warranty is in addition to, and not a limitation of, other rights Client Agency may have under Contract Documents.

a. Special Warranty Period: Two (2) year limited warranty commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.1 CEMENT CONCRETE

A. Class AA Cement Concrete

1. Depth: As shown on the drawings

2. Per Pennsylvania Department of Transportation, Publication 408, Section 704 - Cement Concrete.

3. Provided per Pennsylvania Department of Transportation, Publication 35, Bulletin 15.

2.2 PAVING ASSEMBLIES

A. Comply with applicable requirements of ACI 301.

B. Concrete Dumpster Pad: 3,500 psi 28 day concrete, 6 inches thick (unless noted otherwise), 6x6 - W1.4xW1.4 welded wire reinforcement (unless noted otherwise) with dowel expansion joints of 1/2" diameter x 12" Galvanized steel Slip dowel, 24" on center.

C. Pedestrian Walkways: Minimum 4 inches thick, no reinforcement, on 4 inches compacted crushed aggregate (PennDOT 2A Modified or 2B Clean Aggregate or AASHTO No. 57 Stone or equivalent).

D. Vehicular and Access Drives: Minimum 6 inches thick on 6 inches compacted crushed aggregate (PennDOT 2A Modified or 2B Clean Aggregate or AASHTO No. 57 Stone or equivalent).

E. Driveway Aprons and Sidewalks within Rights of Way: Follow Department of Streets standards of construction.

F. Spraygrounds: 6 inches thick on 6 inches of compacted crushed aggregate (PennDOT 2A Modified or 2B Clean Aggregate or equivalent). Reinforcement shall be per sprayground equipment manufacturer's recommendations/specifications. Thickening of slabs and or foundations for sprayground features shall be per sprayground equipment manufacturer's recommendations/specifications.

2.3 FORM MATERIALS

A. Form Materials: Conform to ACI 310,

a. Forms for Exposed Finish Concrete: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects to provide continuous, straight, smooth, exposed surfaces.

1) Use flexible spring steel forms or laminated boards to form radius bends as required.
2) Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

b. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.

c. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1) Formulate form-release agent with rust inhibitor for steel form-facing materials.

B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751) or sponge rubber or cork (ASTM D1752).

a. Thickness: 1/2 inch (12 mm).

b. Provide removable plastic void cap strip that forms 1/2 inch deep joint for sealant installation.

C. Joint Devices: Combination keyed joint form and screed, galvanized steel slip dowel with minimum 1/2 inch diameter, holes for conduit or rebars to pass through at 12 inches on center; ribbed steel stakes for setting.

a. Height: To suit slab thickness.

b. Composition and Materials: Design is based on the use of Key-Loc Joint System manufactured by Form-A-Key Products Division, and the terminology used may include reference to proprietary products of that company. Construe such reference as establishing

only the minimum quality of workmanship and materials to be provided under this Section, and not as limiting competition.

1) Provide removable plastic cap strip that forms wedge-shaped joint for sealant installation.
2) Construct keyed joint form from minimum 24 gauge galvanized steel with dowel knockouts and shaped to form a constant tongue and groove key between adjacent concrete slab sections.
    a) Steel Stakes: Construct of minimum 13 gauge HRPO steel installed at 2 foot intervals.
    b) Stake clip: Clip is used only when pour is on stake side first and as recommended by manufacturer.

2.4 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M Grade 60 (60,000 psi) (420 MPa); deformed billet steel bars; unfinished finish.

B. Steel Welded Wire Reinforcement: Plain type, ASTM A1064/A1064M; in flat sheets; unfinished.

C. Dowels: ASTM A615/A615M, Grade 40 - 40,000 psi (280 MPa) yield strength; deformed billet steel bars; unfinished finish.

D. Supports for Reinforcement: Chairs, spacers, dowel bar supports and other devices for spacing, supporting, and fastening reinforcing bars, welded wire fabric, and dowels in place. Use plastic or wire bar-type supports, such as chairs and bolsters, conforming to industry practice as described in the WRI "WWR-500, Manual of Standard Practice" (most current version) or "TF 702 - Supporting WWR" (most current version).

a. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.

1) Properly size foot of bar supports or similar devices to prevent settlement on base materials and prevent puncture of geotextiles.

b. All metal bolsters or chairs which bear against the forms for exposed surfaces shall be equipped with snug fitting, high density, polyethylene tips which provide one half inch (1/2") minimum clearance between the metal and any exposed surface.

c. Do not use wood, clay brick, and other devices that can expand due to moisture gain.

E. Fabricate reinforcement according to Concrete Reinforcing Steel Institute's "Manual of Standard Practice."

2.5 JOINT MATERIAL

A. Traverse and Longitudinal Joints.

1. Min 1.25" x 18" long dowel bars.

2. Per Pennsylvania Department of Transportation, Publication 408, Section 705 - Joint Material.

3. Provided per Pennsylvania Department of Transportation, Publication 35, Bulletin 15.

B. Expansion Joint Filler Material

1. Per Pennsylvania Department of Transportation, Publication 408, Section 705 - Joint Material.

2. Provided per Pennsylvania Department of Transportation, Publication 35, Bulletin 15.

C. Joint Sealing material

1. See Section 079210 – Sitework Join Sealants

2. Color: As selected by Architect from full product range.

2.6 CONCRETE MATERIALS

A. Concrete Curing materials

1. Per Pennsylvania Department of Transportation, Publication 408, Section 711 - Concrete Curing Material and Admixtures.

2. Provided per Pennsylvania Department of Transportation, Publication 35, Bulletin 15.

B. Concrete Admixtures

1. Per Pennsylvania Department of Transportation, Publication 408, Section 711 - Concrete Curing Material and Admixtures.

2. Provided per Pennsylvania Department of Transportation, Publication 35, Bulletin 15.

3. Concrete Tint: As selected by Architect from full range of tints.

C. Mortar

1. Per Pennsylvania Department of Transportation, Publication 408, Section 705 - Joint Material.

2. Provided per Pennsylvania Department of Transportation, Publication 35, Bulletin 15. D. Obtain cementitious materials from same source throughout.

E. Exposed Aggregate:

1. Material: As selected by Architect from full product range. F.

Water: Clean, and not detrimental to concrete.

2.7 ACCESSORIES

A. Liquid Surface Sealer: Euco-Guard 100 weatherproofing siloxane sealer by The Euclid Chemical Company, W.R. Meadows, Sonneborn, or equal as approved by the Professional. B. Concrete Paving Joint Sealant: see Section 079210 – Sitework Joint Sealants.

1. Backup Material: As recommended by joint sealant manufacturer for compatibility and width to depth ratio for joint sealant.

2.8 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.

a. The mixing agitation shall begin within 30 minutes, and shall be discharged from the truck within one hour after the water has been added to the concrete mix.

1) Provide batch ticket information including the following:

a) Name of project

b) Date of delivery

c) Supplier of concrete

d) Brand of cement

e) Truck identity & ticket serial

f) Cement content number

g) Strength classification

h) Batching time

i) Admixture content

j) Point of deposit

k) Name of Contractor

l) Total amount of water

m) Name of driver

n) Weight of aggregate

o) Time loaded

p) Daily temperature mixing of concrete

q) Number of cubic yards in load reading of revolution counter

2) Quantity of water used for each batch shall be accurately measured and recorded.

PART 3 EXECUTION

3.1 GENERAL

A. Pennsylvania Department of Transportation, Publication 408, Section 501 Reinforced or Plain Cement Concrete Pavements.

3.2 EXAMINATION

A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.3 SUBBASE COURSE

A. See Section 321123 for construction of base course for work of this Section.

3.4 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Coat surfaces of manhole frames with oil to prevent bond with concrete pavement.

C. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, held securely and shall not cause difficulty in placing concrete.

3.5 FORMING

A. Place and secure forms to correct location, dimension, profile, and gradient.

B. Form Preparation:

a. Clean formwork.

b. Remove rust from steel formwork.

C. Place and secure forms to correct location, dimension, profile, and gradient.

a. Provide slab side forms such that by placing a 10-foot straight edge, form does not exceed 1/8 inch variation.

1) Vertical face: Longitudinal axis not more than ¼" in 10 feet.

b. Do not use forms with dents, holes or patches.

c. Individual formwork elements shall be as large as possible.

d. Position individual formwork elements in regular, uniform pattern with joints aligned.

e. Butt joints and provide backup splice at joints to prevent faulting at form.

f. Do not tape formwork joints.

g. Just before placing concrete, clean forms and adjacent surfaces; remove wood, sawdust, chips, dirt and other debris.

D. Assemble formwork to permit easy stripping and dismantling without damaging concrete. a. Form

Release Agent:

1) Before placing reinforcing steel, thoroughly coat contact surfaces of forms with form release agent.

2) Apply form release agent evenly without excess drip.

3) Do not allow form release agent to come in contact with concrete surfaces or any other surfaces that would be detrimental to the finish Work.

4) Comply with manufacturers recommendations and instructions.

b. Form Removal:

1) Do not remove forms until concrete has hardened sufficiently to support its own weight and imposed construction loads.

a) Formwork not supporting vertical load of concrete may be removed as soon as concrete has hardened sufficiently to resist damage from removal operations but in no case sooner than 12 hours.

2) Removed forms in a manner to avoid damage to concrete.

3) Remove forms without hammering or prying against concrete.

E. Place joint devices and fillers vertical in position, in straight lines. Secure during concrete placement.

3.6 REINFORCEMENT

A. Place reinforcement in accordance with the most stringent requirements of ACI 301 and CRSI Manual of Standard Practice and Placing Reinforcing Bars.

B. Accurately place and secure reinforcement against displacement by firmly wiring at intersections and splices with not less than No. 18 U.S. Standard Gauge annealed wire. C. Turn wire ends away from concrete exterior.

D. Ensure reinforcing is clean, free from defects and kinks, loose mill or rust scale or coatings that shall reduce bond.

E. Place welded wire reinforcement as follows unless noted otherwise.

a. Where one layer of reinforcement is indicated:

1) Place welded wire reinforcement such that the overall depth of the slab divided by four shall be the depth, in inches from the top of the slab, of the welded wire reinforcement; do not allow contraction joints to expose reinforcement. Where contraction joint depth would expose reinforcement, lower reinforcement depth to 1/3 the thickness of the slab.

a) As an example: Concrete sidewalk with a depth of four inches (4") shall have the welded wire reinforcing located one inch (1") below the top of the slab.

b) As an example: Parking area pavement with an overall depth of six inches (6") shall have the welded wire reinforcing located one and one half inches (1.5") below the top of the slab.

b. Where two layers of reinforcement are indicated:

1) Place the upper layer of welded wire reinforcement according to method outlined for one layer of reinforcement (above).

2) Place the lower layer of welded wire reinforcement such that there is one and one half inches (1.5") of clear cover below the welded wire reinforcement.

c. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.

1) Maximum welded wire reinforcement support spacings as follow unless more restrictive spacings are recommended by Wire Reinforcing Institute or Concrete Reinforcing Institute.

d. Clean reinforcement of loose rust and mill scale, earth, ice, mortar, paint, grease, oil, and other materials that reduce or destroy bond with concrete. Reinforcement shall be free from cracks and laminations. Bonded rust, surface irregularities, or mill scale shall not be cause for rejection, provided the minimum dimensions, cross sectional area, and tensile properties of the reinforcement meet the physical requirements for the size and grade of steel specified.

e. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, and spacers.

f. Place reinforcement to maintain minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement securely in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

g. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

1) Sheets at lap splices shall be placed in contact and tied together in such a manner as to maintain the minimum distance to the surface of the concrete.

h. Interrupt welded wire reinforcement at expansion and construction joints.

3.7 COLD AND HOT WEATHER CONCRETING

A. Follow recommendations of ACI 305R when concreting during hot weather.

B. Follow recommendations of ACI 306R when concreting during cold weather.

C. Do not place concrete when base surface temperature is less than 40 degrees F (4 degrees C), or surface is wet or frozen.

3.8 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. The General Contractor and concrete supplier shall have a quality control representative on site during placement of concrete.

C. Do not place concrete until subbase and forms have been checked for line and grade. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment. D. Conveying of concrete:

a. Handle concrete from mixer to place of final deposit as rapidly as practicable and in a manner which shall ensure obtaining specified quality of concrete.

b. Re-tempering: Discard concrete which has already begun to set. Do not re-temper with water.

c. Equipment: Provide mixing and conveying equipment of proper size and design to ensure continuous flow of concrete to delivery end. Do not use aluminum pipe or equipment in contact with concrete.

1) Mixers, agitators and non-agitating units: Conform to ASTM C94 and current certification requirements of Pennsylvania Department of Transportation.

2) Belt Conveyors:

a) Use only types which shall not cause segregation.

b) Discharge runs over 30 feet into hopper.

3) Chutes: Metal or metal lined not to be installed at slopes greater than 1 vertical to 3 horizontal.

4) Runways:

a) Provide runways or other means above finished concrete level for wheeled conveying equipment.

b) Do not support runways on reinforcing.

c) Do not wheel equipment directly over reinforcing or metal deck.

5) Pumps:

a) Submit to Testing Agency for review, changes to concrete mix to necessitate pumping.

b) Use pump hoses and other slickline components with 5 inch minimum inside diameter.

c) For slickline reducers, reduction in diameter shall not exceed 1 inch over a 5 foot length. E. Depositing of concrete:

a. Do not deposit concrete which has partially hardened or has been contaminated by foreign matter.

b. Deposit concrete continuously in layers of such thickness that no concrete shall be deposited on concrete which has hardened sufficiently to cause seams or planes of weakness.

c. Between construction joints, place concrete in a continuous operation such that concrete is plastic at all times and flows readily into spaces between reinforcement.

d. Use placement procedures to avoid segregation.

e. Deposit concrete as near as possible to its final position.

f. Do not place concrete over standing water, mud, frost, ice or snow.

g. Do not use wet screeds or garden style rakes. F. Do not place concrete when base surface is wet.

G. Consolidation of concrete:

a. Consolidate concrete complying with ACI 301 by vibrating, spading or rodding so that concrete is thoroughly worked around reinforcing, embedded items and into the corners of forms.

b. Consolidate each layer of concrete with previously placed layers in a manner that will eliminate air or stone pockets which may cause honeycombing, pitting, or places of weakness.

c. Do not insert vibrator into portions of concrete that have begun to set.

d. Do not use vibrators to transport concrete.

e. Keep spare vibrator on job site during concrete operations.

f. Do not over-vibrate concrete.

g. Use internal vibrator for formed elements; do not use form vibrators.

h. Keep vibrator away from joint assemblies, reinforcement, or side forms.

H. Ensure reinforcement, inserts, embedded parts, and formed joints are not disturbed during concrete placement.

I. Place concrete continuously over the full width and depth of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

a. If a section cannot be placed continuously or if interrupted for more than 1/2 hour, provide construction joints.

