PROJECT MANUAL

CHEW PLAYGROUND
FIELD RENOVATIONS

5800 CHESTER AVENUE
PHILADELPHIA PA 19143

February 04, 2022

Prepared for:

Rebuild PHILADELPHIA

Owner:

FIND YOUR PATH
PHILADELPHIA PARKS & RECREATION

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SECTION 015713

TEMPORARY EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. Compost Sock installation and maintenance.
2. Inlet Protection installation and maintenance.
3. Rock construction entrance installation and maintenance.
4. Maintenance and repairs of erosion and sediment control measures.
5. Temporary seeding.

B. Related Requirements:

1. Section 31 10 00, “Site Clearing”.
2. Section 31 20 00, “Earth Moving”.

1.3 REFERENCES

A. Work and materials shall conform to the latest editions of the following standards:

1. Pennsylvania Code, Chapter 102, Erosion and Sediment Control
2. Pennsylvania Department of Environmental Protection, Erosion and Sediment Pollution Control Manual, latest edition.

1.4 ACTION SUBMITTALS

A. All products used for erosion and sedimentation control which may include, but may not be limited to, compost sock, inlet protection, rock construction entrance, erosion control blanket, temporary seeding, other maintenance or erosion and sediment control measures.

1.5 QUALITY ASSURANCE

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

B. Codes and Standards: Perform work in compliance with applicable requirements of governing authorities having jurisdiction. Construction operations shall be carried out in a manner such that soil erosion, air pollution, and water pollution is minimized. State, County, and Municipal laws concerning pollution abatement shall be followed.
C. The recommendations and Standards set forth in Chapter 102 of the Pennsylvania Code (Erosion and Sediment Control Handbook), published by the PA Department of Environmental Protection, shall be applicable where the work is not specifically detailed in this specification, the accompanying drawings or the Erosion and Sediment Control Plan.
D. The Contractor shall take action to remedy unforeseen erosion conditions and to prevent damage to adjacent properties as a result of increased runoff and/or sediment displacement. Stockpiles of wood chips, hay bales, crushed stone, and other mulches shall be held in readiness to deal immediately with emergency problems of erosion. All erosion control checks and structures shall be inspected after heavy rainfalls, and if damaged, repaired or replaced.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. All materials and products shall meet the approval of the engineer. Cut sheets for all items shall be submitted for review and approval prior to installation.

1. Compost Socks shall be as indicated on details.
2. Inlet Protection shall be as indicated on details
3. Rock Construction Entrance shall be as indicated on details.
4. Erosion Control Blanket shall be Bionet SC150BN Extended Term Biodegradable Erosion Control Blanket by North American Green, distributed by Jobsite Products, Inc. Harleysville, PA, or approved equal.
5. Seed Types shall be as indicated on contract drawings.
6. Pumped water filter bags shall be as indicated on contract drawings.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. All temporary erosion and sediment control measures indicated on the drawings and specified herein shall be in place before the beginning of any earthwork or site work phase.
B. Erosion and sediment control measures shall be inspected weekly and after every precipitation event.
C. Install compost sock and inlet protection according to manufacturer’s directions.
D. Inspect compost sock after every precipitation event.
E. Remove (or spread) compost sock upon project completion and ground stabilization.
F. Install Ground Stabilization Fabric and AASHTO #1 aggregate for Construction Entrance.
G. Maintain clean stone layer throughout the course of construction.
H. All graded or cleared areas shall receive temporary seeding if subject to erosion for a period of 72 hours or more. See Parts 3.9 and 3.10 of Section 312000, Earth Moving.
I. Prepare area to be seeded by hand raking and grading prior to seeding.
J. Temporary seeding shall consist of sod, a blend of turf-type tall fescue and Kentucky Blue Grass (100 percent by weight) or equivalent and shall be placed at 30 lbs per acre or 10 lbs per 1,000 square feet.
K. Mulch newly seeded areas to prevent erosion prior to seed germination and stabilization.

L. Provide adequate maintenance conforming to requirements of the City of Philadelphia Water Department.
M. Remove sediment from compost socks, inlet protections, and pavement areas after each major storm event.

END OF SECTION

SECTION 015719

ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.1 The project shall incorporate environmental controls during construction to protect the atmosphere, waterways, groundwater, plants, animal habitats, soils, utilities, etc., both on and off site.

1.2 Comply with the following Standards or Agencies:

A. Commonwealth of Pennsylvania Department of Environmental Protection (PADEP):

1. Erosion and sediment pollution control program manual (latest edition)

B. City of Philadelphia:

1. City Code
2. Requirements by the Department of Licenses + Inspections

C. Philadelphia Water Department
1. Philadelphia Stormwater Management Guidance Manual, Current Version

1.3 Establish and enforce ecological preservation measures which will avoid pollution of the atmosphere, waterways, groundwater, plants, soils, animal habitats, landfills, wetlands, the site, adjacent sites, roadways, etc. Prevent spilling of chemicals or waste. Provide emergency plans and methods for abatement of accidental spills of toxic substances.

1.4 Until permanent work establishes sediment control, provide temporary control, using vegetative cover with seeding, mulch, and binder within five (5) days after completion of grading of any given area. As a temporary measure, provide silt fences or compost filter socks, arranged along the toe of surface drainage ways and inlets, in such a manner that water will pass through the silt fences and filter the sediment. Replace silt fences or compost filter socks when they become clogged and ineffective. They shall be inspected as required by PWD/PADEP requirements.

1.5 During pipe laying work, prevent silt from entering the piping systems by use of hay bales, silt fence, temporary closures of pipe ends, or other means as best suited to the conditions.

1.6 Perform earth moving in phases to minimize the area and extent of exposed land. Control the rate of water runoff by diversion ditches, benches, berms, and other earth-formed shaping so that the rate of flow is retarded and silting shall be minimized. Reshape and restore conditions showing evidence of earth erosion.

1.7 Keep dust down at all times, including non-working days, weekends, and holidays. Wet down or treat disturbed soil with dust suppressers as required and approved. Do not leave areas of disturbed earth unworked for long periods of time. Provide temporary or permanent earth stabilization promptly. If required install perimeter fencing tarpaulins to control dust leaving the site. Use wet-cutting methods for cutting concrete, asphalt, and masonry. Do not shake out bags containing dust-causing substances.

1.8 Provide mufflers on internal combustion engine equipment. Maximum noise level shall be 90 dbA at 50 feet. Limit hours of operation of noisy construction to limits set by City ordinance.

1.9 Legally dispose of debris, chemicals, contaminated fill, and waste off the site. Collect and contain materials before disposal in orderly fashion and by means which prevent contamination of air, water and soil. Store chemicals in watertight containers. Do not burn materials on the site. Meet all local, state, or federal requirements.

1.10 Dump trucks shall be tarpaulin-covered so that spillage does not occur. Provide a gravel surfaced truck wheel washing area at entrances. Clean all truck wheels of mud, spoil, and debris before the trucks leave the site.

1.11 Maintain in working order environmental protection measures until they are no longer required. Terminate environmental control measures when there is no longer a threat of pollution. Remove temporary control measures. Complete or, if necessary, restore permanent construction that may have been delayed or damaged because of interference with environmental controls.

END OF SECTION

SECTION 026100

PERMEABLE WARNING LINER

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This work shall consist of furnishing, placing and securing a permeable orange non-woven printed demarcation geotextile fabric within the contaminated soil excavation area. The fabric will serve as a permeable warning liner that delineates and demarcates the limits of the clean soil fill and the underlying contaminated soils.

1.02 RELATED SECTIONS

A. Section 026113 Environmental Soils Handling

1.03 SUBMITTALS

B. Submit at the pre-construction meeting the manufacturer, product name, and product specifications of the permeable orange non-woven printed demarcation geotextile the Contractor plans to install.
C. Submit tickets/receipts/records/manifests/bills of lading for any material shipped on and off site. These documents shall be required for payment.

1.04 MEASURMENT AND PAYMENT

A. The cost of all work and materials necessary to construct the permeable warning liner shall be included in the price per square yard bid for 4.6, Permeable Warning Liner. The payment will be full compensation for all materials, labor, equipment, tools, and incidentals necessary to complete the work as specified in the contract documents.

PART 2 - PRODUCTS

2.01 ORANGE NON-WOVEN PRINTED DEMARCATION GEOTEXTILE

A. The Contractor shall install a permeable orange non-woven geotextile with minimum product specifications in accordance with Table 1 below.