J. After concrete placement, adjust forms and bracing to maintain proper alignment and eliminate leakage of cement paste.

K. Apply surface retarder to all exposed surfaces in accordance with manufacturer's instructions.

3.9 JOINTS

A. Place joints as indicated on contract drawings.

B. Align curb, gutter, and sidewalk joints.

C. Construct isolation, contraction (weakened-plane), and construction joints true to line with face perpendicular to surface of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated.

D. When joining existing structures, place transverse joints to align with previously placed joints, unless otherwise indicated.

E. Place joints to allow one continuous placement between bulkheads.

F. Unless otherwise shown on drawings or indicated, maximum spacing between contraction, construction or isolation joints in slabs on grade shall be lesser of the following:

a. 36 times the slab thickness in inches.

b. Panel length to width ratio of maximum 1-1/2:1.

G. Place construction joints at end of placements and at locations where placement operations are stopped for more than 1/2 hour, except where such placements terminate at isolation joints.

a. Construction joints shall be planned and installed in accordance with the overall joint plan where the construction joint shall also function as a contraction joint, maintaining the spacings indicated for contraction joints.

1) Where construction joints are located where a contraction joint was not planned or indicated, the associated concrete sections shall be removed and replaced in order to maintain a consistent joint pattern at no additional cost. H. Construct joints using standard metal keyway-section forms.

a. Form joints with joint device extending from bottom of pavement to within 1/2 inch of finished surface.

b. Secure to resist movement by wet concrete.

c. Protect top edge of joint device during concrete placement with cap of temporary material. Remove protection after concrete has been placed on both sides of joint.

d. Provide joint sealer at all construction joints.

I. Where load transfer-slip dowel devices are indicated for slabs, install so that one end of each dowel bar is free to move.

J. Saw cutting shall not be an acceptable means of providing isolation and keyed joints.

K. Place 1/2 inch wide isolation joints to separate paving from all vertical surface and other components.

a. Form joints with joint filler extending from bottom of pavement to within 1/2 inch of finished surface.

b. Secure to resist movement by wet concrete.

c. Protect top edge of joint filler during concrete placement with cap of temporary material. Remove protection after concrete has been placed on both sides of joint.

d. Provide joint sealer at all isolation joints and locations where joint filler is installed. L. Provide

contraction joints as follows unless noted otherwise:

a. Minimum depth of 1/4 the thickness of the slab, but not less than 1 inch.

1) Adjust the depth of welded wire reinforcing and other reinforcing in order not to expose reinforcement.

b. For paving up to and including eight feet in width, locate joints such that the distance between tooled contraction joints equals the width of the slab.

c. For paving greater than eight feet in width, locate joints such that he maximum joint spacing does not exceed 36 times the slab thickness in inches.

1) As an example, a four inch (4") thick pavement, joints would have joints located not to exceed twelve feet (12').

d. All panels should be square or nearly so with the length never to exceed 1.5 times the width.

e. Sawed Joints: Saw cut joints shall be made within 4 hours of concrete placement; excessive spalling or ravelling of concrete surface at saw cuts shall be reason for replacement of concrete as outlined herein at no additional cost.

1) Employ sufficient number of saws and skilled workers to complete cutting saw joints before shrinkage produces cracking.

2) Saw cut to minimum width of 1/8 inch; width shall be consistent throughout joint.

3) Start cutting sawed joints as soon as concrete has hardened sufficiently to prevent ravelling or dislodging of aggregates.

4) Saw cut joints shall be made within 4 hours of concrete placement and after completing finishing of slab in that joint location.

5) Remove all saw debris, either loose or compacted, from slab surface and joints prior to curing installation.

3.10 FINISHING A.

General:

a. Do not add water to any slab surface during finishing operations.

b. Do not add cement to any slab surface during finishing operations.

c. Perform no finishing operations while water is present on slab surface.

B. After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

C. After floating, test surface for trueness with a 10-ft. straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.

D. Sidewalk. landing: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch (6 mm) radius.

a. Where new portland cement concrete paving abuts existing concrete paving, match existing concrete paving finishing.

b. Remove all tool and trowel marks.

E. Curbs: Light broom, texture parallel to pavement direction.

F. Curing General:

a. Cure concrete in accordance with ACI 301 and ACI 308R unless noted otherwise.

b. Start curing as soon as concrete surface shall not be damaged by curing operations.

c. Continuously cure concrete for at least 7 consecutive days.

d. During curing period, do not allow any part of the concrete to become dry.

G. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

a. Do not use liquid curing compound on surface against which additional concrete, other finishing materials, or coatings are to be bonded if the bond shall be affected by the curing compound.

b. Immediately recoat surfaces subjected to rainfall within 3 hours after compound has been applied or surfaces damaged by subsequent construction operations within the curing period.

c. Barricade concrete surfaces immediately after application of curing compound.

d. Do not allow traffic on concrete surfaces sooner than 3 days after placement or as recommended by curing compound manufacturer; comply with the more stringent requirement.

H. Concrete Sealer: Apply sealer uniformly to all new portland cement concrete paving in continuous operation according to manufacturer's written instructions.

3.11 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/4 inch (6 mm) in 10 ft (3 m).

B. Maximum Variation From True Position: 1/4 inch (6 mm).

3.12 BACKFILLING

A. After curing, debris shall be removed and the areas adjoining shall be backfilled, graded and compacted to conform to the surrounding area in accordance with the lines and grades indicated.

3.13 FIELD QUALITY CONTROL

A. Compressive Strength Tests: ASTM C39/C39M; for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd (76 cu m) or less of each class of concrete placed.

a. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

b. Perform one slump test for each set of test cylinders taken.

B. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.14 PROTECTION AND REPLACEMENT

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Remove and replace concrete paving that is broken, damaged, or defective, or does not meet the requirements of this Section. Defects include color and texture irregularities, crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

a. Area for removal and replacement shall be defined by a perimeter determined by isolation, contraction, and construction joints that completely contain within their prescribed border the break, damage, defect or otherwise unacceptable concrete paving. In no case shall additional joints, saw cuts, etc. be permitted without the express permission.

1) Remove defective areas with clean, square cuts.

2) Mix replacement concrete of same materials to provide concrete of same type or class as original concrete. Prepare, place, reinforce, consolidate, and finish to match adjacent finished concrete. Cure and seal in same manner as adjacent concrete.

3) Where possible, portions of the work cast or set integrally may be salvaged for re-use provided that each item be re-installed according to original Contract Documents requirements.

b. In the case of ramps and stairs, the entire run incorporating all intermediate landings of the ramp and/or stair shall be removed and replaced.

1) Remove defective areas with clean, square cuts.

2) Mix replacement concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to match adjacent finished concrete. Cure in same manner as adjacent concrete.

3) Where possible, portions of the work cast or set integrally may be salvaged for re-use provided that each item be re-installed according to original Contract Documents requirements.

C. Drill test cores where directed when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to paving with epoxy adhesive.

D. Do not permit pedestrian or vehicular traffic over pavement for 28 days minimum after finishing.

a. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

b. Provide access ramps along exposed concrete edges to prevent equipment and machinery from impacting edges; barricade all other exposed edges to machinery and vehicular traffic which may damage edges.

E. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for Substantial Completion inspections.

SECTION 321816 – PROTECTIVE PLAYGROUND 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.

B. The following documents form part of the Specifications to the extent stated. Where differences exist between Codes, Standards, Authorities Having Jurisdiction, and the Documents, the one affording the greatest protection and/or more stringent condition shall apply.

1.2 SUMMARY

A. Section Includes Playground Equipment as follows:

1. Cushion Course comprised of SBR rubber granules and polyurethane binder

2. Surface/Wearing Course comprised of TPV rubber granules polyurethane binder B. Related Sections:

1. Section 116813 Playground Equipment

C. References:

1. The Americans with Disabilities Act (ADA) and the Americans with Disabilities Act Accessibility Guidelines (ADAAG).

2. ASTM F1487 - Standard Specification for Playground Equipment for Public Use

3. CPS #325 – Public Playground Safety Handbook

4. ASTM F1292 – Standard Specification for Impact Attenuation of Surfacing Materials Within the Use Zone of Playground Equipment

5. ASTM F1951 – Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment

6. ASTM F2479 – Standard Guide for Specification, Purchase, installation and Maintenance of Poured-In-Place Playground Surfacing

1.3 ACTION SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

B. Product Data: Submit manufacturer’s product data and installation instructions.

C. Verification Samples: Submit manufacturer’s standard verification samples of 9" x 9" (229 x 229 mm) minimum.

D. Quality Assurance/Control Submittals: Submit the following:
   1. Certificate of qualifications of the playground surfacing installer.

E. Closeout Submittals: Submit the following:
   1. Warranty documents specified herein.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

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

1.5 REGULATORY REQUIREMENTS

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

B. Investigate the conditions of public thoroughfares and roads as to availability, clearances, loads, limits, restrictions, and other limitations affecting transportation to and ingress and egress at the site. Conform to all governmental regulations regarding the transportation of materials and secure, in advance, any necessary permits.

C. Procure and pay for permits and licenses required for Work.

1.6 QUALITY ASSURANCE

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

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer of the playground surfacing system, having experience with other projects of the scope and scale of the work described in this section.

1.7 PROJECT CONDITIONS

A. Carefully examine the site before submitting a bid. Be informed as to the nature and location of the Work, general and local conditions including climate, adjacent properties and utilities, conformation of the ground, the nature of subsurface conditions, the character of equipment and facilities needed prior to and during execution of the Work.

B. Should the Contractor, in the course of Work, find any discrepancies between Drawings and physical conditions or any omissions or errors in Drawings, or in layout as furnished by the Landscape Architect, it will be his duty to inform the Landscape Architect immediately in writing for clarification. Work done after such discovery, unless authorized by the Landscape Architect, shall be done at the Contractor's risk.

C. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

1.8 DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packages materials n clearly marked containers showing net weight, guaranteed analysis and name of manufacturer. Specified requirements for packaged materials apply to bulk shipments. Protect materials from deterioration during delivery and during storage at site.

B. Store materials protected from exposure to harmful environmental conditions and at a minimum temperature of 40 degrees F (4 degrees C) and a maximum temperature of 90 degrees F (32 degrees C).

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace PIP Rubber that fails in materials or workmanship within specified warranty period.

B. Playground surface shall maintain required impact attenuation characteristics and be guaranteed against defects in workmanship and materials for a period of no less than (5) Five Years from date of completion of work. Typical wear, abuse, or neglect will be excepted. Maintenance requirements must be maintained for duration of warranty period.

1. Failures include, but are not limited to, the following:
   a. Deterioration and excessive wear.
   b. Deterioration from UV light.
   c. Excessive loss of shock attenuation.
   d. Seam separation, including game lines and markings.

2. Warranty Period: Per Manufacturer

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by the following:

1. Safety Turf, Inc
   201 N. 4th Ave., Royersford, PA 19468
   Phone: (800) 804-4595,
   Web: www.safetyturf.com

2. ProPour™
   154 N. Sheridan Road, Newmanstown, PA 17073
   Phone: 610-589-1763
   Web: www.theplaygroundpros.com/ProPour.php

3. Or approved equal

2.2 POURED-IN-PLACE (PIP) RUBBER SAFETY SURFACING

A. A two (2) layer surface system consisting of a Cushion Course and Surface/Wearing Course

B. Cushion Course: A layer of SBR (Styrene Butadiene Rubber) recycled crumb rubber granules bound with a solvent free MDI polyurethane prepolymer binder. SBR recycled crumb rubber shall be free of contaminates and metals.
   1. All cushion course depths shall meet ASTM-F1487-11 for fall heights as dictated by the specified play and/or fitness equipment.

C. Wearing Course: A layer of TPV (Thermoplastic Vulcanised) rubber granules (1-4mm size) bound with a solvent free MDI polyurethane prepolymer binder.
   1. Thickness: 1/2 inch minimum. Thicken to 3/4 inch under swings, ends of slides, play equipment entrances/exits, and areas where there will be increased foot traffic such as around spinning play equipment. Provide a 1/4" minimum radius on edges when abutting concrete
   2. Color Scheme:
      a. Surfacing Color 1: Gold granules (50%) and Black granules (50%)
      b. Surfacing Color 2: Light Gray granules (50%) and Black granules (50%)
      c. Surfacing Color 3: Sky Blue granules (50%) and Black granules (50%)
      d. Surfacing Color 4: Royal Blue granules (50%) and Black granules

D. MDI Polyurethane Prepolymer Binder: Binders shall be aromatic. Aliphatic binders shall only be used with the approval of Philadelphia Parks and Recreation. The following are approved binder manufacturers:
   1. VORAMER by DOW Chemical Company
   2. STOBIELAST by Stockmeier Urethanes USA, Inc.
   3. FLEXILON by Rosehill
   4. Or approved equal

E. Base Requirements: Poured-In-Place (PIP) Rubber Safety Surfacing shall be installed on a stable and compacted crushed aggregate base or a paved (asphalt or concrete) base. The paved base may be existing pavement as long as it is in good condition.
   1. Compacted Crushed Aggregate Base: Minimum 6 inches thick of compacted crushed aggregate (PennDOT 2A modified, 2B Clean Aggregate, AASHTO No. 57 Stone, or equivalent) placed on a compacted un-yielding subgrade compacted to 95% minimum per ASTM D698 Standard Proctor.
   2. Asphalt Pavement Base (New): Minimum 3 inches thick ID-2 Binder Course placed on minimum 6 inches thick of compacted crushed aggregate (PennDOT 2A modified or equivalent) placed on a compacted un-yielding subgrade compacted to 95% minimum per ASTM D698 Standard Proctor.
   3. Concrete Pavement Base (New): Comply with Plain Cement Concrete Pedestrian Walkway requirements.

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. Do not begin installation before final grading required for placing playground equipment and protective surfacing is completed.

B. Verification of Site Conditions: Substrate preparation must be in accordance with surfacing manufacturer's specification. New asphalt must be fully cured – up to 30 days. New concrete must be fully cured – up to 7 days.

C. Drainage: Proper drainage is critical to the longevity of the surfacing system. Inadequate drainage will cause premature breakdown of the poured system in affected areas; and void the warranty.

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

3.2 INSTALLATION

A. Do not proceed with playground surfacing installation until all applicable site work, including substrate preparation, fencing, playground equipment installation and other relevant work, has been completed. Consider dust and traffic in adjacent work areas that may impact surfacing finish.

B. Basemat Installation:

1. Using screeds and hand trowels, install the basemat at a consistent density of 29 pounds, 1 ounce per cubic foot (466 kg/m3) to the specified thickness.
2. Allow basemat to cure for sufficient time so that indentations are not left in the basemat from applicator foot traffic or equipment.
3. Do not allow foot traffic or use of the basemat surface until it is sufficiently cured.

C. Primer Application: Using a brush or short nap roller, apply primer to the basemat perimeter and any adjacent vertical barriers such as playground equipment support legs, curbs or slabs that will contact the surfacing system at the rate of 300 ft2/gal (7.5 m2/L). D. Top Surface Installation:

1. Using a hand trowel, install top surface at a consistent density of 58 pounds, 9 ounces per cubic foot (938 kg/m3) to a nominal thickness of 1/2" (12.7 mm).
2. Allow top surface to cure for a minimum of 48 hours.
3. At the end of the minimum curing period, verify that the top surface is sufficiently dry and firm to allow foot traffic and use without damage to the surface.
4. Do not allow foot traffic or use of the surface until it is sufficiently cured.

3.3 CLEANUP

A. Do NOT dispose of excess concrete and water-borne debris from cleaning out equipment in adjacent areas designated to be future planting beds.

B. Legally dispose of off-site all refuse and debris from these operations. Remove or neatly store material at the end of each day's work. Burning of material or dumping on the site is prohibited.

C. Maintain the site in an orderly condition during the progress of Work. Continuously and promptly remove excess and waste materials; keep lawn areas, walks and roads clear. Store materials and equipment where directed. Immediately remove rejected materials from the property. Promptly remove equipment, surplus material, and debris and trash resulting from operations under this Contract upon completion and prior to initial acceptance of Work. Leave the site in a neat, orderly condition, "broom clean".

3.4 FIELD QUALITY CONTROL

A. Contractor is responsible for testing of surfacing post installation to meet requirements of ASTM F1951 (Accessibility of Surfacing) and ASTM F1292 (Attenuation of Surfacing). B. Prepare test and inspection reports.

END OF SECTION 321816

SECTION 32 31 13 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Replacement of fence framework, fabric, and accessories as required for construction access.

B. Concrete foundation for posts and center drop for gates, as needed.

C. Excavation for post bases, as needed.

D. Replacement of manual gates and related hardware as required for construction access.

E. Replacement of privacy slats, as needed.

1.3 RELATED REQUIREMENTS

A. Section 311000 - Site Clearing.

B. Section 312316 - Excavation.

C. Section 312316.13 – Trenching.

D. Section 312323 – Fill and Backfill.

E. Philadelphia Parks and Recreation, Design Rebuild Specifications.

1.4 REFERENCE STANDARDS

A. ASTM International:

1. ASTM A121 - Standard Specification for Metallic-Coated Carbon Steel Barbed Wire.
2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
4. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.

5. ASTM A491 - Standard Specification for Aluminum-Coated Steel Chain-Link Fence Fabric.
6. ASTM A817 - Standard Specification for Metallic-Coated Steel Wire for Chain-Link Fence Fabric and Marcelled Tension Wire.
7. A1011/A1011M-07 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
8. ASTM B429/B429M - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
9. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
10. ASTM F552 - Standard Terminology relating to Chain Link Fencing.
11. ASTM F567 - Standard Practice for Installation of Chain-Link Fence.
12. ASTM F626 - Standard Specification for Fence Fittings.
13. ASTM F668 - Standard Specification for Polyvinyl Chloride (PVC) and Other Organic PolymerCoated Steel Chain-Link Fence Fabric.
14. ASTM F900 - Standard Specification for Industrial and Commercial Swing Gates.
15. ASTM F934 - Standard Specification for Standard Colors for Polymer-Coated Chain Link Fence Materials.
16. ASTM F1043 - Standard Specification for Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework.
17. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
18. ASTM F1183 - Standard Specification for Aluminum Alloy Chain Link Fence Fabric.
19. ASTM F1184 - Standard Specification for Industrial and Commercial Horizontal Slide Gates.
20. ASTM F1345 - Standard Specification for Zinc - 5% Aluminum -Mischmetal Alloy-Coated Steel Chain-Link Fence Fabric.

B. Chain Link Fence Manufacturers Institute:

1. CLFMI - Product Manual.

1.5 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.

C. Product Data: Submit data on fabric, posts, accessories, fittings and hardware.

D. Samples: Submit two samples of slat infill (12” length) illustrating construction and color finish.

E. Manufacturer's Installation Instructions: Submit installation requirements for hardware and slat infills.

1.6 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines and easements.

C. Operation and Maintenance Data: Procedures for submittals.

1.7 QUALITY ASSURANCE

A. Supply material according to CLFMI - Product Manual.

B. Perform installation according to ASTM F567.

C. Perform Work according to Philadelphia Parks and Recreation, Design Rebuild Specifications.

1.8 DELIVERY, STORAGE AND HANDLING

A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Deliver fence fabric and accessories in packed cartons or firmly tied rolls.

C. Identify each package with manufacturer's name.

D. Store fence fabric and accessories in secure and dry place.

PART 2 - PRODUCTS

2.1 FENCE MATERIALS, COMPONENTS, AND ACCESSORIES

A. Conform to Philadelphia Parks and Recreation, Design Rebuild Specifications and Contract Drawings.

2.2 MANUFACTURERS

A. Fence Materials, Components, and Accessories

a. Northeast Fence and Iron Works – 8451 Hegerman Street, Philadelphia, Pennsylvania 19136,

Phone: (215) 335-1681, Web: http://www.northeastfence.net/

b. Stephens Pipe and Steel, LLC – 300 Streibeigh Lane, Montoursville, Pennsylvania 17754, Phone:

(888) 275-1638, Web: http://www.spsfence.com

c. Master Halco – 3010 Lyndon B Johnson Freeway, Suite 800, Dallas, Texas 75234, Phone: (800) 883-8384, Web: www.masterhalco.com

d. Equal approved Philadelphia Parks and Recreation.

2.3 GATES

A. General:

1. Gate Types, Opening Widths and Directions of Operation: As indicated on Contract Drawings.
2. Factory assemble gates.
3. Design gates for operation by one person. B. Swing Gates:

1. Fabricate gates to permit 180 degree swing.
2. Gates Construction: ASTM F900 with welded corners. Use of corner fittings is not permitted.

2.4 PRIVACY SLATS

A. Privacy Slats: Vinyl strips, flat configuration, sized to fit fence fabric, color as selected; manufacturer as approved by Philadelphia Parks and Recreation.

2.5 FINISHES

A. Painted Components: Galvanized to ASTM A123/A123M for components; ASTM A153/A153M for hardware; ASTM A392 for fabric.

B. Non-Painted Components and Fabric: Vinyl coating, black color according to ASTM F934.

C. Hardware: Galvanized to ASTM A153/A153M.

D. Accessories: Same finish as framing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install framework, fabric, accessories, and gates according to ASTM F567.

B. Set posts plumb, in concrete footings with top of footing at finish grade. Slope top of concrete for water runoff.

C. Line Post Footing Depth Below Finish Grade: per Contract Drawings.

D. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: per Contract Drawings.

E. Brace each gate and corner post to adjacent line post with horizontal center brace rail and indicated diagonal truss rods. Install brace rail one bay from end and gate posts.

F. Install top rail through line post tops and splice with 6-inch long rail sleeves.

G. Install center and bottom brace rail on corner gate leaves.

H. Place fabric on outside of posts and rails.

I. Do not stretch fabric until concrete foundation has cured 28 days.

J. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.

K. Position bottom of fabric 2 inches above finished grade.

L. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 24 inches on centers.

M. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.

N. Install bottom tension wire stretched taut between terminal posts.

O. Install support arms sloped per the Contract Drawings and attach barbed wire; tension and secure.

P. Support gates from gate posts. Do not attach hinged side of gate from building wall.

Q. Install gate with fabric and barbed wire overhang to match fence. Install three hinges on each gate leaf, latch, catches, retainer and locking clamp.

R. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.

S. Connect to existing fence at existing terminal post or existing line post converted to terminal post by installation of brace rails and brace rods.

T. Install posts with 3 inches maximum clear opening from end posts to buildings, fences and other structures.

U. Excavate holes for posts to diameter and spacing indicated on Drawings without disturbing underlying materials.

V. Reuse holes resulting from removal of existing post footings for installation of new posts.

W. Center and align posts. Place concrete around posts, and vibrate or tamp for consolidation. Verify vertical and top alignment of posts and make necessary corrections.

X. Allow footings to cure minimum 7 days before installing fabric and other materials attached to posts.

3.2 PRIVACY SLATS

A. Install slat inserts in diagonal pattern woven through fence fabric.

B. Fasten slats according to manufacturer’s instructions.

3.3 ERECTION TOLERANCES

A. Section 014000 - Quality Requirements: Tolerances.

B. Maximum Variation From Plumb: 1/4 inch.

C. Maximum Offset From Indicated Position: **1** inch.

D. Minimum distance from property line: 1 inch.

END OF SECTION 323113

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. Benches.
2. Exterior Ramp B. Related Sections:

1. Division 32 Section "Concrete Paving" installing site furnishings on concrete slab.

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. Product Schedule: For site furnishings. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Guarantee: Obtain in the Owner’s name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. Guarantees must be in addition to, and not in lieu of, other liabilities, which the Contractor may have by law or other provisions of the Contract Documents.

1.5 QUALITY ASSURANCE

A. General:

1. Experienced fabricator(s) or manufacturer(s) will fabricate and install site furnishings, and have prior experience in ornamental metal, or wood work of equal scope and fabrication standards to Project requirements.
2. Materials, methods of fabrication, fitting, assembly, bracing, supporting, fastening, operating devices, and erection must be in accordance with Project Contract Drawings and Specifications, approved shop drawings, and be of highest quality practices of the industry.
3. Use new and clean materials as specified, having structural properties sufficient to safely sustain or withstand stresses and strains to which materials and assembled work will be subjected.
4. Fabricate, assemble and neatly and accurately erect all work with smooth finished surfaces.

5. Field Measurements and Coordination: Verify dimensions with work specified in other sections which adjoins or to which this work will be attached.

    a. Effect coordination with related work of other sections, including work of other separate Contracts.
    b. Take measurements of adjoining work, so that work specified in this Section fits closely into the spaces and conditions provided.
    c. If any unusual conditions are encountered, the nature and location of conditions must be shown on shop drawings submitted to Landscape Architect for determination and approval prior to fabrication.

6. Coordination with other Trades: Coordinate with and furnish all necessary templates and patterns required by work of other sections. Furnish components of assemblies that are to be built into work specified as part of other sections. Supervise and be responsible for the correct location and installation of such built-in items.
7. This Specification Section does not define or establish the extent of work performed by sub-trades. Contractor will assign sub trade work as they deem appropriate for a complete, coordinated, cost effective and proper execution.

B. Shop Assembly: Insofar as is practical, fitting and assembly of work must be done in shop in order to minimize field splicing and assembly.

1. Work that cannot be permanently shop-assembled must be completely assembled, marked for re-assembly and disassembled in shop before shipment to ensure correct assembly in field.
2. Shop assembles work in largest practical sizes to minimize field work.
3. Shop fabricated items must correctly fit the field condition. In event that shop- fabricated items do not fit the field condition, the item must be returned to the shop for correction, unless otherwise approved by Landscape Architect. C. Product Testing:

D. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

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

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

1.6 DELIVERY, STORAGE, AND HANDLING

A. In accordance with Division 01 Section – PRODUCT REQUIREMENTS.

B. Finished Materials:

1. The Contractor will be responsible for timing delivery of all site improvement items, so as to minimize on-site storage time prior to installation. All stored materials and items must be protected from weather, careless handling and vandalism. Damaged items must be repaired or replaced, as determined by the Landscape Architect.

2. Load and store primed and coated articles off the ground and under cover to prevent formation of wet storage film. Allow air between and around surfaces and allow for continuous drainage of units until installed and painted.
3. Protect finishes against soiling, staining, or damage from scratches and abrasion. Maintain protection during construction until project completion.

1.7 PROJECT CONDITIONS

A. Existing Conditions

1. Carefully examine the site before submitting a bid. Be informed as to the nature and location of the Work, general and local conditions including climate, adjacent properties and utilities, conformation of the ground, the nature of subsurface conditions, the character of equipment and facilities needed prior to and during execution of the Work.
2. Should the Contractor, in the course of Work, find any discrepancies between Drawings and physical conditions or any omissions or errors in Drawings, or in layout as furnished by the Landscape Architect, it will be their duty to inform the Landscape Architect immediately in writing for clarification. Work done after such discovery, unless authorized by the Landscape Architect, will be done at the Contractor's risk.

1.8 SEQUENCING AND SCHEDULING

A. Coordinate Work of this Section with Work of all other Sections of Specification.

1.9 CLOSEOUT REQUIREMENTS

A. Project Record Documents: Submit in accordance with Division 01 Section – EXECUTION REQUIREMENTS.

B. Operations and Maintenance Data:

1. Provide Maintenance and Cleaning instructions for Owner. C.

Provide manufacturer’s standard warranty.

PART 2 - PRODUCTS

2.1 BENCHES

A.

Manufacturer:	Dumor, Inc.
Address:	P.O. Box 142, Mifflintown, PA 17059
Other Contact Info:	Phone: (800) 598-4018
Web:	www.dumor.com.
Local Representative:	General Recreation P.O. Box 440, Newtown Square, PA 19073 Phone: (800) 726-4793 Web: www.generalrecreationinc.com

Product Name:	Dumor Series 69-860-3-ART Steel Bench (Backed), 6 foot length with center armrest with custom “Fairmount Park Panel” in center armrest.
Color:	Black
Note:	Bench shall be Philadelphia Parks and Recreation Department Standard Product. Coordinate required accessories and options with the manufacturer.

2.2 EXTERIOR RAMP (Add Alternate)

A.

Manufacturer:	Amramp
Address:	835 Sussex Blvd, Broomall, PA 19008
Other Contact Info:	Phone: (PA) 610-585-2308 (NJ) 609-685-1002
Web:	www.amramp.com
Product:	Exterior ADA-Compliant Steel Wheelchair Ramp for Commercial Use.
Color:	Selected by landscape Architect from the manufacturer’s standard color range.

Dimensions: See Drawing. Requirements:

1. Ramp made from steel mesh, non-skid surface that allows for rain, dirt and snow to pass through, deterring slippery conditions.
2. Ramp with continuous handrails in sloping areas.

2.3 ACCESSORIES

A. Anchors, Fasteners, Fittings, and Hardware: Manufacturer's standard, corrosion-resistantcoated or noncorrodible materials; commercial quality, tamperproof, vandal and theft resistant.

B. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M; recommended in writing by manufacturer, for exterior applications.

PART 3- EXECUTION

3.1 EXAMINATION

A. Inspection: Verify the conditions, elevations, and measurements affecting the work of this Section prior to installation. Examine surfaces to receive site furnishings and do not proceed until any defects detrimental to the finished work are corrected. Take proper precautions so as not to disturb or damage subsurface elements of utilities, conduits, underdrainage systems, water proofing, insulation, or foam fill.