Table 1: Non-Woven Geotextile Specifications

Fabric Structure	Non-woven Needle Punched
Material	Polypropylene
Density	8 oz/sy
Grab Tensile Strength	240 lbs

Grab Elongation	70%
CBR Puncture	605 lbs
Apparent opening size	80 US Std. Sieve
Permeability Flow Rate	110 gal/min/sf
UV Resistance Strength Retention %	80% @ 500 Hrs

B. The non-woven geotextile shall be high-visibility, vibrant orange in color.

C. The non-woven demarcation geotextile will be labeled with the warning - "DANGER DO NOT DIG / PELIGRO NO EXCAVAR".

D. Warning label shall be printed directly onto the fabric.

E. The warning label shall be printed with a spacing of approximately 24 to 36 inches.

2.02 SECURING PINS

A. Use steel securing pins minimum 8 inches long by minimum ¼ inch in diameter and with a 1 1/2-inch washer head. Alternate securing devices that provide equivalent or greater anchorage may be used, if approved by the Engineer's representative.

PART 3 - EXECUTION

3.01 INSTALLATION OF NON-WOVEN GEOTEXTILE

A. Prepare the surface and remove any object that may puncture the geotextile. Roll out the geotextile over the prepared surface. Place fabric in a loose and unstretched condition, but without folds or wrinkles. Do not drag the geotextile on the ground during placement and handling. Overlap fabric roll-ends and edges a minimum of 12 inches with adjacent material. Fabric shall be placed in a manner that provides for a minimum of 12 inches of coverage on vertical excavation faces, as measured from bottom elevation of excavation. Once in place, do not allow the fabric to be exposed to the sun for more than 72 hours before covering with subbase or other required fill material.

B. For areas where contaminated soils were excavated at depths greater than the surrounding excavation (hotspot excavation areas).The deeper excavation shall be lined as prescribed above and the geotextile shall be placed and secured on vertical excavation faces and extend onto the surrounding excavated surface so that a minimum of 24 inches of geotextile extends past the deeper excavation extent and is overlaid by the geotextile placed on the surrounding excavation surface.

C. Secure the fabric in place by installing Securing Pins - Part 2.03, with a maximum spacing of 5' along the length of the fabric. Horizontal excavation faces may be secured by placement of subbase or other required fill material, provided that prescribed placement of geotextile is not disturbed and remains intact as designed when placing subbase or other require fill material.

END SECTION

SECTION 026113

ENVIRONMENTAL SOILS HANDLING

PART 1 - GENERAL

1.01 SCOPE OFWORK

A. This specification outlines the required tasks and procedures involved with the characterization, handling and disposal of unsuitable soil and related debris.
B. The Contractor is to assume that all excavated soils from the site, are to be transported offsite and that **NO** soils have been cleared for site reuse.
C. In planning the project, the contractor needs to maintain a zero-dust policy. Anytime dust is potentially expected to become an issue steps should immediately be taken to alleviate any potential issues before a problem arises. If a dust issue arises the site will be shut down until the issue is under control and measures have been taken to prevent the issue from occurring again. Any stoppage of work due to dust issues is at the contractor's expense. If water is required by the Contractor to control dust, the Contractor will need to provide their own water, as no water will be available at the site for use during remediation.
D. Soils to be removed from the site are to be managed in accordance with the with the disposal facility selected by the contractor. The facility chosen by the contractor will require approval by the City of Philadelphia. Based on the disposal facility chosen, the contractor will have soil sampled and analyzed per the requirements of the disposal facility.
E. Contractor shall supply all labor, materials and equipment to conduct the following:
    a. all site preparation
    b. clearing of work areas – all material (grass, brush, top soil) will need to be disposed of in the same manner as the soils. Asphalt, Concrete, and some construction debris may be disposed separately in not contaminated with arsenic and/or lead.
    c. excavation of all soils to a depth of 18" below the ground surface (bgs) across the entire project area (approximately 1 ½ acres). Locations that will/may need to be excavated to a deeper depth include the following:
        i. utility lines
        ii. hot spots (hot spots are locations within the project area that reported elevated concentrations of arsenic and/or lead and have been identified as areas that will need to be excavated to depths greater than 18 inches. Base on the sampling locations an area of 25 x 25-feet will be removed to various depth) to be removed include the following locations:
            1. **SB-4** – a 25x 25-foot area will be excavated to a depth of 2 feet bgs with sampling location SB-410 located directly in the center of the area.
            2. **SB-10** – a 25x 25-feet area will be excavated to a depth of 2 feet bgs with sampling location SB-10 located directly in the center of the area.

3. **SB-11** - a 25x 25-feet area will be excavated to a depth of 4 feet bgs with sampling location SB-11 located directly in the center of the area.
4. **SB-22** - a 25x 25-foot area will be excavated to a depth of 4 feet bgs with sampling location SB-22 located directly in the center of the area.
5. **Duffield SB-7** - a 25x 25-foot area will initially be excavated to a depth of 4 feet bgs with sampling location Duffield SB-7 located directly in the center of the area. Following the removal of the soils, the onsite Environmental Field Scientist will collect soil samples at 4-feet bgs and with the assistance of the contractor obtain soil samples at 6-feet bgs. Following obtaining the samples the contractor will move forward to the next area requiring removal of soil. Once the soil samples are analyzed, a decision will be made by the onsite Environmental Field Scientist whether any additional soils will be to be excavated. . This process may take up to four days till a decision has been reached.
6. **Duffield SB-12** - a 25x 25-foot area will initially be excavated to a depth of 4 feet bgs with sampling location Duffield SB-12 located directly in the center of the area. Following the removal of the soils, the onsite Environmental Field Scientist will collect soil samples at 4-feet bgs and with the assistance of the contractor obtain soil samples at 6-feet bgs. Following obtaining the samples the contractor will move forward to the next area requiring removal of soil. Once the soil samples are analyzed, a decision will be made by the onsite Environmental Field Scientist whether any additional soils will be to be excavated. This process may take up to fours days till a decision has been reached.
7. An anomaly located at the north-eastern corner of the site will be investigated by the contractor with oversight of the onsite Environmental Field Scientist. The amount of soil that may be removed from this area is unknown at this time and will be determined in the field.

iii. Removal of Underground Storage Tank – specification for the removal of the tank is presented in the Specification for Storage Tank Removal. But note that the area in which the tank is to be removed will be excavated a depth required to remove the tank and sample the soils. If additional soil removal is required, the contractor will be informed of the steps required.

d. support of utilities, maintenance of excavation, removal of all water, backfilling with certified clean fill, disposal of excess material, grading, compaction, removal of contaminated materials/debris, contaminated liquids and all incidental work for the removal, transportation and disposal or treatment of excess or unusable material as shown on drawings, as specified and/or as recommended by the onsite Environmental Field Scientist.

e. installation of Permeable Warning Liner (following Permeable Warning Liner specification to be provided). The installation of the Permeable Warning Liner will be conducted when all soil has been removed from an area (including areas with depths greater than 18 inches bgs or where utilities have to be re-installed). The contractor should check in with the Environmental Field Scientist to ensure additional excavation will not be required in the area.

F. The prices bid for the items shall include all excavation of contaminated soils, installation of the permeable warning liner, backfilling with certified clean fill, stock piling contaminated soils, loading, transportation and disposal. Excavation shall be in open cut, unless otherwise required due to safety reasons, protection of existing utilities, or other substantiated reason. Following bid submittal, no extra compensation will be allowed where hand excavation and backfill are employed. The Contractor shall be responsible for planning the work to avoid conflicts, obstructions, and other potential impediments to excavation identified in the project documents or visible at the work site prior to bid submittal.

G. Included in the excavation are turf fields, a baseball field, landscaped areas, and asphalt paving, as shown within the area depicted on project plans. Removal of these structures and materials is depicted on contract drawings.

H. If localized petroleum or substances of potential human health or environmental concern are encountered in site soils, the Contractor will be directed by the Environmental Field Scientist on any excavation of the soils that will be required. The contaminated soils, as identified on the drawings or recommended by the Environmental Field Scientist, shall be excavated and stockpiled as described in 1.01, prior to loading into dump trailers for export and disposal or treatment. The Contractor may load directly into dump trailers if a permitted treatment or disposal facility has approved receipt of the materials for disposal. Analysis of contaminated soils shall be performed as required by the disposal facility. This material shall be managed in accordance with all applicable federal, state and local regulations. Any additional excavation of contaminated materials will be at the direction of the Environmental Field Scientist for the hot spots.