3.2 INSTALLATION

A. GENERAL

1. Unless otherwise noted in specifications or shown on Drawings: Install all site furnishings according to manufacturer's instructions, plumb, straight, true to line or radius, accurately fitted and located, with flush tight joints, with provisions to allow for thermal movement, with provision to exclude water, and with attachment devices as required for secure and rigid installation. Make field assembly and connections with the same level of quality as shop fabricated work.
2. Install, or coordinate with other work as required to install bases, grouts, fillers, flashings, sealants, and other components as the work progresses.
3. Install work to provide items with capabilities to safely sustain or withstand stresses and strains to which materials and assembled work will be subjected.
4. Restore protective coverings which have been damaged during shipment or installation of work. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at the same location.
5. Field Welding: Comply with the applicable AWS specification for procedures of manual shielded metal-arc welding, for appearance and quality of welds made.

B. ATTACHMENTS

1. All attachment devices must be of type, size and spacing to suit condition and as approved by Landscape Architect. When exposed to view, finish must match item attached.
    a. Provide shims, slotted holes, or other means necessary for leveling, plumbing, and other required adjustments.
    b. Mechanical Fastenings: Limit fasteners to concealed and inconspicuous locations as approved.
2. Do all necessary drilling, tapping, cutting or other preparation of surrounding construction in the field accurately, neatly, and as necessary for the attachment and support of work of this Section.
3. Do not cut or abrade finishes, which cannot be completely restored in the field, without the Landscape Architect's approval. Do not weld fabrications after shop priming.

3.3 CLEANUP

A. Legally dispose of off-site all refuse and debris from these operations. Remove or neatly store material at the end of each day's work. Burning of material or dumping on the site is prohibited.

B. Maintain the site in an orderly condition during the progress of Work. Continuously and promptly remove excess and waste materials; keep lawn areas, walks and roads clear. Store materials and equipment where directed. Immediately remove rejected materials from the property. Promptly remove equipment, surplus material, and debris and trash resulting from operations under this Contract upon completion and prior to initial acceptance of Work. Leave the site in a neat, orderly condition, "broom clean".

END OF SECTION 323300 – SITE FURNISHINGS

329115 – SOIL PREPARATION AND MIXES

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. Furnishing and testing all soils and plant mix materials, including salvaged on-site topsoil, off site borrow materials, amendment materials, manufactured growing media and other component materials for approved use in planting mixes. These consist of:

    a. Various Planting Mixes comprised of Salvaged On-site Topsoil and additional soil amendment materials.

2. Preparing transition zone and subgrade at planting areas.

    a. Preparation shall include amending and mixing planting soil with existing on-site soil to the depths indicated for transition zones of each area.
    b. Preparation of subgrade shall include verification and scarification of the subgrade prior to placement of planting soil mixes.

3. Placing, spreading, and fine grading pre-mixed planting soil material of the type(s) indicated for plant areas.
4. Testing installed planting soil mixes and Growing Media to ensure compaction rates as specified.
5. Protecting all stock piles and plant mix installations with approved means until substantial completion.
6. Supplying and installing erosion control material. B. Related Sections:

1. Division 31 “Fill and Backfill”
2. Division 32 Section “Turf and Grasses”
3. Division 32 Section “Exterior Planting”

1.3 REFERENCE STANDARDS

A. ASTM: American Society of Testing Materials

B. USDA: United States Department of Agriculture

C. AASHTO: American Association of State Highway and Transportation Officials

D. AOAC: Association of Official Agricultural Chemists

E. SSSA: Soil Science of America, Methods of Soil Analysis

F. TMECC: Test Methods for the Examination of Composting and Compost

G. NER493: Recommended Soil Testing Procedures for the Northeastern U.S.

1.4 DEFINITIONS

A. Base Mix Composite: Homogenously blended mix of sand and loam component materials which is then used for mixing with organic matter to create planting soils.

B. Debris: Elements including, but not limited to, concrete, concrete masonry, wood, excavated rock and rock fragments, rubble, overburden soils, abandoned utility structures, trash, refuse and litter.

C. Finish Grade: Elevation of finished surface of planting soil.

D. Growing Medium: A manufactured mix of mineral materials, stabilizing organic amendments and stabilized aggregates to provide a mixture that promotes good growing conditions for the plants specified.

E. Salvaged On-site Topsoil: Stripped native loam removed within the limits of work, but outside of the "Tree Protection Areas", to its entire natural depth.

F. Soil: A naturally occurring material of differing horizons, of which the uppermost is often used as a component in a soil mix or growing medium.

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

H. Topsoil: Natural surface-soil or prepared planting mix layer containing organic matter and sand, silt and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil materials including, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of weeds, roots, toxic materials, or other non-soil or non-specified materials.

I. Transition Mix: Imported topsoil / loam or manufactured soil, mixed with soil amendments as specified, such as sand that is homogeneously blended as specified to create a conversion layer between the existing native soil and imported planting soil.

1.5 ACTION SUBMITTALS

A. Product Data: Submit technical descriptive data for each manufactured or packaged product of this Section. Include manufacturer's product testing and analysis and installation instructions for manufactured or processed items and materials.

B. Submittal Requirements for Plant Mix or Amended Soil Suppliers:

1. Locations: Submit locations of material sources. Submit location of mixing sites, including off site mixing of plant mix or soil amendment components.
2. Landscape Architect shall have the right to reject any soil supplier or salvaged on-site topsoil.

3. Soil Mix supplier shall have a minimum of five-year experience at supplying custom planting soil mixes.
4. Submit supplier name, address, email, telephone, and fax email numbers and contact name.
5. Submit certification that accepted supplier is able to provide sufficient quantities of materials and mixes for the entire project and within the limitations of the Project Schedule.
6. Statement(s) of Qualifications: Submit within 45 days of notice to proceed to confirm qualifications. C. Certificates:

1. Submit certified analysis for each soil treatment, amendment, and fertilizer material specified and as used. Include guaranteed analysis and weight for packaged materials.

D. Test reports – Soil, Soil Amendment and Plant Mix Component Analysis: The Contractor shall submit representative samples of salvaged on-site topsoil, all plant mix materials and organic material components which are intended to be used for planting soil mixes and final mixes, to an independent Soil and Plant Testing Laboratory acceptable to the Landscape Architect. All tests shall be performed in accordance with the current standards of the Association of Official Agriculture Chemists. All reports shall be sent to the Landscape Architect for approval. Samples of all soil materials to be brought to the site must be approved before delivery. Deficiencies in the soils shall be corrected by the Contractor, as directed by the Landscape Architect after review of the testing agency report. Testing reports shall include the following:

1. Date issued.
2. Project Title and names of Contractor and supplier.
3. Testing laboratory name, address and telephone number, and name(s), as applicable, of each field and laboratory inspector.
4. Date, place, and time of sampling or test, with record of temperature and weather conditions.
5. Location of material source.
6. Type of test.
7. Results of tests including identification of deviations from acceptable ranges.
8. Soil Amendment and Plant Mix analysis tests shall show recommendations for soil additives, including organic and inorganic soil amendments, necessary to accomplish particular planting objectives noted.
9. pH and Buffer pH.
10. Analysis for levels of toxic elements and compounds including arsenic, boron, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, zinc, and PCB. Test results shall be cited in milligrams per kilogram.
11. Particle size analysis to include sand sieve analysis shall be performed and compared to the USDA Soil Classification System per ASTM D422 hydrometer test) or ASTM F1632 (pipette test). The silt and clay content shall be determined on soil passing the #270 sieve and shall be reported separately.
12. Percent of organic matter shall be determined by an Ash Burn Test, ASTM D2974-14
13. Saturated hydraulic conductivity per ASTM F1815.
14. Analysis for nutrient levels by parts per millions including Nitrate nitrogen, Ammonium nitrogen, Nitrite, Phosphorus, Potassium, Calcium, Magnesium, Iron, Manganese, Zinc, Copper, and Extractable Aluminum.
15. Soluable Salt by electrical conductivity of a 1:2 soil/water sample measured in Millimho per cm.

16. Cation Exchange Capacity (CEC) per NER493 or NCR221 using the pH 7 ammonium acetate method.
17. Carbon to Nitrogen Ratio (C:N Ratio).
18. Certified reports on analyses from producers of composted organic materials are required, additional tests are required when sources are changed. The analysis performed shall include pH, bulk density, salinity, total organic nitrogen, C:N Ratio, Solvita Maturity Index, moisture, sodium, potassium, calcium, magnesium, and phosphorus. Yard waste composts that may contain grass clippings shall be tested for chlopyralid and picloram.
19. Although the report(s) may contain the laboratory's comments or recommendations to the Landscape Architects regarding amendment requirements or procedures, the report shall not be interpreted to prescribe or dictate procedures or quantities of soil materials for the work of this Contract without the Landscape Architect's written permission. E. All samples to be submitted to the Landscape Architect for approval:

    1. Organic Compost Material, each source, 5 lb. packaged.
    2. Sand, each source, 5 lb packaged.
    3. Loam, each source, 5 lb packaged.
    4. Base Mix Composite, each source, 5 lb. packaged.
    5. Planting Soil Mix, each specified, 5 lb. packaged.

    7. Salvaged On-site Topsoil, each source, 5 lb packaged. (Screened & Shredded)F. Equipment Data: Submit descriptive information with wheel load data for each proposed item of equipment to be used for execution of earthwork of this Contract. Equipment Data will be evaluated for conformance to site restriction of use.

F. Schedule and Protection Plan: Submit a detailed plan for scheduling and sequencing of all contract work and for protection of soil mixes and other completed work including coordination with contractors requiring access through the site. Indicate with schedules and plans the utilization of soil mix and subsoil protection measures, over the surface area of plant bed installations, until Substantial Completion. Indicate with schedules and plans the utilization of finished work protection measures (wooden protection boards or other approved methods) over the work area of construction operations concurrent with all construction operations until substantial completion.

G. Settlement Methodology: Submit a plan with a schedule describing the proposed method intended for settling installed work.

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. Various Planting Mixes are comprised of Salvaged On-site Topsoil and additional soil amendment materials must meet the specification herein and be verified by testing as specified

herein, prior to being delivered to the site.

B. No component or composite mix will be accepted unless it meets all submittal, testing and certification requirements including testing and certification report format specified herein.

C. Inspections and Testing

1. Sand, soil, compost, and other material testing and soil mix testing required in this Section or additionally required by the Landscape Architect shall be furnished and paid for by Contractor.

2. The Landscape Architect reserves the right to take and analyze at any time such additional samples of materials as deemed necessary for verification of conformance to specification requirements. Contractor shall furnish samples for this purpose upon request and shall perform testing as requested.

D. Qualifications

1. Installation and maintenance foreman on the job shall be competent supervisor(s), with experience in landscape installation and maintenance. Perform work with personnel totally familiar with planting soil preparation and lawn and planting installations under the supervision of a foreman experienced with landscape work.
2. Testing Laboratory: Experienced person or persons employed by public or private soils testing laboratory, qualified and capable of performing tests, making soil recommendations, and issuing reports as specified. The Testing Laboratory shall be as approved by the Landscape Architect.
3. It shall be the responsibility of the Contractor to see that the specifications are being adhered to. Failure of the Landscape Architect to immediately reject unsatisfactory workmanship or to notify the Contractor of his/her deviation from the specifications shall not relieve the Contractor of his/her responsibility to repair and/or replace unsatisfactory work.

E. Pre-Installation Conferences: Person(s) responsible for soil preparation and mixes of this Section shall attend Pre-Installation Conference(s) to coordinate with work of other sections.

1.8 REGULATORY REQUIREMENTS

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

B. Procure and pay for permits and licenses required for work of this section.

1.9 PROJECT/SITE CONDITIONS

A. The Contractor shall be responsible for pedestrian and vehicular safety and control within the work site. He/she shall provide the necessary warning devices and ground personnel needed to give safety, warning and protection to persons and vehicular traffic within the area.

B. During site preparation, soil installation and protection, the Contractor shall be responsible for all damage to existing features above and below finished grade (structural decking, waterproofing, drainage, utility lines, irrigation pipes, paving surfaces, existing vegetation, site furnishings) incurred as a result of work operations. Repairs or replacements shall be made to the satisfaction of the Owner.

C. Investigate the conditions of site and public thoroughfares and roads as to availability, clearances, loads, limits, restrictions, and other limitations affecting transportation to, ingress and egress of this work site. Conform to all governmental regulations in regard to the transportation of materials to, from, and at the job site, and secure in advance such permits as may be necessary.

D. Should the Contractor, in the course of Work, find any discrepancies between Contract Drawings and physical conditions or any omissions or errors in Drawings, or in layout as furnished by the Owner, it will be Contractor's duty to inform the Landscape Architect immediately in writing for clarification. Work done after such discovery, unless authorized by the Landscape Architect, shall be done at the Contractor's risk. E. Environmental Requirements for Soil:

1. Perform both off-site mixing and on-site soil work only during suitable weather conditions. Do not disc, rototill, or work soil when frozen, excessively wet (as defined by Landscape Architect), or in otherwise unsatisfactory condition.
2. Soil mixes shall not be handled, hauled or placed during rain or wet weather or when near or above the point where maximum compaction will occur (as defined by Landscape Architect).

F. Sequencing and Scheduling: Adjust, relate together and otherwise coordinate work of this Section with work or Project and all other Sections of Project Specifications.

1.10 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packaged materials to the location where soils are to be mixed, in unopened bags or containers, each bearing the name, guarantee, and trademark or the producer, material composition, manufacturer’s certified analysis, and the weight of the material. Retain packages for the Landscape Architect.

B. Store and handle packaged materials in strict compliance with manufacturer’s instructions and recommendations. Protect all materials from weather, damage, and theft.

C. Soil or amendment materials stored on site temporarily in stockpiles prior to placement shall be protected from intrusion of contaminants and erosion. All temporary storage means and methods shall be approved by the Landscape Architect.

D. After mixing, soil mixtures shall be covered with a tarpaulin until time of actual use and protected from contamination or erosion.

PART 2 PRODUCTS

2.1 PLANTING SOIL PROFILE MATRIX

A. Provide planting soil profiles in locations and in accordance with details as indicated in the Drawings.

B. Use Amended salvaged soil as top-dress existing soil for existing trees and turf.

2.2 AMENDED ON-SITE PLANTING SOIL COMPONENTS

A. Planting Soil Components consist of:

1. Stockpiled Native Topsoil
2. Amended Salvaged On-site Soil
3. Imported Sand
4. Organic Material
5. Inorganic Soil Amendments
6. Surface-applied Nutrients

B. Stockpiled Native Topsoil

1. Salvaged surface soil stockpiled onsite.
2. Quantity: The approximate quantity of stockpiled native topsoil will not be known until demolition and rough grading have been completed. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Notify Landscape Architect of stockpile locations and quantities prior to importing supplemental topsoil.
3. Composition: Fertile, friable well-drained soil, of uniform quality, free of stones over two (2) inch in diameter, sticks and all construction debris and gravel less than twenty five percent (25%).
4. Test Results:

   a. Furnish soil samples for testing by Soil Testing Lab and correct deficiencies in the soils prior to plant installation, as directed by the Landscape Architect after review of the testing agency report.

C. Salvaged On-Site Soil Component

1. Salvaged soil shall be a friable mineral soil essentially free from heavy or stiff clay lumps, stones, cinders, roots, sticks brush, limit of one percent (1%). Content of concrete, brick, litter, plastics, metals refuse or other deleterious materials shall be zero percent (0%). The soil shall be free of herbicides, petroleum-based materials or other sub-stances of a hazardous or toxic nature which may inhibit plant growth. The soil shall be free of noxious weeds, seeds or vegetative parts of weedy plants that cannot be selectively controlled in the planting.

2. Salvaged On-site Soil for use in Planting Soil shall meet the following specifications.

   a. Texture: Salvaged Planting Topsoil shall be a salvaged Ap Horizon Topsoil; Subsoil layers are not acceptable.

   b. Salvaged Planting Topsoil shall be classified as a Loamy Sand or Sandy Loam.

   b. The pH shall be 5.5 to 7.5.
   c. The soluble salts shall be less than 3 millimho/cm, chloride shall be less than 150 parts per million in saturation extract

d. The organic matter content shall be lower than 1% on a dry weight basis. Blending may be used to achieve the required minimal organic content.

e. Free of noxious weeds, seeds, and rhizomes listed on invasive species list for local jurisdiction.

f. Clay content shall be under 30%. If clay content is greater than 30%, soils shall be amended with approved #20 sand in order to reduce clay content within acceptable levels.

g. Stone content shall be under 50%

3. Provide certification that soil does not contain any toxic substances harmful to plant growth.

4. Any off-site (imported or borrow) topsoils meeting the criteria shown above must be approved by the landscape architect through submittal testing and sampling prior to sourcing and delivery to the site.

5. Total petroleum hydrocarbons shall not exceed 50 mg/kg dry soil measured per the modified EPA Method No. 8015. Total aromatic volatile organic hydrocarbons (benzene, toluene, xylene and ethylbenzene) shall not exceed 0.5 mg/kg dry soil measured per EPA Methods No. 8020.

6. Percolation rate: one half inch per hour (1/2" / hr) minimum.

7. Compaction shall be 83-85% dry density per ASTM D 1775, or least level of compaction achievable as measured with neutron probe or other approved method, as approved by Landscape Architect, Civil Engineer and Geotechnical Engineer.

Table 2. General relationship of soil bulk density to root growth based on soil texture (NRCS Soil Quality Institute, 1999).

Soil texture	Ideal bulk densities (g/cm^3)	Bulk densities that may affect root growth (g/cm^3)	Bulk densities that restrict root growth (g/cm^3)
Sands, loamy sands	<1.60	1.69	>1.80
Sandy loams, loams	<1.40	1.63	>1.80
Sandy clay loams, loams, clay loams	<1.40	1.60	>1.75
Silts, silt loams	<1.30	1.60	>1.75
Silt loams, silty clay loams	<1.10	1.55	>1.65
Sandy clays, silty clays, some clay loams (35-45% clay)	<1.10	1.49	>1.58
Clays (>45% clay)	<1.10	1.39	>1.47

D. Imported Sand Component

1. If imported sand must be added to existing salvaged on-site soil in order to meet specified texture: the sand shall be a clean, sharp, or natural silica not a limestone sand that has been suitably washed and classified (sieved). Suitable sands may be referred to in commerce as a uniform, or a coarse U.S.G.A. root zone sand. The selected sand must meet the following U.S.D.A.

particle size distribution as well as the other gradation characteristics listed in Part C when tested in accordance with the ASTM D-422 using U.S.D.A. particle size classifications.

E. Organic Material (Compost)

1. The organic amendment shall be stable, mature aerobically composted yard debris (green waste) compost. Leaf humus compost, manure composts, peat, peat-humus are not acceptable. Compost material must meet the requirements of all state and local Composting Regulations and have the following characteristics:

   a. The compost shall be a homogeneous material essentially free of soil clods, lumps, roots and stones.
   b. The compost shall have a foreign material (hard plastics, metal, glass, etc.) content less than 1.5% as material retained on a U.S. Std.No.5 (4 mm) sieve (TMECC 03.06).
   c. The compost shall be screened such that a minimum of 100% passes a U.S. Std. 3/4" sieve and that no more than 10% passes a U.S. Std. No.10 sieve on a dry weight basis. The compost shall have a pH of 5.5 to 7.5.
   d. The compost shall have a soluble salts content less than 10.0 millimhos per cm. when determined in saturation extract.
   e. The compost shall have an organic matter content of not less than 40% by weight determined by ASTM D2974-87 Method C on material passing a U.S. Std.1/4" sieve.
   f. The compost shall have a carbon to nitrogen (C:N) ratio less than 25:1.
   g. The compost shall have a Solvita® Maturity Index between 6 and 7.
   h. The compost shall have a moisture content of 45% to 65%.
   i. The compost shall have a dry bulk density of 0.17 to 0.35 grams per cubic centimeter (g/cc). (some compost have bulk density values of about 0.6.)
   j. The compost shall be tested for nitrate nitrogen, phosphorus, potassium, calcium, magnesium, iron, manganese, zinc, copper, boron and sodium using the AB-DTPA extraction method.
   k. The total digestible heavy metal content shall not exceed the following limits:

Element	Concentration Limits (mg/Kg d.w.)
Arsenic	20
Cadmium	15
Chromium	100
Copper	200
Lead	300
Mercury	10
Molybdenum	20
Nickel	100
Selenium	30
Zinc	200

   l. The compost shall meet all applicable state regulations based on the feedstock type.
   m. All compost testing shall be done in conformance with the U.S. Compost Council's publication "Test Methods for the Examination of Composting and Compost", USDA or SSSA methods.

F. Inorganic Soil Amendments

1. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
   a. 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. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through a No. 60 sieve.
   c. Form: Provide lime in form of ground dolomitic limestone.
2. 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.
3. Iron Sulfate: Granulated ferrous sulfate heptahydrate containing a minimum of 20 percent iron and 10 percent sulfur.
4. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve. G. Surface-Applied Nutrients:

1. Chelated Iron: Commercial-grade FeEDDHA (Ethylenediamine-di (hydroxyphenylacetate without acid) for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.
2. Calcium Nitrate: 15.5% Nitrogen

2.3 SOIL COMPOSITIONS PROFILES

A. Provide the Planting Composition Profiles at the locations and depths as indicated on the Contract Drawings. Mix ratio volumes, will be established upon completion of the testing for the individual components of the Planting Mixes. The controlling factor will be the percent (%) organic matter by weight as specified for each Planting Mix. Note that volume ratios of the Base Mix and the Organic Amendment (compost) components will be, in large part, determined by the organic matter content of the compost. Follow the recommendations on mix design provided by the soil testing laboratory to achieve the target organic matter content. B. Soil profiles and amendments will be uniformly mixed and blended.

1. Blending consistency shall match approved In Situ mock-up.
2. There shall be no discernable discreet pockets of organic matter, fertilizer components or other amendments.

C. Compaction: Final compaction rates in-place shall be a maximum of 85% dry density per ASTM D 1557.

D. Percolation rate: Hydraulic conductivity rate shall not be less than 2 inch per hour, nor more than 10 inches per hour when tested in accordance with the USDA Handbook Number 60, method 34b, or other approved methods. Percolation rates to be confirmed using open pit percolation test as described in Part 1.

E. General planting soil testing and adjustment: Test as required to confirm specified conditions and remove soil or otherwise modify the condition as required to achieve specified requirements. Conduct additional testing as required to determine extent of any nonconforming areas and confirm correction through testing of final condition prior to planting.

F. Weed

1. Noxious weeds and plants listed on the invasive species list of the Native Plant Association shall not be present on site.
2. The following shall not be present in either components or final planting soils, as a single plant, or plant part, such as roots, rhizomes, stolons or seeds: Bermuda grass, wild oats, bromus malus, guackgrass, johnsongrass, nutsedge, nutgrass, poison oak, star thistle, poa annua (annual bluegrass), cyperus rotundus, Lepidium (pepper weed).
3. Tolerances:

   a. not more than 1% undesirable grass species or clover. No more than 2 weeds per 500 square feet.
4. Eradicate and remove using means and extent as approved by Landscape Architect or Owner. Proposed removal methods may include flame in place, mowing and tilling, Round-Up, hand removal.
5. Remove weeds within 1 week, and do not allow them to produce seed prior to removal.

2.4 PLANTING MIXES

A. Adequate quantities of planting mix materials shall be provided to attain, after compaction and natural settlement, all design finish grades. Verify quantities for placement as specified to suit site conditions.

B. Uniformly mix components using a mechanical soil blender designed for such purpose as specified for each Planting Mix Type.

1. Mixing of Base Mix and Compost: Add compost as recommended by the testing laboratory to achieve the specified organic matter content by Planting Mix type. Other amendments shall not be added to Planting Mixes unless approved by the Landscape Architect and additional tests have been conducted to verify type and quantity of amendment.

C. Testing of Planting Mixes:

1. Perform initial tests to confirm compliance with the Planting Mix organic matter content specifications. These test results, when approved, will establish the standard to which all other test results must conform.

D. Planting Mix Types: Provide the following Planting Mix types at the locations and depths as indicated on the Contract Drawings. Mix ratio volumes, will be established upon completion of the testing for the individual components of the Planting Mixes. The controlling factor will be the percent (%) organic matter by weight as specified for each Planting Mix. Note that volume ratios of the Base Mix and the Organic Amendment (compost) components will be, in large part, determined by the organic matter content of the compost. Follow the recommendations on mix design provided by the soil testing laboratory to achieve the target organic matter content for Planting Mix Type A.

1. Planting Soil Mix A

   a. Organic Matter Content by ASTM D2974-14 Method C on material passing a U.S. Std.1/4” sieve shall be within the range of following criteria:

i. If salvaged soil mix is a loam or sandy loam, add 5-8% organic amendment by

volume, or 1” thick organic amendment per top 6-8” blended into topsoil.

ii. If salvaged soil mix is a clay or clay loam, add 15-20% organic amendment by volume, or 2” thick organic amendment per top 6-8” of topsoil.

2. Based upon salvaged soil testing and soil volume requirements, Contractor shall determine if additional soils are required. Contractor, at minimum, shall assume 10% borrow materials will be required. Additional borrow soils may be required if salvaged topsoils are unsuitable for planting use. Borrow soils shall comply with the requirements listed above.

E. Planting Mix Testing: Take one (1) composite sample upon arrival to the site from each 500 cubic yards or as required by the Landscape Architect for testing each type of Planting Mix and test the following:

1. Particle size analysis: Use sieve sizes as specified for the Base Mix.
2. Organic matter content ASTM D2974-14 Method C on material passing a U.S. Std.1/4” sieve.
3. Nutrient Analysis to include phosphorus, potassium, calcium, magnesium, iron, manganese, zinc, copper and boron. Request testing laboratory recommendations for fertilizer requirements for plant types being used.
4. Soil pH and Buffer pH.
5. Cation Exchange Capacity.
6. Soluble Salt Content.

F. Stockpiling

1. General: Stockpiling on-site, off-site, and at the source should be restricted to no more than the needs of what can be used in a 72-hr. period. Under no circumstances shall onsite or off-site stored material exceed 500 cubic yards. Stockpiles should be no more than 6 feet in height to prevent anaerobic conditions within the pile. Stockpiled composts should be turned every other week (unless otherwise instructed by the Landscape Architect) to prevent anaerobic conditions excessive water absorption and anaerobic conditions.

PART 3 EXECUTION

3.1 VERIFICATION

A. Prior to construction and soil placement operations at planting areas ascertain the location of all electric cables conduits under drainage systems and utility lines. Take proper precaution so as not to disturb or damage sub-surface elements. Contractor failing to take these precautions shall be responsible for making requisite repairs to damaged utilities at Contractor’s own expense.

B. Verify that required underground utilities are available, located, and ready for use. Coordinate with other trades.

C. Verify that all work requiring access through or adjacent to areas where plant mixes are to be placed has been completed and no further access will be required. In the event that access will be required, this must be coordinated with the Contractor.

3.2 PREPARATION & PLACEMENT OF TRANSITION LAYER

A. Prior to preparation and placement of Transition Layer the Contractor shall verify asconstructed or existing elevations and do whatever additional grading is necessary to bring the subgrade to a true, smooth slope as indicated on Drawings.

1. Clean up subgrade and dispose of all debris and garbage prior to inspection.

B. Any soils polluted by gasoline, oil, mortar and grout debris, construction debris, unacceptable soils, or other substances which would render the soils unsuitable for a proper plant growth shall be removed from the premises whether or not such pollution occurs or exists prior to or during the Contract period. In the event that such material is placed, this material shall be removed and replaced with approved material. All remedial operations associated with soil mixes shall be reviewed and approved by the Landscape Architect.

C. Transition Layer: After acceptance of grades for plant areas, the Transition Layer shall be formed by blending the specified Planting Soil Mix with the in situ rough graded subsoils (Existing Subgrade) to a depth per the drawings in plant beds to permit soil mixing and bonding of the native soil to the Planting Soil Mix.

1. Blend specified Planting Soil Mix with existing subsoil to the depths indicated and at the approximate rate of 50% existing subsoil to 50% Planting Soil Mix.
2. Transition Layer shall be blended in situ and shall be thoroughly mixed such that the components of the Transition Layer are not individually discernible.
3. Root systems of existing plants adjacent to soil work, particularly blending of Transition Layer with native soil adjoining existing trees, shall be protected from damage to the fullest extent possible and may not be conducted when existing roots are in the immediate vicinity. All work infringing on root systems of existing plant material shall be reviewed and approved by the Landscape Architect prior to beginning work. Blending of Transition Mix with native soils immediately adjacent to existing roots may be carefully conducted by amending the soil by hand with hand tools.

3.3 PLANTING MIXTURES

A. Planting mixture for planters and plant backfill shall be of the type(s) indicated in accordance with the planting details, and shall be pre-mixed and placed as specified.

1. Bring to pH levels as specified herein for non-ericaceous plants.
2. For ericaceous plants lower the pH by using elemental sulfur product. Peat moss or copper sulfate may not be used to lower pH.

B. All amendments shall be thoroughly incorporated into the mixture to assure uniform distribution. Delay mixing of fertilizers if planting will not follow within a few days.

C. Additional amendments shall be mixed into the soil as recommended by the testing laboratory and as approved by the Landscape Architect for each plant type and condition of installation.

3.4 SITE PREPARATION FOR PLANTING SOIL MIXES

A. Do not proceed with the installation of the Soil material until all walls, curb footings and utility work in the area have been installed. For site elements dependent on Soil for foundation support, postpone installation until immediately after the installation of Soil.