I. All soil stockpiles of contaminated soils and clean fill (if stockpiled) shall be placed on 15-mil plastic sheeting and covered with 15-mil polyethylene plastic sheeting at the end of each working day. The plastic cover sheeting shall be weighted utilizing hay bales to prevent the 15-mil polyethylene plastic from blowing off these soil stockpiles and to prevent stormwater runoff from eroding these soil stockpiles.

J. The Contractor shall remove concrete, asphalt and construction debris immediately after excavation activities are completed. Debris shall not contain any soils and be managed off-site in accordance with all applicable federal, state and local regulations.

K. The excavation shall be backfilled by the Contractor in accordance with the provisions of the Contract Specifications. Backfill material will meet the definition of Clean Fill as defined by the PADEP Management of Fill Policy. The soil to be certified as clean fill to be utilized as backfill at the site, will need to be analyzed for all the analytes listed in the following tables:

a. 25 Pa. Code Chapter 250, APPENDIX A, Table 3 - Medium-Specific Concentrations (MSCs) for Organic Regulated Substances in Soil A. Direct Contact Numeric Values
b. 25 Pa. Code Chapter 250, APPENDIX A, Table 4 - Medium-Specific Concentrations (MSCs) for Inorganic Regulated Substances in Soil A. Direct Contact Numeric Values

L. Certificates of Clean Fill and testing results (along with summary tables) will be required to demonstrate the materials are clean fill. All material shall be approved by the owners Representative before being brought on-site.

1.02 CODES AND REGULATIONS

A. All work and disposal or treatment shall be performed in compliance with all applicable Federal, State, and City regulations including, but not limited to:

1. Pennsylvania Department of Transportation Officials (PennDOT)
    a. PennDOT Publication 408 - Standard Specification for Construction
2. United States Environmental Protection Agency (USEPA)
    a. Test Method for Evaluating Solid Waste (SW-846)
    b. Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §6901 et seq.
3. Pennsylvania Department of Environmental Protection (PADEP)
    a. 2020 Management of Fill Policy (Document 258-2182-773)
    b. Residual Waste and Special Handling Waste Streams (Document 258-2000-764)
    c. 25 Pa. Code Chapters 287 to 299 (residual waste regulations)
    d. 25 Pa. Code Chapters 271 to 285 (municipal waste regulations) Solid Waste Management Act, 35 P.S. §§ 6018.101 et seq.
    e. Land Recycling and Environmental Remediation Standards Act, 35 P.S. §§ 6026.101 et seq.
4. Code of Federal Regulations (CFR) – 40 CFR Part 261 Subpart C

1.03 PERMITS

A. The Contractor shall be responsible for obtaining all necessary permits and approvals required for the performance of the work. Permits shall include at a minimum construction permits, dust control permit, waste hauling and disposal permits, and all other permits required to complete the work in compliance with all applicable regulations. The Contractor will be required to submit proof of such compliance prior to starting the work.

1.04 SUBMITTALS

A. Submit at the pre-construction meeting the name, address and sampling requirements of the proposed facility to receive fill.
B. Submit Experience with Remedial Projects - The work at the site will require a Contractor who is qualified and able to demonstrate a minimum of three years of continuous experience in remedial action operations associated with wastes generated at the site.

C. Submit Health & Safety Plan (HASP) - The Contractor is responsible for assessing the physical and chemical hazards that could be encountered during construction activities completed for the Chew Playground Remediation Project (including those identified in the report for Soils Investigation for Chew Playground dated July 2, 2020) and prepare a HASP that is protective of the Contractor's employees as well as any subcontractors working at the site on behalf of the Contractor. The selection and use of Personal Protective Equipment (PPE) will be completed in such a manner as to ensure protection of site personnel from on-site hazards and potential hazards. The selection of the PPE is to be based on an evaluation of the performance characteristics of the PPE relative to the requirements of the site. Provisions for increasing or decreasing the levels of protection (depending on additional site-specific information gained during excavation of the soils are to be included. Use of PPE greater than Level D is to be considered only if engineering and administrative controls and work practice modifications are not feasible. Insure the HASP includes hand protection, foot protection, eye protection, head protection, personal hygiene, work area requirements, physiological monitoring, and decontamination requirements that me regulatory standards if applicable.
D. Submit OSHA Training Certificates and Medical Monitoring Approval for all workers that will be working at the site.
E. Submit tickets/receipts/records/manifests/bills of lading for any material shipped offsite. These documents shall be required for payment.
F. Submit tickets/receipts/records for clean fill delivered to the site for purposed of backfilling the excavated soils at the site.

1.05 OWNER RESPONSIBILITES

A. Owner representative will provide the report for the Soils Investigation for Chew Playground dated July 2, 2020
B.

1.06 MEASURMENT AND PAYMENT

A. The measurement of soils deemed unsuitable for use on site and requiring disposal or treatment at a permitted facility, will be based on the unit rate per ton of soil delivered to the receiving facility. Weights shall be measured at the receiving facility scale or other means acceptable to the Owner and confirmed in writing. Payment for disposal or treatment will not be made until final tickets/receipts/records/manifests/bills of lading are provided.

1.07 DEFINITIONS

A. Clean Fill– Uncontaminated, non-water-soluble, non-decomposable, inert solid material used to level an area or bring an area to grade. Uncontaminated means that no regulated substance (Substances required to be sample include all analytes from 25 Pa. Code Chapter 250, APPENDIX A, Table 3 - Medium-Specific Concentrations (MSCs) for Organic Regulated Substances in Soil A. Direct Contact Numeric Value and 25 Pa. Code Chapter 250, APPENDIX A, Table 4 - Medium-Specific Concentrations (MSCs) for Inorganic Regulated Substances in Soil A. Direct Contact Numeric Values) concentrations exceed the Clean Fill Concentration Limits as per the Management of Fill

Policy. The term includes soil, rock, stone, dredged material, used asphalt, and brick, block or concrete from construction and demolition activities that is separate from other waste and recognizable as such (25 Pa. Code §§ 271.101 and 287.101).

B. Contaminated (Regulated, Non-hazardous) Fill - Soil, rock, stone, dredged material, used asphalt, historic fill, and brick, block or concrete from construction and demolition activities that is separate from other waste and recognizable as such that has been affected by a spill or release of a regulated substance and the concentrations of regulated substances exceed the Clean Fill Concentration Limits.

PART 2 - PRODUCTS

2.01 Fill Transport

A. The Contractor shall provide transport fill material in equipment or containers that are free and clear of deleterious material, sealed or lined such that no spillage or leakage can occur between locations during transport. Equipment or containers used for transport of material shall be managed to prevent cross contamination of clean fill.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. The contractor shall handle, transport, and dispose of all excess fill material consistent with all applicable regulations.

B. The Contractor shall clearly define, in writing, the means and methods to manage fill material prior to the start of work and clearly document the conformance during the completion of the work.

C. The Contractor shall be responsible for providing a clean work area. The contractor will inspect all vehicles leaving the site. Any excess debris, soil, and other materials will be removed prior to exiting the site. Debris, soil and other materials dislodged from equipment onto access roads or adjacent properties shall be immediately collected and removed by the Contractor.

D. Testing and ultimate disposal documentation shall be retained, and copies provided to the Owner, consistent with the Submittals Section.

E. The area will be restored/improved based on the project plans and specifications.

F. All contractor employees and their subcontractors onsite will be required to have OSHA 29 CFR 1926 /1910 training and certifications. Copies of the 40-hour training and 8-hour annual updates certificates will be provided to the owner prior to commencing work at the site.

G. The Contractor is responsible for providing all on-site personnel (with appropriate PPE and medical surveillance in accordance with the accepted site-specific HASP.

H. The Contractor is responsible for and is to ensure that all personnel performing or supervising work within the Control Zone or exposed or subject to exposure to chemical vapors, liquids, or contaminated solids observe and adhere to the personal hygiene related provisions of the accepted HASP. Any personnel found to be consistently disregarding personal hygiene-related provisions of this plan may be required, at the request of the City of Philadelphia, to be barred from the site. This is not to be construed as relieving the Contractor from responsibility for enforcement of these provisions. Smoking, chewing gum or tobacco products, eating, and drinking are prohibited during Corrective Action and Contingent Remedial Action except in a designated, Contractor-provided smoking or eating area. Personnel are required to thoroughly cleanse their hands and face before entering smoking or eating areas.