B. Install subsurface drain lines as shown on the Drawings prior to installation of Soil material.

C. 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.

D. 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.

E. 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. F. All subsurface drainage systems shall be operational prior to installation of Soils.

G. Protect adjacent walls, walks and utilities from damage or staining by the soil. 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.

1. Clean up all trash and any soil or dirt spilled on any paved surface at the end of each working day.
2. Any damage to the paving or architectural work caused by the soils installation Contractor shall be repaired by the general contractor at the soils installation contractor's expense.

H. Maintain all silt and sediment control devices required by applicable regulations. 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.

3.5 PLACING PLANTING SOIL MIXES AND GROWING MEDIA

A. Remove all large clods, lumps, brush, roots, stumps, litter, and other foreign material and stones one-half inch (1/2") in diameter or larger. Dispose of removed material legally off-site. B. Do not place a muddy or wet soil mix (as defined by the Landscape Architect).

C. Transition Layer Conditions: Refer to Article 3.2, herein.

D. Place and spread planting soil mix of the type specified over approved subgrade or transition zone areas to a depth sufficiently greater than the depth required for planting areas so that after settlement as previously approved by Landscape Architect, the completed work will conform to the lines, grades, and elevations shown or otherwise indicated. E. For Plant Bed Areas:

1. Required Transition Layer depth per drawings.
2. Required Planting Soil depths shall be as indicated on drawings with a total of Planting

Soil Mix(es) to be a minimum per the drawings as measured in place in a settled position.

3. Place fills lightly in layers of a maximum of six to eight inch (6-8") lifts and very carefully settle soils to eliminate air pockets and to minimize future settling. Lightly scarify previously placed surfaces prior to placing subsequent lifts. Proposed method of settlement shall be as previously approved by the Landscape Architect. Method may include, but is not limited to, natural settlement over an approved period of time or light hand-tamp, light water misting of each layer and/or light rolling. Do not over-compact Planting Soil Mixes.
4. After settlement has occurred, add soil to maintain finished grades. If for any reason soil is left exposed for a long duration prior to planting, add soil and re-grade as required if erosion occurs. Fills shall not be so compacted as to in any way restrict the flow of water or air through the soil.

F. For Lawn Areas:

1. Required Transition Layer depth shall be per drawings.
2. Required Planting Soil depth shall be as indicated on drawings with a total of Planting Soil Mix(es) to be a minimum per the drawings as measured in place in a settled position.
3. Place fills lightly in layers of a maximum of six inch (6") lifts and very carefully settle soils to eliminate air pockets and to minimize future settling. Lightly scarify previously placed surfaces prior to placing subsequent lifts. Proposed method of settlement shall be as previously approved by the Landscape Architect. Method may include, but is not limited to, natural settlement over an approved period of time or light hand-tamp, light water misting of each layer and/or light rolling. Do not over-compact Planting Soil Mixes.
4. Roll the whole surface of lawn bed with a hand roller weighing approximately one hundred pounds (100 lb.) per foot (12") of roller width. During the rolling, fill all depressions caused by settlement with additional planting soil and then re-grade. Lightly roll and rake until the surface presents a smooth, even, and uniform finish that is at required grade.
5. Allow plant mix in lawn areas to remain undisturbed until fully settled in accordance with settlement methodology submitted as approved by the Landscape Architect. After any additional settlement has occurred, restore areas to finished grade prior to sodding.

    a. Protect plant mix against construction activity with site protection fence as specified and the eroding effects of wind and rain with filter fabric as approved for the protection plan.

    b. If soils are placed in the fall, the use of winter rye will be permitted. Where winter rye is used, the rye grass shall be roto-tilled into the soil in the spring and soil preparation and rolling shall be repeated as specified.

G. Backfilling for trees in this area shall use material specified in this section but be installed as specified in Section 329310 – "Exterior Planting". Removal or shoring is the responsibility of the Contractor for Soil Preparation and Mixes.

H. Grading Tolerances: Planting areas shall be fine graded within ±1/10 (0.10) feet of grades indicated on drawings. Maintain all flat areas and slopes to allow free flow of surface drainage without ponding.

3.6 CLEANUP

A. Legally dispose of off-site all refuse and debris from these operations. Remove or neatly store material at the end of each day's work. Burning of material or dumping on the site is prohibited.

B. Maintain the site in an orderly condition during the progress of Work. Continuously and promptly remove excess and waste materials; keep lawn areas, walks and roads clear. Store materials and equipment where directed. Immediately remove rejected materials from the property. Promptly remove equipment, surplus material, and debris and trash resulting from operations under this Contract upon completion and prior to initial acceptance of Work. Leave the site in a neat, orderly condition, "broom clean".

END OF SECTION

SECTION 329210 – 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. Preparing subgrade.
   3. Soil amendments.
   4. Mulching.
   5. Protecting and maintaining all sodded areas until Substantial Completion.
   6. Turf renovation.
   7. Erosion-control material(s).
   8. Final Clean-up. B. Related Sections:

1. Division 31 Section "Site Clearing"
2. Division 32 Section "Exterior Planting"

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

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

F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 ACTION SUBMITTALS

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

1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.
2. Mulch(s)
3. Erosion control netting
4. Commercial fertilizer B. Samples with product data:

1. Mulch: Two (2) pound bag of each type.
2. Erosion control netting: 12" x 12" piece.

C. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.

E. Product Certificates: For soil amendments and fertilizers**,** from manufacturer.

1. Commercial Fertilizers: Include guaranteed analyses.
2. Ground Limestone: Include guaranteed analysis, and weight for packaged material.

F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required initial maintenance periods.

G. Schedule and Work Plan: Submit detailed schedule and Work plan, indicating location and installation dates for each area of lawn.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified 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.

1.6 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: **Five** years' experience in turf installation in addition to requirements in Division 01 Section "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the National Association of Landscape Professionals:
    a. Certified Landscape Technician - Exterior, with installation specialty area(s), designated CLT-Exterior.
    b. Certified Turfgrass Professional, designated CTP.
    c. Certified Turfgrass Professional of Cool Season Lawns, designated CTP-CSL.
5. Maintenance Proximity: Not more than **two** hours' normal travel time from Installer's place of business to Project site.
6. Pesticide Applicator: State licensed, commercial.

B. Preinstallation Conference: Conduct conference at Project site.

C. Installer: Perform work with personnel totally familiar with lawn construction under the supervision of an experienced landscape foreman at all times during the construction. Notify the Landscape Architect of the name and phone number of the foreman five (5) business days in advance of the first day of lawn construction.

D. Arrange a preconstruction meeting between the Landscape Architect, General Contractor and Lawn Subcontractor. Such meeting shall seek to review the lawn construction schedule, phasing, review of specifications and construction procedures.

1.7 REGULATORY REQUIREMENTS

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

B. Investigate the conditions of public thoroughfares and roads as to availability, clearances, loads, limits, restrictions, and other limitations affecting transportation to and ingress and egress at the site. Conform to all governmental regulations regarding the transportation of materials. C. Procure and pay for permits and licenses required for Work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying. 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. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

1.9 PROJECT CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.

1. Sodding

a. Spring: April 1 to June 15.

b. Fall: September 1 to October 15.

c. Sodding at any time other than within the above seasons shall be allowed only when the Contractor submits a written request for permission to do so and permission is granted in writing by the Owner. Newly sodded areas, if sodded out of season, must be continuously watered according to good practice if sodding is done between June 15 and August 15. Contractor shall be responsible for providing an acceptable stand of grass as specified.

B. Existing Conditions

1. Carefully examine the site before submitting a bid. Be informed as to the nature and location of the Work, general and local conditions including climate, adjacent properties and utilities, conformation of the ground, the nature of subsurface conditions, the character of equipment and facilities needed prior to and during execution of the Work.

2. Should the Contractor, in the course of Work, find any discrepancies between Drawings and physical conditions or in layout as furnished by the Landscape Architect, inform the Landscape Architect immediately in writing for clarification. Work done after such discovery, unless authorized by the Landscape Architect, shall be done at the Contractor's risk.

C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions. Do not place sod when the ground is frozen, or the soil is otherwise in an unsatisfactory condition for lawn construction.

1.10 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Sodded Turf: 30 days from date of Substantial Completion.

1.11 INSPECTION FOR SUBSTANTIAL COMPLETION

A. Refer to Division 01 Specification Sections for provisions regarding guarantees for the Work.

B. Maintain all lawn areas until Substantial Completion. Maintenance will be in accordance with requirements specified in Part 3 of this Section.

C. The Landscape Architect will make an inspection for Substantial Completion of the Work of this Section at the time of Substantial Completion of the entire Contract. The Contractor shall furnish a full and complete written program for maintenance of the lawns for review by the Landscape Architect at the time of the request for Substantial Completion.

1. Submit a written request for inspection at least two (2) weeks prior to the day on which the inspection is requested.

2. The Contractor shall prepare a list of items to be completed or corrected for review by the Landscape Architect, prior to inspection.

3. All lawns shall show a uniform, thick, well developed stand of grass. If the grass stand is unsatisfactory, as determined by the Landscape Architect, the Contractor's maintenance responsibility shall continue until an acceptable stand of grass is achieved.

D. Upon completion of the inspection, the Landscape Architect shall amend the list of items to be completed or corrected, and indicate the time period for their completion or correction.

E. Lawns will not be accepted until all items have been completed or corrected. The Landscape Architect, after an additional inspection, shall recommend in writing the Substantial Completion of the Work of this Section. The Contractor's responsibility for maintenance shall terminate, under issuance of a certificate of Substantial Completion for the entire Contract.

1.12 GUARANTEE

A. In addition to the specific guarantee requirements of the General Conditions and Supplementary General conditions, the Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

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, strongly rooted, and capable of vigorous growth and development when planted.

B. Turfgrass Mixture: Sod of grass species as follows, majority of seed to be Turf Type Tall Fescue (3 varieties min.) with remaining volume of seed to be Perennial Rye Grass, Kentucky Blue

Grass, and/or Fine Fescue depending on sod farm.

C. Sod shall be thick, well developed, machine cut strips 3/4-inch thick, from an approved sod farm. Individual sod pieces shall be cut to a uniform size with square corners. Standard sections shall be strong enough to support their own weight when held vertically. Each piece shall be uniformly moist, and not excessively dry or wet.

D. Sod shall be free from noxious weeds, annual grasses, moss, large stones, tree roots, or other materials harmful to growth, or that will interfere with future mowing or other maintenance of the sodded areas.

E. Pegs where required for holding sod shall be of approved sound soft wood and be at least 3/4 inch in thickness, square or round, and at least 8 inches long.

F. Sod shall be harvested, delivered and installed within a period of 48 hours. Sod not installed within this period must be approved by the Landscape Architect prior to installation.

2.2 FERTILIZERS

A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 1 percent nitrogen and 10 percent phosphoric acid.

B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

C. 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: 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.

2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

D. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.3 PESTICIDES

A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.

3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

4. Uniformly moisten excessively dry soil that is not workable and which is too dusty. B.

Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Landscape 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. Limit turf subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches (150 mm). Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Thoroughly blend planting soil off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.

a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.

2. Spread planting soil to a depth of 8 inches (200 mm) but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

a. Spread approximately 3 inches of planting soil over loosened subgrade. Mix thoroughly into top 3 inches of subgrade. Spread remainder of planting soil.

b. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:

1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.

2. Loosen surface soil to a depth of at least 8 inches (200 mm). Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches (100 mm) of soil. Till soil to a homogeneous mixture of fine texture.

3. Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, trash, and other extraneous matter.

4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. 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. Sodding shall consist of soil preparation, sodding, weeding, watering and otherwise all labor and materials necessary to secure the establishment of acceptable turf.

B. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

C. After soil mix has been placed and grading is complete, irrigate the soil mix bed twelve to twenty-four (12-24) hours prior to sodding to a depth making the lawn mix evenly moist. Sod shall not be laid on soil that is powdery dry or excessively moist or slippery.

D. 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 (38 mm) below sod.

E. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Do Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, 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 angle of slopes exceeding 1:3.

2. Anchor sod on slopes exceeding 1:3 with wood pegs or steel staples spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.

F. Tamp the sod lightly to ensure good contact with the soil surface. When laying is completed, dress top surface lightly with screened soil mix free of any material larger than one-half inch, which shall be worked into the seams between the pieces with a brush. When finished, the sod should present a smooth and uniform surface parallel to the finish grade.

G. Water all sod areas immediately following its installation so that the sod surface and lawn mix surface are thoroughly soaked. Cut and maintain established sod in accordance with the requirements contained herein.

3.5 TURF RENOVATION

A. Renovate existing turf as indicated on the Drawings.

B. Renovate existing 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 (150 mm).

I. Apply soil amendments and initial fertilizers required for establishing new turf and mix thoroughly into top 4 inches (100 mm) of existing soil. Install new planting soil to fill low spots and meet finish grades.

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. Maintenance shall begin immediately after each portion of lawn is installed. Maintenance is hereby defined as: re-sodding , repair of ruts and erosion, regarding, repair of protective devices, watering, weeding, fertilizing, cutting and the repeating of any or all phases of lawnwork construction as required to establish healthy, viable turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.

2. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. 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 (100 mm).

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 (25 mm) per week unless rainfall precipitation is adequate.

C. Lawnwork shall be maintained on daily basis, weekends and holidays excluded, except as otherwise required herein, until Substantial Completion.

D. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow **turf-type tall fescue** to a height of 2 to 3 inches (50 to 75 mm).

E. Turf Post fertilization: Apply fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) 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, evencolored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Scattered bare or dead spots, none of which are larger than 36 square inches, will be allowed up to a maximum of two percent (2%) of any lawn area after initial installation. After the grass has been established, all areas which fail to show a uniformly thick and well developed stand of grass and all scattered base or dead spots, for any reason whatsoever, shall be resodded or reseeded repeatedly until all areas are covered with a satisfactory growth of grass. Lawn areas shall show no joints or dead spots at Substantial Completion and shall be anchored to lawn mix bed with vigorous, healthy root growth. Prior to Substantial Completion, damage resulting from erosion, gulleys, washouts or other causes shall be repaired by filling with lawn mix, tamping, re-fertilizing and re-sodding.

C. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.8 PROTECTION OF LAWN AREAS

A. Protect all lawn areas continuously against damage with a fence as specified. Maintain continuously in a condition acceptable to the Landscape Architect. Remove fence and any

protective devices remaining on site after Substantial Completion unless directed otherwise by the Landscape Architect.

B. Contractor shall pay cost of replacement of lawn areas except where it can be definitely shown that the loss resulted from vandalism or deleterious effects caused by maintenance procedures performed by the Owner without the concurrence of the Contractor. Fully restore all lawn areas, damaged or disturbed by replacement or repair operations to their original condition.

3.9 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.10 WATERING

A. The Contractor shall provide all labor and arrange for all watering necessary for establishment of lawn areas. In the absence of adequate rainfall, watering shall be performed daily or as often as necessary and in sufficient quantities to maintain moist soil to a depth of at least four (4) inches.

3.18 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. 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.

C. Remove nondegradable erosion-control measures after grass establishment period.

D. Maintain the site in an orderly condition during the progress of Work. Continuously and promptly remove excess and waste materials; keep lawn areas, walks and roads clear. Store materials and equipment where directed. Immediately remove rejected materials from the property. Promptly remove equipment, surplus material, and debris and trash resulting from operations under this Contract upon completion and prior to inspection of Work. Leave the site in a neat, orderly condition, "broom clean".

END OF SECTION 329210

SECTION 329310 - EXTERIOR PLANTING

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. Furnishing and installing trees
2. Tree stabilization
3. Mulching
4. Fertilizing
5. Guarantee
6. Maintenance
7. Clean-up

B. Related Sections:
1. Division 31 Section – “Tree Protection and Arboriculture”.
2. Division 32 Section – “Soil Preparation”.
3. Division 32 Section – “Turf and Grasses”.

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 ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

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

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

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

F. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

G. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-

ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.

H. Finish Grade: Elevation of finished surface of planting soil.

I. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

J. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

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

Planting Area: Areas to be planted.

M. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

N. 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.

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

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

Q. 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.

R. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

S. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 REFERENCES

A. ASNS: "American Standard for Nursery Stock," ANSI Z60.1 latest edition, published by the American Association of Nurserymen, (AAN).

B. SPN: "Standardized Plant Names," latest edition, by the American Joint Committee on Horticultural Nomenclature.

C. Agricultural chemist: Qualified, experienced public or private soils testing laboratory, capable of providing test results as specified, and approved by the Landscape Architect.

1.5 ACTION SUBMITTALS

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

1. Approval by the Landscape Architect of submitted product data, samples, test reports, and certificates, or plants inspected at source of supply, does not constitute final acceptance.
2. Plant sources: Submit proposed sources for all plants within 60 days of award of contract. Provide name and location of nursery, contact person, and telephone number.
3. Commercial fertilizer: include guarantee analysis, and weight for packaged materials.
4. Herbicides, pesticides and fungicides: include safety information.
5. Anti-dessicant

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

1. Organic Mulch: 1-pint (0.5-liter) 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.
2. Root Barrier: Width of panel by 12 inches (300 mm).

C. Test Reports: Submit certified reports by an agricultural chemist. Make submittals at least three (3) weeks prior to delivery of materials to site.

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

1. Manufacturer's certified analysis of standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
3. Plants: Furnish certificates of inspection as may be required by Federal, State or other authorities that plants are free of disease or hazardous insects.

E. Schedule and Work Plan: Submit detailed schedule and Work plan, indicating start and finish dates of planting activities, including layout, soil preparation, delivery of plants from nursery sources, excavation, and installation. If planting work is being installed in phases, submit plan with definable areas outlined and keyed, and provide schedule for planting work within each area.

F. Maintenance Program: Submit full and complete written program for maintenance of the planting. Submit prior to inspection for substantial completion.

1.6 INFORMATIONAL SUBMITTALS

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

1.7 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: **Five** years' experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's shall have certification in one of the following categories from the National Association of Landscape Professionals:

    a. Certified Landscape Technician - Exterior, with installation specialty area(s), designated CLT-Exterior.
    b. Certified Ornamental Landscape Professional, designated COLP.

5. Pesticide Applicator: State licensed, commercial.

B. Plants: Meet or exceed applicable ANSI Z60.1 standards.

1. Plant List: Investigate sources of supply prior to submitting bid. Confirm that size, variety and quantity of plants specified on Plant List can be supplied. Failure to take this precaution will not relieve the successful bidder from his responsibility for furnishing and installing all plants in strict accordance with the Contract requirements and without additional expense to the Owner.

    a. Substitutions will not be permitted unless substantiated written proof is supplied that a specified plant is not obtainable. In this situation a proposal to use the nearest equivalent size or variety with an equitable adjustment of Contract Price will be considered.

2. Trees and Shrubs: Measure according to ANSI Z60.1. Do not prune to obtain required sizes. 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 (150 mm) above the root flare for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above the root flare for larger sizes.

3. Other Plants: Measure with stems, petioles, and foliage in their normal position. C.

    Landscape plantings will conform to the following standards:

    1. General standards for Landscape Plantings:

a. Trees:

1) Canopy Trees:

i. Sizes: All canopy trees will be a minimum 2-1/2” caliper size, unless otherwise requested or authorized by Philadelphia Parks and Recreation. All trees must conform to ANSI Z60 standards for nursery stock, latest edition.

ii. Condition: The central leader and branches will be free of breakage or damage. Trees that are suckering before installation will be rejected.

iii. Mulch: All canopy trees should be covered with 3-4” of brown, doubled ground hardwood mulch, where applicable.

iiii. Planting Procedure: Comply with the latest International Society of Arboriculture recommendations.

2) Ornamental Trees:

i. Sizes: All understory/ornamental trees will be installed at a minimum of size of 6’ tall, unless otherwise requested or authorized by Philadelphia Parks and Recreation. All trees must conform to ANSI Z60, latest edition.

ii. Condition: The central leader (crown in the case of multi-stem trees) will be free of breakage or damage. Trees that are suckering before installation will be rejected.

iii. Mulch: All canopy trees should be covered with 3-4” of brown, doubled ground hardwood mulch, where applicable.

iiii. Planting Procedure: Comply with the latest International Society of Arboriculture recommendations.

D. Arrange a preconstruction meeting between the Landscape Architect, General Contractor and Planting Subcontractor. Such meeting shall seek to review the proposed plant schedule, source of plants, consideration of substitutions, general review of specifications and planting procedures.

1. Notify the Landscape Architect of the name and phone number of the foreman five (5) business days in advance of the first day of planting operations.

1.8 PLANT SELECTION AND INSPECTION

A. Landscape Architect will inspect and select all plants at the source of supply for compliance with requirements for genus, species, variety, cultivar, size, and quality. Locate all plants and be present for inspection of plants at the source. Make all pre-selection arrangements at the source of supply to insure a ready supply of materials, equipment and man power required for an efficient selection procedure. Request the visit a least fourteen (14) days in advance of the desired inspection date.

B. Plants will be inspected and approval given by the Landscape Architect at the source for conformity to Specification requirements. Landscape Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during delivery and installation. Remove rejected trees or shrubs immediately from Project site.

C. All plants specified as ball and burlap (B&B) must be in the ground at the growing source at the time of inspection. Pre-dug material will not be accepted.

D. Arrange for adequate manpower and equipment on site at the time of plant inspection and installation to provide a complete staked layout and to unload, open and handle plants during inspection.

1.9 DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened clearly marked containers showing net weight, guaranteed analysis and name of manufacturer. Specified requirements for packaged materials apply to bulk shipments. Protect materials from deterioration during delivery and during storage at site. Upon delivery to the site, request, in writing, inspection of materials by Owner's representative and by Landscape Architect. 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. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

C. Plants:

1. Notify the Landscape Architect seven (7) days in advance of any delivery of plants to the site.
2. Immediately before moving plants from its source, spray all deciduous plants with an anti-dessicant, applying an adequate film over trunks, branches, twigs and foliage. Plants may be resprayed after planting.
3. Dig and handle plants with care to prevent injury to trunks, branches and roots. Handle planting stock by root ball.
4. Deliver bare-root stock plants freshly dug. 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.
5. Do not prune prior to 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 manner as to damage bark, break branches or destroy natural shape. Pack and ship to insure arrival at site in good condition. Provide protective covering during delivery. No plants will be accepted if ball is cracked or broken.
6. Deliver trees and shrubs after preparations of planting areas have been completed and approved and plant immediately.

a) If planting is delayed more than twenty-four (24) hours after delivery, set balled and burlapped plants in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage and keep roots moist, on the ground well protected with soil, straw, hay or other acceptable material. Adequately cover all roots of bare root material with soil, wet straw, hay or other acceptable material. Protect balls and roots and container grown material from freezing, sun, drying winds, and/or mechanical damage. Water as necessary until planted.

b) Heeling in of plants shall not be allowed for more than two (2) days without approval of the Landscape Architect.

7. Immediately remove rejected plants from the site.
8. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F (16 to 18 deg C) until planting.
9. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
10. Do not remove container-grown stock from containers before time of planting.
11. 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.

1.10 PROJECT CONDITIONS

A. Existing Conditions

1. Carefully examine the site before submitting a bid. Be informed as to the nature and location of the Work, general and local conditions including climate, adjacent properties and utilities, conformation of the ground, the nature of subsurface conditions, the character of equipment and facilities needed prior to and during execution of the Work.
2. Should the Contractor, in the course of Work, find any discrepancies between Drawings and physical conditions or any omissions or errors in Drawings, or in layout as furnished by the Landscape Architect, it will be his duty to inform the Landscape Architect immediately in writing for clarification. Work done after such discovery, unless authorized by the Landscape Architect, shall be done at the Contractor's risk.

B. 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.

C. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:

1. Notify Landscape Architect and Owner no fewer than two days in advance of proposed interruption of each service or utility.
2. Do not proceed with interruption of services or utilities without Owner's written permission.

D. Planting Restrictions: Plant only within the following dates, weather permitting. Coordinate planting periods with maintenance periods to provide required maintenance from date of

Substantial Completion. Do not plant when the ground is frozen, or the soil is otherwise in an unsatisfactory condition for planting.

1. Plant ground covers and balled and burlapped broadleaf evergreens in the spring only, between April 1 and June 30.
2. Plant balled and burlapped deciduous trees and needled evergreen trees and shrubs and container grown trees and shrubs between April 1 and June 15 and September 1 and November 15.
3. The following plants are listed in three groups according to lessening degrees of risk for fall planting. The list is not based on controlled experiments, but on years of observation by nursery men. Planting at times other than spring shall be done at Contractor's risk, and shall not relieve him of the obligation of Guarantee.

    a. Plants with significant risk of loss. Best to postpone planting the following plants until spring:
        1). Carpinus spp., hornbeams
        2). Cercis Canadensis, eastern redbud
        3). Chamaecyparis nootkatensis, nootka cypress
        4). Koelreuteria paniculata, golden-rain tree
        5). Liriodendron tulipifera, tulip tree
        6). Magnolia spp., magnolias
        7). Nyssa sylvatica, black gum
        8). Populus spp., poplars
        9). Quercus alba, white oak
        10). Quercus coccinea, scarlet oak
        11). Quercus macrocarpa, bur oak
        12). Quercus phellos, willow oak
        13). Quercus robur, English oak
        14). Quercus rubra, red oak
        15). Zelkova serrata, Japanese zelkova

    b. Plants with some degree of risk. The following plants can be transplanted if stock is freshly dug and moved quickly and carefully. Stake, wrap, and provide extra care.
        1). Acer rubrum, red maple
        2). Betula spp., birches
        3). Cornus florida, flowering dogwood
        4). Crataegus spp., hawthorns
        5). Prunus spp., stone fruits (peach, cherry, etc.)
        6). Pyrus calleryana, Callery pear
        7). Salix spp., willows (tree forms)
        8). Tilia tomentosa, silver linden

    c. Plants not at great risk, but avoid late planting. These are best planted in late August or September: they may have trouble if planted later.
        1). Berberis julianae, wintergreen barberry
        2). Cotoneaster salicifolius, willowleaf cotoneaster

3). Hedera helix, English ivy
4). Ilex crenata, Japanese holly
5). Pinus thunbergiana, Japanese black pine
6). Rhododendron spp., rhododendrons and azaleas, evergreen types
7). Tsuga canadensis, Canada hemlock
8). Viburnum rhytidophyllum, leatherleaf viburnum

4. Plant shrubs in the spring only, when dormant, as close to April 1 as possible.
5. Plant perennials as soon as the ground is workable in spring until November 15.

E. 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.

F. 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.

1.11 INSPECTION FOR SUBSTANTIAL COMPLETION

A. Maintain all plants until Substantial Completion.

B. The Landscape Architect, with the Contractor and the Owner's Representative, will make an inspection for Substantial Completion of the Work of this Section. Furnish full and complete written program for maintenance of the planting for review by the Landscape Architect at the time of the request for Substantial Completion.

1. Submit a written request for inspection at least **two (2)** weeks prior to the day on which the inspection is requested.
2. All planting shall be alive, healthy and installed as specified to be accepted.
3. Prepare a list of items to be completed or corrected for review by the Landscape Architect.

C. Upon completion of the inspection, the Landscape Architect shall amend the list of items to be completed or corrected, and indicate the time period for their completion or correction.

D. The Landscape Architect will make another inspection after notification from the Contractor that all items have been completed and corrected. If the work is complete and acceptable, the Landscape Architect will certify in writing to the Owner the Substantial Completion of the Work. The guarantee period will not begin until certification is received from the Owner.

1.12 GUARANTEE

A. Contractor is not responsible for acts of vandalism occurring after the beginning of Guarantee Period, nor shall Contractor be held responsible for deleterious effects caused by maintenance procedures performed by the Owner without the concurrence of the Contractor or caused by Owner's failure to follow maintenance program.

B. During this time the Owner shall maintain all plants; however, during the Guarantee Period it shall be the Contractor's responsibility to inspect the plants to satisfy himself that the areas are receiving proper care.

1. If the Contractor is of the opinion that the care being given the plants by the Owner is insufficient or may cause them to die prematurely, he shall immediately, and in sufficient time to permit the condition to be satisfactorily rectified, notify the Landscape Architect in writing; otherwise no consideration will be given to his claim at a later date. C. Guarantee for plants other than herbaceous material:

1. Replace at no additional cost for a period of one (1) year after the establishment of the beginning date of Guarantee Period, any trees, shrubs, or ground covers that have died or that are, in the opinion of the Landscape Architect, in unhealthy or unsightly condition, or that have lost their natural shape due to dead branches, excessive pruning, excessive defoliation, or inadequate or improper maintenance.

a. Replace unacceptable plants no later than the next succeeding planting season.
b. Replace unacceptable plants in accordance with original Specification. Cost is considered to be included in the Bid and Contract price. Guarantee all replaced material for a period of one (1) year from date of replacement.

D. Guarantee for herbaceous plants

1. Perennials, Bulbs and Aquatics

a. Guarantee to show signs of healthy growth in the succeeding blooming season.

1.13 FINAL ACCEPTANCE

A. The Owner’s Representative will make an inspection for Final Acceptance of the Work of this Section at the end of the Guarantee Period.

1. Submit a written request for inspection at least two (2) weeks prior to the day on which the inspection is requested.
2. All planting shall be alive, healthy and maintained as specified to be accepted.

B. Upon completion of the inspection, the Owner’s Representative will submit to the Owner a list of items to be completed or corrected, and indicate the time period for their completion or correction.