I. Work Area Requirements – The Contractor is responsible for controlling access to the work areas to prohibit unauthorized access to the work areas for the purpose of protecting the general public. Work areas should be set up and controlled in accordance with protocols specified in the HASP and Site Work Plan and in compliance with all local, state, and federal requirements. The gates into the work area cannot remain open, except when vehicles are entering or exiting the facility.

END SECTION

SECTION 026500

STORAGE TANK REMOVAL

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. This specification outlines the general requirements for the cleaning and removal (e.g., closure) of petroleum-containing underground storage tanks (USTs) as per 25 Pa. CODE § 245 Administration of the Storage Tank and Spill Prevention Program.

1. Regulated Underground Storage Tanks are defined as tanks used to contain regulated substances with a capacity of more than 110 gallons where 10 percent or more of the volume is below the surface of the ground.

2. Regulated Substances include, but are not limited to, petroleum, including crude oil and/or fraction thereof and hydrocarbons which are liquid at standard conditions of temperature and pressure including but not limited to, petroleum products such as, fuel oil, used oil, oil sludge, oil reuse, diesel, kerosene, and gasoline.

3. Tanks that meet ALL the following requirements are NOT REGULATED and are not required to follow PADEP storage tank regulations:

   a. The tank was emptied before December 22, 1988.
   b. The tank has remained out of operation since before December 22, 1988.
   c. The tank does not pose a current or potential threat to human health and the environment.

4. Tanks which store heating oil used on the premises where stored are NOT REGULATED USTs.

5.

B. Decisions regarding regulated and un-regulated USTs will be made by an environmental professional and/or a PADEP-certified Tank Contractor.

C. Regulated tanks must be closed by a PADEP-certified Tank Contractor and in accordance with applicable regulations.

D. The closure of unregulated tanks does not require a PADEP-certified Tank Contractor.

E. The Environmental Field Scientist will observe tank cleaning and removal, and will conduct soil sampling after removal of USTS, whether REGULATED or NOT REGULATED. Sampling and analysis will conform to PADEP guidance for tank closures.

1.01 CODES AND REGULATIONS

A. Requirements of Regulatory Agencies

1. Administration of the Storage Tank and Spill Prevention Program (25 Pa Code 245).

2. U.S. Environmental Protection Agency (EPA), Code of Federal Regulations, 40 CFR Parts 280 and 281
3. Title 25, Pennsylvania Code, Chapter 250, Administration of Land Recycling Program (Act 2)
4. Occupational Safety and Health Administration (OSHA) 29 CFR 1926:
   a. Safety and Health Regulations for Construction
   b. Confined Spaces in Construction, including documentation of Non-Permit Required Confined Space (if required)
5. Closure Requirements for Underground Storage Tank Systems (Document 263-4500-601).
6. OSHA 29 CFR 1910.12, Hazardous Waste Operations and Emergency Response
7. Applicability of Chapter 245.453-Assessing the Site at Closure or Change-In-Service- to UST Systems Closed Prior to the Effective Date of the Federal Regulations (Document 263-0900-014).
8. Site Assessment Sampling Requirements at Regulated Storage Tank System Closures (document 2630-BK-4699, Rev. 9/2020.
9. 2020 Management of Fill Policy (Document 258-2182-773) – Will not apply to onsite soil during this project.
10. Residual Waste and Special Handling Waste Streams (Document 258-2000-764).
11. 25 Pa. Code Chapters 287 to 299 (residual waste regulations).
12. 25 Pa. Code Chapters 271 to 285 (municipal waste regulations) Solid Waste Management Act, 35 P.S. §§ 6018.101 et seq.
13. Land Recycling and Environmental Remediation Standards Act, 35 P.S. §§ 6026.101 et seq.
14. The Storage Tank and Spill Prevention Act (the Act of July 6, 1989, as amended 35 P.S. Section 6021.101 et seq.) and Chapter 245.454.
15. API Publication 2015, Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks.

B. City of Philadelphia, Department of Licenses and Inspections.

C. Code of Federal Regulations (CFR) – 40 CFR Part 261 Subpart C.

1.03 SUBMITTALS

A. The Contractor shall provide copies of PADEP-Certified Installer Certificate, both individual and company.
B. The Contractor shall provide copies of all worker certifications associated with OSHA 40 Hour Hazardous Waste Site Health and Safety Training in accordance with 29 CFR 1910.120.

C. Contractor shall provide a Site-specific Health and Safety Plan.
D. Submit at the pre-construction meeting the name, address and sampling requirements of the proposed facility to receive fill.
E. Contractor shall submit tickets/receipts/records/manifests/bills of lading for any material shipped offsite. Submittal of these documents shall be required for payment.

1.04 OWNER RESPONSIBILITES

A. The Owner will pay the PADEP registration fees for tanks that require registration prior to removal.
B. Owners Representative will conduct soil sampling to support the characterization and disposal of materials to be transported offsite.
C. Owners Representative will provide to Contractor soil sampling diagram, chain-of-custody for samples, and laboratory report to support disposal approvals.
D. Owner's Representative will observe UST cleaning and removals and collect soil samples for analysis to document soil conditions after removal.
E. If it is a regulated tank, the UMR will prepare the PADEP UST System Closure Report Form.

1.06 MEASURMENT AND PAYMENT

A. The measurement of petroleum-containing soils with concentrations that are unacceptable for reuse on-site and requiring disposal at a permitted facility, will be based on the measured weight of soil delivered to the receiving facility. Weights shall be measured at the receiving facility scale or other means acceptable to the Owner and confirmed in writing. Payment for disposal will not be made until final tickets/receipts/records/manifests/bills of lading are provided.

PART 2 PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. The Contractor shall furnish all labor, material, tools, transportation and equipment necessary to remove and dispose of UST(s), associated electrical, structural, and product equipment, (e.g., dead men, anchor straps, piping, manways, piping, pumps, and dispenser(s), if present). This section specifies requirements for the environmental and tank assessment, permitting, removal and disposal of the UST(s). Generally, the work shall include, but not be limited to:
B. Submitting all necessary notices, obtaining all permits and licenses, and paying for all fees, and other costs in connection with the work. Obtaining all necessary approvals of all governmental departments having jurisdiction.
C. Conducting tank removal in a manner that minimizes interference with adjacent structures, if any.

D. Containerizing, removing, and properly disposing of residual stored products and sludges from the designated tanks and appurtenant equipment.
E. Clean, remove, and dispose of UST(s), and appurtenant piping for the tank(s). The work shall include removal and proper disposal of fuel and residual sludges in the tanks and associated piping between the tanks and the building.
F. If a release is verified, the PADEP-certified tank contractor will notify the Owner and/or Owner's Representative and will report the release to the PADEP in accordance with §245.304 (c) (2). The contractor will provide a copy of the Notification of Release to the Owner.
G. Perform remediation of contaminated material, if necessary, as directed by the Owners Representative at the unit price established for the work.
H. Coordinate with the Owners Representative relative to the collection, sampling and analysis of impacted soils. Refer to ENVIRONMENTAL SOILS MANAGEMENT PLAN.

I. The area will be restored/improved based on the project plans and specifications.
J. All contractor employees and their subcontractors onsite will be required to haveOSHA 29 CFR 1926 /1910 training and certifications. Copies of the 40-hour training and 8-hour annual updates certificates will be provided to the owner prior to commencing work at the site.
K. If a regulated tank is removed, support the preparation of the UST System Closure Report Form by completing and certifying Section II. Tank Handling Information. Owner's Representative will submit the Form to PADEP.

END SECTION

SECTION 033001

SITE CONCRETE

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. This section covers cast-in-place concrete materials, reinforcing steel, forms, and finishing in conjunction with site structures.
2. The construction of concrete pads
3. Incidental and related operations.

B. Related Work: The following items are not included in this Section and are specified under the designated Sections:

1. Section 312000 – EARTH MOVING

1.3 SUBMITTALS

A. Product Data: Provide the following for each mix and define where mix is to be used on site:

1. Submit mix design, equipment details, and vendor name for filed batched concrete.
2. Submit three copies of catalogue cuts of all fabricated materials for approval by the Owner prior to ordering.
3. Submit all required testing reports including compressive strength testing.

B. Material Test Reports: For aggregates. Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

C. Field quality-control reports

B. Shop Drawings: Show fabrication and installation details of site concrete elements. Include plans, elevations, sections, details, and attachments to other work.

1.4 REFERENCES

A. Work and materials shall conform to the latest editions of the following standards:

1. Annual Book of ASTM Standards, latest edition; American Society for Testing and Materials, Philadelphia PA.
2. Pennsylvania Department of Transportation Specifications, latest edition, Publication 408.
3. Standards of the American Association of State Highway and Transportation Officials (AASHTO), latest edition.

1.5 ACTION SUBMITTALS

A. Product Data: For each of the following:

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Aggregates.
5. Admixtures:

    a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.

6. Color pigments.
7. Curing materials.
8. Joint fillers.
9. Reinforcement.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.

C. Shop Drawings:

1. Steel Reinforcement: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, length, material, grade, bar schedules bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
2. Formwork Shop Drawings for Architectural Concrete: Show formwork construction including form-facing joints, rustications, construction and contraction joints, form joint-sealant details, form tie locations and patterns, inserts and embedments, cutouts, cleanout panels, and other items that visually affect cast-in-place architectural concrete.

    a. Location of joints is subject to approval of the Architect.

1.6 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Steel reinforcement and reinforcement accessories
4. Curing compounds
5. Bonding agent or epoxy adhesive
6. Joint fillers.

B. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Aggregates.
5. Admixtures:

a. Permeability-Reducing Admixture: Include independent test reports, indicating compliance with specified requirements, including dosage rate used in test.

C. Field quality-control reports.

1.7 QUALITY ASSURANCE

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

B. Codes and Standards: Perform work in compliance with applicable requirements of governing authorities having jurisdiction.

C. Materials and workmanship shall conform to applicable requirements of Pennsylvania Department of Transportation Specifications.

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready- mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

C. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.

D. ACI Publications: Comply with ACI 301 (ACI 301M) unless otherwise indicated.

D. ASTM A82, ASTM A185, ASTM A615, ASTM M996, AASHTO M85, AASHTO T27.

E. Mockups: Cast concrete formed-surface wall panels to demonstrate surface finish, color, and standard of workmanship.

1. Formed Surfaces: Build wall panel approximately 10 sq. ft. in the location indicated or, if not indicated, as directed by Architect.

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

F. References

1. Annual Book of ASTM Standards, latest edition; American Society for Testing and Materials, Philadelphia PA.
2. Pennsylvania Department of Transportation Specifications, latest edition, Publication 408.
3. Standards of the American Association of State Highway and Transportation Officials (AASHTO), latest edition.

1.8 DELIVERY, STORAGE, AND HANDLING

A. For delivery, storage and handling of concrete for pads and structures, conform to all requirements of PennDOT Publication 408 Section 501, Reinforced or Plain Cement Concrete Pavements.

B. For general concrete, conform to all requirements of PennDOT Publication 408 Section 704, Cement Concrete.

1.9 PROJECT CONDITIONS

A. Conform to all conditions and restrictions included in other sections, including erosion and sediment control, protection of vegetation, existing improvements and utilities.

1. All work shall be in accordance with the laws of the Commonwealth of Pennsylvania.
2. All work shall be in accordance with the requirements of PennDOT Publication 408, latest edition.
3. The Contractor shall apply and pay for all necessary permits and fees required in the course of his work as required by the governing codes.
4. The Contractor shall be responsible for coordinating his work with the work of other trades. Do no work that will damage, displace, or make unnecessarily difficult the installation of the work of other trades.
5. The Contractor shall not cover any work until it has been inspected by the Engineer. Any work covered prior to inspection shall be opened to view by the Contractor at his expense.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
   1. Use flexible or uniformly curved forms for curves with a radius of 100 feet (30.5 m) or less. Do not use notched and bent forms.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 CONCRETE

A. Concrete: composed of Portland Cement; fine and coarse aggregate; water; and, an air entraining agent. Provide Class AA concrete as described below and in PennDOT Publication 408, Section 704, Cement Concrete.

B. For Class AA concrete use ready-mixed concrete; conform to ASTM C 94, latest edition; deliver and place within one hour after all materials have been placed in the mixing drum.

C. Proportion components, except water, by weight. Water may be measured by volume. One sack of Portland Cement consists of one cubic foot or 94 pounds. Proportion components to meet current version of PennDOT Publication 408 requirements, Section 704.1 Table A Cement Concrete Criteria. Including

   1. Class AA Concrete
      a. Minimum sacks of cement per cubic yard: 6.25
      b. Maximum water cement ratio: 0.477 lbs/lbs
      c. Slump range: 1 - 3 inches
      d. Minimum 28 day compressive strength: 3500 PSI

D. Cementitious Material: Conform to the requirements of PennDOT Publication 408, Section 701, Cement. Use the following cementitious materials, of same type, brand, and source throughout Project:
   1. Portland Cement: ASTM C 150 (AASHTO M 85), white portland cement Type I or Type II. Supplement with the following:
      a. Fly Ash: ASTM C 618, Class C or Class F.
      b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

E. Cement: conform to the requirements of PennDOT Publication 408, Section 701, Cement.

F. Water: potable water free from injurious amounts of acids, alkalis, oils, sewage, vegetable matter and dirt and complying with ASTM C 94/C 94M.

G. Air Content: design cement concrete with an air content of 4% to 7% in the plastic state.

H. Air entraining agent: use in all Class A concrete; conform to AASHTO M 154; add to the mixing water in solution; proportion to provide four (4) to seven (7) percent air in the concrete.

I. Normal-Weight Aggregates: ASTM C 33, Class 4S, uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.

1. 1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal. Clean, hard and durable crushed stone or washed gravel; reasonably well graded from course to fine; per AASHTO T 27.
2. 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement. Clean, hard, durable particles of natural sand free from injurious amounts of organic impurities; conform to the gradation requirements of AASHTO T 27.

J. I. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.3 REINFORCING STEEL

A. Steel wire: conform to ASTM A 82, Cold-Drawn Steel Wire for Concrete Reinforcement.

B. Steel Welded Wire Fabric: conform to AASHTO-M55 (ASTM-A185); gauge and mesh per plans. WWF shall be epoxy coated and conform to AASHTO-M284 (ASTM D3963) except as follows:

1. Film Thickness — 5-12 Mills on at least 90% of the recorded film thickness measurements after cure.
2. Continuity of Coating — No greater than an average of 2 holidays per square foot of welded wire fabric including holidays present at wire intersections if these are not attributable to weld spurs.
3. Adhesion — Evaluated on a representative number of equivalent size reinforcement bars that have been processed through the cleaning and coating production line along with the welded wire fabric sheets.
4. Coating color — Light color shades which will reveal rusted or undercoated areas of steel.
5. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) plain-steel bars. Cut bars true to length with ends square and free of burrs.
6. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
    a. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

C. Submit reinforcing steel bars shop drawings for approval.

D. All steel reinforcement: free from rust, scale, mortar, dirt, or other objectionable coatings.

2.4 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry or cotton mats.

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

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

2.5 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.

B. Proportion mixtures to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 4000 psi (24.1 MPa).

2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.

3. Slump Limit: 3 inches (75 mm).

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

1. Air Content: 6 percent for 5/8-inch (16-mm) nominal maximum aggregate size.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture; high-range, water-reducing admixture; high-range, water- reducing and retarding admixture; or plasticizing and retarding admixture in concrete as required for placement and workability.

2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

F. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of Portland cement, which would otherwise be used, by not less than 40 percent.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the areas and conditions under which work is to be performed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

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

3.2 PREPARATION

A. Perform excavation per Division 31, Section “Earth Moving”.

3.3 INSTALLATION, GENERAL

A. Concrete Class:

1. Use Class AA Concrete for concrete pads and curbs.

B. All installation shall be done in accordance with PennDOT Publication 408 requirements.

C. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.
1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

D. Build forms neat, square, and flat so concrete will have smooth finish when forms are pulled. Construct forms to provide finished concrete to dimensions shown on plans.

E. Place reinforcing steel accurately in accordance with details shown on the plans and properly secure in position.

F. Vibrate all structural concrete as it is placed using internal vibrators capable of transmitting vibration to the concrete at frequencies not less than 4,500 impulses per minute. Do not use form vibrators. Limit vibration to provide satisfactory consolidation without causing segregation. Do not insert vibrator more than six (6) inches into the lower courses previously vibrated. Use vibrators in a substantially vertical position; insert at uniformly spaced points no farther apart than the visible effectiveness of the vibrator.

G. Vibration is not required in manhole bases and pipe encasements; consolidate concrete in these places with a tamping rod so a dense void free mass is formed.

H. Allow concrete to cure for at least 48 hours before stripping forms. If concrete is in a structural member, do not remove forms until the concrete can safely withstand all superimposed loads.