C. The Final Acceptance will not occur until all items have been completed or corrected. The Owner’s Representative after additional inspection, will recommend in writing to the Owner Final Acceptance of the Work. Final Acceptance will be certified in writing by the Owner.

1.14 MAINTENANCE SERVICE

A. Initial Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after

plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period: **12** months from date of **Substantial Completion**.

B. Initial Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period: **Six** months from date of **Substantial Completion**.

C. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.1 PLANTING PIT MATERIALS

A. Soil and Soil Mixes: See Division 32 Section – “Soil Preparation and Plant Mixes”.

2.2 COMMERCIAL FERTILIZER (for maintenance period)

A. Soluble fertilizer, with analysis of 20-20-20 or 23-29-27, such as Ra-Pid-Gro or an approved equal for non-ericaceous plants, unless otherwise recommended by soil test results.

B. Miracid, or an approved equal, for ericaceous and other evergreen plants, unless otherwise recommended by soil test results.

2.3 WATER

A. Potable, clean, fresh and free from harmful materials. Water shall be furnished by the Owner. All hoses and other irrigation equipment required for the Work shall be furnished by the Contractor.

2.4 PLANTS

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch (19 mm) in diameter; or with stem girdling roots will be rejected.

2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
3. Nomenclature: Agree with SPN or as accepted in the nursery trade for varieties not listed therein.

    a) Clonal types shall be true.

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 shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.

2.5 MULCH MATERIALS

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

1. Type: Double Ground Hardwood Mulch.
2. Color: Natural.

2.6 ROOT BARRIERS

A. Root Barrier: Black, molded, modular panels 18 inches (457 mm) high (deep); manufactured with minimum 50 percent recycled polyethylene plastic with UV inhibitors.

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

    a. DeepRoot UB 18-2
    b. NDS EP-1850

2.8 PLANT TREATMENT MATERIALS

A. Herbicides, Fungicides, Pesticides: Approved before use for type and rate of application by Landscape Architect and local, state and/or federal agencies with jurisdiction.

B. Anti-dessicant: "Wiltproof" as manufactured by Wiltproof Products, Inc., P.O. Box 4280, Greenwich, Ct. 06830, 203-531-4740.

PART 3 - EXECUTION

3.1 EXAMINATION OF SITE

A. Prior to excavation of planting areas, ascertain the location of all electric cables, conduits, underdrainage systems and utility lines. Take proper precautions so as not to disturb or damage sub-surface elements. If sub-surface elements are uncovered, promptly notify the Landscape Architect, who will relocate the plants. If Contractor fails to follow this procedure he is responsible for making requisite repairs to damaged utilities at his own expense.

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.

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.

3.3 LAYOUT

A. Stake out locations for new plants and outlines of planting areas for approval by the Landscape Architect where shown on Drawings except where obstructions exist below ground, overhead, or where changes have been made during construction. Adjustments shall be approved by the Landscape Architect. Completely layout of planting beds and pits before seeking approval by the Landscape Architect.

3.4 INSTALLATION

A. Excavation: All plant pits and trenches shall be excavated in accordance with the Planting Details after approval of staked locations by the Landscape Architect. Excavation of plant pits shall be done after soil testing, and analysis and approval by the Landscape Architect.

B. Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

1. Excavate as indicated on the Drawings for balled and burlapped stock.
2. Excavate at least 12 inches (300 mm) wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
3. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
4. 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.
5. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
6. Maintain supervision of excavations during working hours.

7. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
8. When compacted soil is encountered, sides and bottoms shall be loosened by scarifying.
9. Exercise extreme caution during excavation to avoid damaging or interrupting existing underground utilities. Use appropriate detection equipment to locate utilities during excavation of pits to the required depth.
10. Erect barricades, warning signs, or other protective devices as is required by local, state or federal laws and regulations to protect open excavation.
11. Excavated material shall be removed and disposed off-site, unless approval, in writing, has been obtained from the Landscape Architect.

C. Subsoil and topsoil removed from excavations may be used as planting soil.

D. Drainage of Pits

1. Verify by testing that pits are free draining. If pits are not free draining notify Landscape Architect and Owner and submit alternative method of drainage for approval.

    a. Check planting drainage system to insure it is functioning correctly prior to planting. Refer to Drawings for layout and design of planting drainage system.
    b. Do not put plants in pits until the pits have been approved by the Landscape Architect.

E. Obstructions Below Ground

1. In the event that rock, underground construction work, utilities or obstructions are encountered in any plant pit excavation work under this Contract, alternate locations may be selected by the Landscape Architect.
2. Where locations cannot be changed, the obstruction shall be removed, subject to the Landscape Architect's approval, to a depth of not less than three (3) feet below grade and no less than six (6) inches below bottom of ball or roots when plant is properly set at the required grade. Payment shall be made in accordance with the Contract.

F. Placement of Plants

1. Plants shall be set in center of pits plumb and straight, in accordance with the planting details, and faced to give best appearance and relationship to adjacent plants and structures.
2. Do not plant until plants has been approved by the Landscape Architect at site.
3. Plant to such depth that the finished grade level of the plant, after settlement, will be the same as that at which the plant was grown, and so that the root flair is at finish grade.
4. Do not pull burlap out from under balls. Remove platforms, wire and surplus binding from top and sides of ball. Cleanly cut off all broken or frayed roots.
5. Remove plants from containers by cutting or inverting the container.
6. Set the bare root plants in the pit so that all roots, when fully extended, will not touch the walls of the planting pit and the uppermost roots are just below the original grade. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the topmost root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

G. Set **balled and potted** stock plumb and in center of planting pit or trench with root flare 2 inches (50 mm) above adjacent finish grades.

1. Use planting soil Mix B for backfill.
2. Carefully remove root ball from container without damaging root ball or plant.
3. 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.
4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

H. Backfilling

1. Use planting soil Mix B for backfill.
2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, 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.
3. 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.
4. Spread out the roots of bare root plants properly and work backfill mix among them. Prune off broken roots in a natural position. Water thoroughly while backfilling.
5. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.

a) Continue backfilling process. Water again after placing and tamping final layer of soil.

I. Installation Inspection

1. The Landscape Architect will inspect trees for injury to trunks, evidence of insect infestation and improper pruning before wrapping. Treat injuries of infestation by accepted methods. Remove and replace plants determined by the Landscape Architect to have injuries or infestations which cannot be treated or which have caused unacceptable damage to the plant.
2. Trees shall stand plumb after staking or guying.

3.5 TREE PRUNING

A. Prune, thin, and shape trees as directed by Landscape Architect.

1. Remove broken or badly bruised branches with a clean cut. Perform pruning with clean, sharp tools.

2. Accidental damage to trees and shrubs occurring during the course of planting operations which is not so great as to require removal of a branch or the replacement of the plant shall be promptly traced and treated in accordance with recognized horticultural practices as directed by the Landscape Architect. D. Do not apply pruning paint to wounds.

3.6 TREE STABILIZATION

A. Install trunk stabilization as follows unless otherwise indicated:

1. Upright Staking and Tying: Stake trees of 2- through 5-inch (50- through 125-mm) caliper. Stake trees of less than 2-inch (50-mm) caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches (450 mm) below bottom of backfilled excavation and to extend one-third of trunk height above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
2. Use two stakes for trees up to 12 feet (3.6 m) high and 2-1/2 inches (63 mm) or less in caliper; three stakes for trees less than 14 feet (4.2 m) high and up to 4 inches (100 mm) in caliper. Space stakes equally around trees.
3. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

3.7 ROOT-BARRIER INSTALLATION

A. Install root barrier where trees are planted within 48 inches (1200 mm) of paving or other hardscape elements, such as walls, curbs, and walkways unless otherwise shown on Drawings.

B. Align root barrier vertically and run it linearly along and adjacent to the paving or other hardscape elements to be protected from invasive roots.

C. Install root barrier continuously for a distance of 60 inches (1500 mm) in each direction from the tree trunk, for a total distance of 10 feet (3 m) per tree. If trees are spaced closer, use a single continuous piece of root barrier.

1. Position top of root barrier flush with finish grade.
2. Overlap root barrier a minimum of 12 inches (300 mm) at joints.
3. Do not distort or bend root barrier during construction activities.
4. Do not install root barrier surrounding the root ball of tree.

3.8 GROUND COVER AND HERBACEOUS PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated in even rows with triangular spacing.

B. Use planting soil Mix B for backfill.

C. Dig holes large enough to allow spreading of roots.

D. For rooted cutting plants supplied in flats, plant each in a manner that will minimally disturb the root system but to a depth not less than two nodes.

E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.9 PLANTING AREA MULCHING

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

1. Trees and Tree-like Shrubs in Turf Areas: Apply organic mulch ring of 3-inch to 4-inch average thickness, with 24-inch (600-mm) radius around trunks or stems. Do not place mulch within 6 inches (150 mm) of trunks or stems.
2. Organic Mulch in Planting Areas: Apply 3-inch to 4-inch average thickness of organic mulch extending 12 inches (300 mm) beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place within 6 inches (150 mm) of trunks or stems.

B. Shovel-Cut Edging: Separate mulched areas from turf areas and paving with a 45-degree, 4- to 6-inch- (100- to 150-mm-) deep, shovel-cut edge.

3.10 MAINTENANCE PRIOR TO SUBSTANTIAL COMPLETION

A. Immediately begin maintenance after each plant is planted. Plants shall be watered, mulched, weeded, pruned, sprayed, fertilized, cultivated, and otherwise maintained and protected until Substantial Completion. Tree turnbuckles and stakes shall be tightened and repaired as required. Defective work shall be corrected as soon as possible after it becomes apparent and weather and season permit. Settled plants shall be reset to proper grade and position, planting saucer restored and dead material removed.

B. Upon completion of planting, and prior to Substantial Completion, remove from site excess soil and debris and repair all damage resulting from planting operations.

C. As part of maintenance, provide protection and extermination measures against gophers, rabbits, or other rodents, and repair damage caused by their activities. D. Adjust irrigation systems as required.

E. Do no pruning without approval of the Landscape Architect.

F. 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.

3.14 MAINTENANCE DURING GUARANTEE PERIOD

A. Perform procedures set forth in the submitted and approved maintenance program for the duration of the Guarantee Period. The program based on the requirements of the Specification must be approved by the Landscape Architect and Owner.

B. Herbaceous Plants

1. Perennials

a. After initial installation:

1) If a time-released, high-phosphate fertilizer has been incorporated during plant installation, no more fertilizer need be applied the first growing season. b. The following year:

1) Fertilize 3 times (May 1, May 21, June 15) using one of the following methods: Apply liquid fertilizations of 20:20:20 water soluble fertilizer (not to exceed 1 lb. of 20:20:20 per 100 gal. of water). Or, apply 1-1/2 lbs. of 10:10:10 or 5:10:10 granular fertilizer per 100 sq. ft. Or, apply fish emulsion as a liquid spray following manufacturer's recommendations.
2) Cut spent leaves and stems of deciduous perennials flush to ground by March 1 (if not done previous fall) to allow new growth to develop freely.
3) Mulch once in early spring (1 inch deep) and again in fall (1 inch deep).
4) Inspect for insect or disease problems.
5) Weed perennial bed.
6) Prune to make bushier plants, as needed. Cut back after flowering if approved by Landscape Architect.

c. The following fall:

1) Cut back deteriorating plant parts.

3.15 CLEAN UP AND DISPOSAL

A. Legally dispose of off-site all refuse and debris from these operations. Remove or neatly store material at the end of each day's work. Burning of material or dumping on the site is prohibited.

1. Maintain segregation of man-made materials, debris, organic matter, and soil material as may be required for conditions of disposal.
2. Transport materials over legal haul routes and obtain necessary permits for transporting and disposal as required by Federal, State and local regulations.
3. Removals at Completion: Remove all temporary preparation and protection measures installed on Project site at completion of Work and at a time approved by Landscape Architect.

B. Maintain the site in an orderly condition during the progress of Work. Continuously and promptly remove excess and waste materials; keep lawn areas, walks and roads clear. Store materials and equipment where directed. Immediately remove rejected materials from the property. Promptly remove equipment, surplus material, and debris and trash resulting from operations under this Contract upon completion and prior to initial acceptance of Work. Leave the site in a neat, orderly condition, "broom clean".

END OF SECTION

SECTION 33 05 13 - MANHOLES AND STRUCTURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Repair of top section with precast concrete grade rings to frame and lid, covers, anchorage, and accessories.

1.3 RELATED REQUIREMENTS

A. Section 311000 - Site Clearing.

B. Section 312316 - Excavation.

C. Section 312316.13 – Trenching.

D. Section 312323 – Fill and Backfill.

1.4 REFERENCE STANDARDS

A. ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections; 2015.

B. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals; 2008 (Reapproved 2013).

C. ASTM C1634 - Standard Specification for Concrete Facing Brick; 2011.

D, ASTM D3753 - Standard Specification for Glass-Fiber-Reinforced Polyester Manholes and Wetwells; 2012.

E. Commonwealth of Pennsylvania Department of Transportation (PennDOT):

1. PA DOT Publication 408, latest edition.

a. PennDOT Section 605 – Endwalls, Inlets, manholes, and Spring Boxes.

b. PennDOT Section 1105 – Fabricated Structural Steel and Aluminum.

c. PennDOT Section 713 – Precast Concrete Structures.

2. PennDOT Publication 35, Bulletin 15 – Approved Construction Materials

1.5 SUBMITTALS

A. Product Data:

1. Product data sheets, complete catalog information, descriptive literature, specifications, and identification of materials, and specialty items.

B. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

C. Shop Drawings:

1. Manhole frame and lid: Include plans, elevations, sections, details, frames, and covers.

1.6 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.1 PRECAST CONCRETE INLETS and MANHOLES

A. General

1. Precast Concrete Inlets and Manholes to conform with Pennsylvania Department of Transportation Specifications, Publication 408, Section 714 - Precast Concrete Products and Section 605 - Endwalls, Inlets, Manholes, and Spring Boxes, all supplements to date.

2. All Details of this work shall conform to the Latest Pennsylvania Department of Transportation Standards for Roadway construction - RC1M to RC100M.

3. Replacement manhole cover to conform with PWD Standards.

B. Components

1. Grade Adjustment Rings and Frame: Provide per RC-39M.

2. Cover: Provide per RC-39M. Provide 2" raised letter with use: "STORM," "WATER," "SANITARY," or "ELECTRIC."

C. Manufacturer/Material- follow PennDOT Publication 35, Bulletin 15 – Approved Construction Materials

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify items provided by other sections of Work are properly sized and located.

B. Verify that built-in items are in proper location, and ready for roughing into Work.

3.2 PREPARATION

A. Coordinate placement by other sections and manufacturer.

B. Before construction or fabrication, obtain acceptance of shop drawings.

END OF SECTION 330513