I. On all exposed surfaces, including the inside surface of manholes, remove all fins and projections so the surface is smooth. Cut out and fill any honeycombed areas with grout. Extensive honeycombing is not allowable.

3.4 CONCRETE PADS AND FOOTINGS

A. Before placing subbase, check subgrade for grade and slope. All slopes or locations not clear on the drawings shall be confirmed prior to placing of subbase. Place gravel subbase to depths and widths shown on the drawings. Subbase shall be compacted to form a hard, even, unyielding surface. All irregularities in the surface which exceed 1/2" shall be loosened and material added or removed as needed.

1. Provide contraction, expansion and construction joints as shown on the drawings or specified here. All joints and edges shall be tooled to form neat edges. Contraction joints shall be to a depth equal to at least 1/4 concrete thickness. Expansion joints shall be no more than 30' apart and shall extend the full depth of paving or curbing. Construction joints shall be no more than 10' apart. Each poured section of curb shall be separated when pouring by a 1/8 inch steel template equal to the full depth of the curb.
2. Exposed concrete vertical surfaces shall have a smooth-rubbed finish.
3. Concrete slab surfaces shall be steel troweled and medium broomed to form a non-slip surface and remove shine.
4. All exposed edges shall have ¾” chamfer.
5. All irregularities shall be a maximum of 1/4 inch in 10 ft. and 1/16 inch in 12 inches.

3.5 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

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

3.6 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

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

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

3.7 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

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

D. Comply with ACI 301 (ACI 301M) requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

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

G. Consolidate concrete according to ACI 301 (ACI 301M) by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
   1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement dowels and joint devices..

H. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
   1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
   2. Do not use frozen materials or materials containing ice or snow.
   3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

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

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
   1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
      a. Water.
      b. Continuous water-fog spray.
      c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
   2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches (300

mm) and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

END OF SECTION

SECTION 116833

ATHLETIC FIELD AND SPORTS EQUIPMENT

PART 1 - GENERAL

1.1 Athletic field and sports equipment shall conform to the following minimum standards:

A. Athletic field and sports equipment include:

1. Baseball/softball backstops, bases, outfield fences, foul poles, and accessories.

2. Combination football/soccer goals.

B. Approved Manufacturers:

1. PW Athletic, (George Ely Associates) P.O. Box 396, Carlisle, PA 17013, 800-262-8448

2. JayPro Sports, LLC., 976 Hartford Turnpike, Waterford, CT 06385, 800-243-0533

3. GameTime (MRC, P.O. Box 106, Spring Lake, NJ 07762, 800-922-0070)

4. TrueBounce Inc. 56 Conduit Street, New Bedford, MA 02745, 866-873-3715 www.true-bounce.com.

a. TrueBounce XL7042 Perforated Polycarbonate Backboard, or approved equal. Install per manufacturer's specifications.

b. TrueBounce RB240 Park & Rec Front Mount Super Goal, or approved equal. Install per manufacturer's specifications.Bison Inc. 603 L Street, Lincoln Nebraska 68508, 402-474-3353 www.bisoninc.com

5. Bison Inc. 603 L Street, Lincoln Nebraska 68508, 402-474-3353 www.bisoninc.com

C. Fencing for athletic fields and sports courts shall be powder coated steel posts and hardware with black vinyl coated fabric. Fence fabric mesh size shall be no greater than 2-inch. Fence fabric shall be placed facing the field or court so that fence posts are not exposed to players, except at corners, openings, and gates.

D. Baseball/Softball:

1. Baseball/softball backstops shall be angular type with overhang sections for foul ball protection. Color for fencing shall be black with steel posts and vinyl coated fabric. Arch or round type backstops are not permitted.

2. 8-Foot high fencing shall overlap with the end of the backstop fence, leaving a protected pass through for players entering the field, and extend at a minimum past the players bench and any spectator seating area(s) on the side of the field to protect these areas from foul balls. Protective netting of the sides of the field is not preferred and shall be approved by PPR.

3. Outfield fences if provided and under 8 feet in height shall include a 4-inch diameter

corugated HDPE/plastic yellow fence top protector. Fence top protector shall be secured to fence top with manufacturer's recommended fasteners every 2 feet.

4. Baseball/softball infield mix soil for base runs, batting area, skinned area, and/or pitchers' mound shall be a manufactured clay soil product specifically for baseball/softball use. Manufacturer's include:

   a. Diamond-Tex, Gap, PA, Web: http://www.diamondtex.com/
   b. DuraEdge Products, Inc., Grove City, PA., Web: https://duraedge.com/
   c. Beam Clay/Partac Peat Corporation, Great Meadows, NJ, Web: http://www.beamclay.com/

1.1 QUALITY ASSURANCE

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

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

END OF SECTION

SECTION 129300

SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. The work of this section specifies site furnishings, including:

1. Benches

2. Trash and Recycling Receptacles

1.3 ACTION SUBMITTALS

A. All products used for site furnishings.

1.4 QUALITY ASSURANCE

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

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

PART 2 - PRODUCTS

2.1 PRODUCTS

Site furnishings shall conform to the following minimum standards:

B. Approved Site Furnishing Manufacturers:

1. Dumor, Inc. – P.O. Box 142, Mifflintown, PA 17059, 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

2. Concrete Classics – P.O. box 382, Middlebury, CT, 06762, Phone: (203) 560-9097, Web:

www.concreteclassics.com

3. Equal approved by Philadelphia Parks and Recreation.

C. Benches:

1. Dumor Series 105-PL, 6-foot length, “Grey” Recycled Plastic Slats.

   a. Standard Philadelphia Parks and Recreation color bench metal is black. Designer may select another color from manufacturer’s standard color palette, but color selection shall be approved by PPR.

   b. Bench to be surface mounted to concrete paving or pad or PPR approved rigid paving with manufacturer’s recommended anchors. For selected benches for ADA compliance provide paved space on the pad directly adjacent to the side of the bench for wheelchair parking/seating.

D. Trash and Recycling Receptacles:

1. Dumor Series 157-32-FTO, 157-32-SH or 157-32-25BT.

   a. Standard Philadelphia Parks and Recreation color is black for trash, blue for recycling. Designer may select another color from manufacturer’s standard color palette; but color selection shall be approved by PPR.

   b. Standard top opening.

   c. 32 Gallon interior plastic liner, black in color.

   d. Side liner access with operable latch.

   e. Trash and recycling receptacle to be surface mounted to concrete paving or pad or PPR approved rigid paving with manufacturer’s recommended anchors or post anchored in a concrete footing cast below grade.

END OF SECTION

SECTION 312000

EARTH MOVING

PART 1 – GENERAL

1.1 SUMMARY

A. The work of this section includes all earthwork and related and incidental operations, including:

1. Site protection, erosion and sediment control, site clearing, and sitework clearing.
2. Preparing of subgrade for walkways and pavements, and sitework clearing.
3. Drainage fill course for support of building slabs is included as part of this work.
4. Excavating and backfilling of trenches within building lines.
5. Dewatering as required to keep excavations free of water and soil erosion during construction period.
6. Preparing subgrades for slabs on grade.
7. Excavating and backfilling for building structures.

B. Excavating and backfilling for underground mechanical and electrical utilities and buried mechanical and electrical appurtenances shall be by the mechanical or electrical contractor.

C. Related Sections
1. Section 015713, “Temporary Erosion and Sediment Sedimentation Controls”.

1.2 General earthwork requirements shall conform to the following minimum standards:

A. Provide positive drainage away from all structures.

B. Unless otherwise noted, minimum slope shall be ¼ inch per foot or 2% and a maximum slope shall not exceed 3:1 (h:v) or 33% for non-paved surfaces. Paved surfaces shall have a minimum grade or 1% and have positive drainage off of the pavement.

C. Grades on designated handicapped accessible areas/routes shall comply with the provisions of the Americans with Disabilities Act.

D. Notify the PPR immediately if slope requirements cannot be met. At no time will slopes in excess of those above the maximum allowed, be accepted, unless prior approval is received in writing by PPR.

E. Grade earthen, non-paved, surfaces to a smooth finish. Slope lawn areas in swales to a gentle crown along the centerline.

F. Grade all seeded fine lawn areas flush with finish grade. Adjust finished grade to the proper depth where sod abuts paved areas.

G. Grade all tree/shrub/groundcover planting beds to 3 inches below top of abutting curbs, paving, or lawn areas to allow for mulching.

H. Adjust existing and new manhole, catch basins, and drains rim/grate elevations to new grade

elevations (pavement or soil).

I. Finished surfaces shall be graded smooth and even with no abrupt or awkward changes in grade.

J. Provide properly compacted subgrades of native soil or approved fill. Native soils, fill, or subgrades deemed insufficient shall be removed and replaced with appropriate material. Subgrades shall be inspected by a qualified inspector to ensure compaction requirements are met. Submit test reports and field logs to PPR for review and for record.

K. Existing on-site soils should be evaluated for both suitability for use in construction as well as environmentally for contaminants by licensed and qualified professionals such geotechnical engineers and environmental scientists. Many sites throughout the City include various types of urban fill. In some cases there may be abandoned structures below grade. These soils and features should be evaluated before design and engineering newly planned features. Also, environmental due diligence and/or testing should be completed near the beginning of design and engineering to ascertain if on-site materials are clean or regulated. Testing of existing on-site soils and materials shall comply with the requirements of Pennsylvania Department of Environmental Protection requirements for fill management whether it is determined to be clean or regulated. Submit geotechnical testing and environmental due diligence reports to PPR for review and for record.

L. Any soil materials leaving the site or being brought to the site shall comply with the Pennsylvania Department of Environmental Protection requirements for fill management.

M. Environmental due diligence: investigative techniques, including, but not limited to, visual property inspections, electronic data base searches, review of property ownership, review of property use history, sanborn maps, environmental questionnaires, transaction screen, analytical testing, environmental assessments or audits. Submit all environmental due diligence reports to PPR for review and for record.

N. Exported fill materials will be tested as per the Management of Fill Policy (2020) to determine whether the materials meet the analytical criteria for Clean Fill.

O. The materials that meet the criteria for clean fill do not require special handling. However, a Clean Fill Certification Form FP-1001 must be submitted to PADEP and retained by the owner of the property receiving the fill. PPR and Rebuild will not prepare Clean Fill Certifications.

P. Fill material that does not qualify as clean fill is regulated fill. Regulated fill is waste and must be managed in accordance with the municipal or residual waste regulations in 25 pa code chapters 287 residual waste management or 271 municipal waste management, whichever is applicable.

Q. Designers and contractors shall comply with the Pennsylvania Underground Utility Line Protection Law, Act 287 of 1974, as amended by Act 50 of 2017. This includes contacting the Pennsylvania One Call System or 811 as required by law.

R. Designers and contractors, in additional to complying with the Pennsylvania Underground Utility Line Protection Law requirements shall research available utility records from the project owner for the site or facility. Upon evaluation of these records the designer or contractor can evaluate the need for extensive underground utility locating depending the project. The designer or contractor shall determine the need and level of underground utility located needed for the project in conformance with the American Society of Civil Engineers (ASCE) National Consensus Standard – ASCE C-I 38-02, Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data. The designer or contractor shall determine the Quality Level of utility located required by the project, Levels D, C, B, or A. The costs associated with underground

utility locating services shall be evaluated and balanced with the available utility information, conditions in the field, the type of project being proposed, the risks associated with utility conflict and/or damage, and the ability of a utility locator to obtain information. These evaluations shall be done in consultation with Philadelphia Parks and Recreation.

1.3 ACTION SUBMITTALS

A. Test Reports: Submit the following reports in addition to other test reports described in subsequent sections directly to the Landscape Architect from the testing services, with a copy to the Contractor and the Owner:

1. Test reports on borrow material, including USCS classification (grain size, liquid limit, plastic limit, and natural water content), Clean Fill certification, and optimum moisture-maximum density curve for standard Proctor.
2. Verification of suitability of each footing subgrade material, in accordance with specified requirements.
3. Field reports; in-place soil density tests.
4. One optimum moisture-maximum density curve for each type of soil encountered. One USCS classification (grain size, liquid limit, plastic limit, and natural water content), Clean Fill certification and optimum moisture-maximum density curve for standard Proctor for each fill and backfill material.
5. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.

1.4 QUALITY ASSURANCE

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

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

1. The Standards for Soil Erosion and Sediment Control in Pennsylvania, as published by the Pa. Department of Environmental Protection, shall be applicable where the work is not specifically detailed on the accompanying drawings or by local requirements.
2. Earthwork recommendations outlined in the Project's current Geotechnical Engineering Report shall be followed unless otherwise noted.

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

D. A Geotechnical Testing Agency shall be retained by the Contractor to perform soil testing

and inspection services for quality control during earthwork and site grading operations.

1. The Contractor shall submit data demonstrating the qualifications of the Geotechnical Testing Agency for approval by the Architect.
2. The Geotechnical Testing Agency shall be qualified according to ASTM E 329 to conduct soil materials and rock definition testing as documented according to ASTM D 3740 and ASTM E 548.
3. The Geotechnical testing agency shall have on staff a professional engineer who is legally authorized to practice in the jurisdiction where the Project is located and who is experienced in providing geotechnical engineering.
4. The Geotechnical Testing Agency shall perform the tests and provide the services specified below and submit test reports to the Owner and Landscape Architect. All test reports must be signed and sealed by the qualified professional engineer responsible for their preparation.
5. Testing shall be performed in the presence of a county/city representative.

E. Field Engineering: A Surveyor shall be retained by the Contractor to provide field engineering services required for proper completion of the work including but not necessarily limited to layout work and setting of grades, slopes and levels:

1. The Contractor shall submit data demonstrating qualifications of persons proposed to be engaged for field engineering services for approval by the Architect.
2. The surveyor shall submit documentation verifying that layout, grades, slopes and levels are in conformance with the drawings and specifications.
3. The Contractor shall locate and protect control points and reference points throughout the progress of work.

1.5 REFERENCES

A. Annual Book of ASTM Standards, 2005; American Society for Testing and Materials, Philadelphia, PA.

B. Standard Specifications of the Pennsylvania Department of Transportation, Pub. 408, latest edition.

C. Management of Fill Policy, Pennsylvania Department of Environmental Protection, January 1, 2020 (Document No. 258-2182-773).

1.6 PROJECT CONDITIONS

A. Site Information

1. Existing data was used for the basis of the design and are available to the contractor for information only. Existing conditions are not intended as representations or warranties of accuracy or continuity. The Owner will not be responsible for interpretations or conclusions drawn from this data by Contractor.
2. Test borings and other exploratory operations may be performed by contractor, at the Contractor's option; however, no change in the Contract Sum will be authorized for such additional exploration.

B. Site Protection: Comply with requirements specified in Temporary Erosion and Sediment Controls, Section 01 57 13, prior to the start of, and throughout, earthwork operations.

1. Before beginning site and sitework clearing or any other construction activity, Contractor

shall set up and maintain temporary fencing along the limits of construction indicated on the drawing, staked out by the Contractor, and shall notify Architect.

2. This temporary fencing shall describe the area of protection of existing soils/vegetation to remain. Under no conditions shall this line be penetrated by any construction vehicle or construction process, including storage of materials, waste, or fill, or for any purpose without the written consent of the Architect or Owner.
3. Temporary fencing shall be maintained in good condition throughout the work and shall be removed when work is completed.
4. Vegetation in protected areas which is damaged due to construction activities shall be replaced or otherwise restored to the satisfaction of the Architect and at no cost to the Owner.
5. Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction.
6. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
7. Perform excavation by hand within dripline of large trees to remain. Protect root systems from damage or dry out dryout to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with moistened burlap.
8. No vehicles shall be driven or parked under the canopy of trees nor shall material be stored or any construction activity take place under canopies except that directly related to work there.

C. Protection of Existing Utilities

1. Locate existing underground utilities in the area of the work prior to the beginning of the work. Where utilities are to remain in place, provide suitable protection where required before starting work and maintain protection throughout the course of the work. Do not interrupt existing utilities without written approval from the utility owner.

    a. Provide minimum of 48-hour notice to the Landscape Architect and receive written notice to proceed before interrupting any utility.

2. Should uncharted or incorrectly charted utilities be encountered during excavation, consult the utility owner immediately for directions. Cooperate with the Owner and public and private utility companies in keeping their respective services and facilities in operation.
3. Restore damaged utilities to their original condition to the satisfaction of and at no cost to the Owner. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shutoff of services if lines are active.

D. Use of Explosives: Use of explosives is not permitted without the prior approval of the Architect.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Class 4, Type A Geotextile: Per PENNDOT Publication 408, Section 735 with AOS 70-100 U.S. Sieve.

2.2 SOIL MATERIALS

A. Satisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, and SP.

B. Unsatisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GC, SC, ML, MH, CL, CH, 0L, OH, and PT.

C. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100 percent passing a 1-1/2 inch sieve and not more than 10 percent passing a No. 4 sieve and 0% passing No. 200 sieve.

D. Topsoil: Topsoil stripped and stockpiled on the site should be used for fine grading. Topsoil is defined as soil existing as top layer of earth on the site, which produces heavy growths of crops, grass or other vegetation. If there is not sufficient stripped and stockpiled topsoil, furnish additional topsoil as needed conforming to the requirements specified in Section 32 93 00, Plants.

E. Fill and Backfill Materials:

1. Fill must have a bearing capacity of at least 3,000 pounds per square foot (PSF) when compacted to 95% of the maximum dry density (ASTMD-1557 or ASTM D-698 for trenches or other small spaces where large compaction equipment is not used).
2. Ordinary fill material shall be clean and free of high organic top soil, peat or muck, masonry materials, broken concrete or asphalt, stones larger than six inches, frozen lumps, trash, and other debris that would interfere with compaction or cause settlement.
3. Fill material shall be of a moisture content suitable for compaction, specifically within +/- 2% of the optimum moisture content per the standard Proctor test (ASTM D698) and shall be obtained from a location that is normally dry and well-drained.
4. Select fill material shall be PENNDOT No. 2A per PENNDOT Section 703.2.
5. Should it be necessary to import fill material from off-site, the Contractor shall furnish certified report(s) of the testing laboratory showing the analysis of a representative sample of the material he proposes to use. A separate report shall be furnished for each source of material, <u>including USCS classification (grain size, liquid limit, plastic limit, and natural water content), Clean Fill certification, and optimum moisture-maximum density curve for standard Proctor.</u> The Contractor shall furnish the reports to the Engineer for approval. Imported fill shall be well-graded granular material similar to PADOT 2A <u>or crushed, recycled concrete with a gradation similar to PADOT 2A.</u>
6. Structural Fill: Clean bank run sand and gravel containing non-plastic fines for that portion passing a No. 40 U.S. Standard sieve. Conform to the following gradation.

U.S. STANDARD SIEVE SIZE	PERCENT PASSING
4 inch	100
No. 4	30 to 100
No. 200	0 to 12<u>35</u>

a. Material Availability: Borrow areas for structural fill material are not available on the site. Provide off-site materials of the quality specified and quantities required. Obtain material from a single source if possible.

7. Crushed Stone: Angular, washed natural stone; free of shale, clay, friable materials and debris; graded in accordance with ANSI/ASTM C136 within the following limits:

U.S. STANDARD SIEVE	PERCENT
3/4 inch	95 to 100
5/8 inch	75 to 100
3/8 inch	55 to 85
No. 4	35 to 60
No. 16	15 to 35
No. 40	10 to 25
No. 200	5 to 10

8. Sand: Natural river or bank sand; dry, washed, free of silt, clay, loan, friable or soluble materials and organic matter; graded in accordance with ANSI/ASTM C136 within the following limits:

U.S. STANDARD SIEVE	PERCENT
No. 4	100
No. 14	10 to 100
No. 50	5 to 90
No. 100	4 to 30
No. 200	0

9. Dense Graded Aggregate: Broken stone, crushed gravel or blast furnace slag conforming to the following gradation:

U.S. STANDARD SIEVE	PERCENT FINER BY
1 inch	100
3/4 inch	55 to 90
No. 4	25 to 60
No. 50	5 to 25
No. 200	3 to 12

10. Pea Gravel: Natural stone; washed, well rounded, clean, free flowing, free of clay, shale, organic matter; 1/4 inch minimum to 5/8 inch maximum size.
11. Porous Fill: Crushed stone aggregate conforming to the following gradation:

U.S. STANDARD SIEVE	PERCENT FINER BY
1 inch	100
3/4 inch	90
3/8 inch	30
No. 4	5
No. 8	0

12. Ballast: Coarse, crushed stone aggregate conforming to the gradation of Table C. and properties specified in PADOT 703.2

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions under which earthwork and site grading is to be performed and notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

3.2 SITE PROTECTION MEASURES

A. All temporary erosion and sediment control measures indicated on the drawings and as specified in Section 01 57 13 and all temporary fencing shall be in place before beginning any earthwork or sitework.

B. Construction operations shall be carried out in a manner such that soil erosion and air and water pollution are minimized. State and local laws concerning pollution abatement shall be followed.

C. The General Contractor shall be responsible for all soil erosion and sediment control and site protection during the construction period and shall provide barriers and other measures and devices to ensure that these specifications are complied with.

D. Preventative measures against sinkhole formation:

1. Provide positive drainage away from building areas and exposed rock at all times during construction.
2. Avoid ponding water or concentrations of surface flows except where designated on the drawings.
3. Prevent runoff water from flowing onto exposed subgrades. Close excavations as soon as possible after exposure. Foundation concrete should be placed the same day that excavation is completed.
4. Backfill shall be compacted and be no more permeable than adjacent subgrade.

E. Contractor shall notify the Architect before any work is begun on the site to review temporary erosion control measures, site protection, permanent stormwater management features, and the sequence of construction.

F. Permanent stormwater management features and additional temporary erosion control measures as indicated on drawings shall be constructed after clearing and stripping of topsoil and are to be in place before the beginning of other construction activities.

G. No water which transports sediment resulting from earth moving, demolition, or other construction activities shall be permitted to discharge beyond the limits of disturbance or grading indicated on the drawings.

3.3 SITE PREPARATION

A. Following the setting up of temporary fencing, tree protection and temporary erosion control measures as specified, remove trees, shrubs, grass and other vegetation or obstructions which interfere with new construction. Completely remove stumps of trees and shrubs which are located within ten feet of proposed new construction, including buildings, roads, etc. to at least one foot below finish grade.

B. Strip all topsoil to the full depth of the topsoil horizon, minimum 6 inches, from the area to be disturbed by new earthwork or construction.

1. Keep topsoil reasonably free from subsoil, debris, and stones larger than two inches.
2. Stockpile topsoil for future use in location to be approved by the Architect. If so directed by the Architect, create separate stockpiles for different stripped areas.
3. Prevent erosion of stockpiles, as specified in Section 015713.

3.4 EXCAVATION

A. Excavation is unclassified and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.

B. The Contractor shall perform excavation to the dimensions and elevations indicated on the drawings for all buildings and structures and work incidental thereto. For excavation of infiltration beds, see Section 33 41 00 – Storm Utility and Structures and Section 33 31 00 Sanitary Sewerage Utility Piping.

C. Excavated materials to be reused for topsoil, backfill, or other purposes shall be piled away from the edge of the excavated area a sufficient distance to prevent overloading the bank, and graded in such a way as to prevent surface water from entering the excavated area. Excess material from excavation not suitable or required for backfill or other purposes shall be hauled from the site as excavated and disposed of legally.

Exposed subgrades outside of ultimate stormwater infiltration or bioretention areas shall be proof rolled with heavy pneumatic-tired equipment in the presence of the Geotechnical Testing Agency to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades. At minimum, a triaxle dump truck (loaded) with minimum tire pressure of 100 psi (Gross Vehicle Weight of 75,000 lb) should be used.

Excavate and replace soft or unstable areas of subgrade and replace with approved compacted fill as directed by the Geotechnical Testing Agency. The Contractor should refer to the pavement subgrade over excavation detail should soft or unstable areas be encountered. Over excavation should consist of 1’ min to 3’ max depth in areas identified as unsuitable by proof rolling, the placement of Class 4, type A geotextile, and backfilled with compacted dense graded aggregate. Use select fill material specified in 2.2.E. as PADOT 2A per 703.2 or approved crushed, recycled concrete of similar gradation.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Geotechnical Testing Agency.

E. Rock Excavation: The following classifications of excavation will be made when rock is encountered:

1. Earth Excavation includes excavation of pavements and other obstructions visible on surface; underground structures, utilities, and other items indicated to be demolished and removed; together with earth and other materials encountered that are not classified as rock or unauthorized excavation.
2. Rock excavation for trenches and pits includes removal and disposal of materials and obstructions encountered that cannot be excavated with a track-mounted power excavator, equivalent to Caterpillar Model No. 2l5C LC, and rated at not less than 115 HP flywheel power and 32,000-pound drawbar pull and equipped with a short stick and a 42-inch wide, short tip radius rock bucket rated at 0.81 cubic yard (heaped) capacity. Trenches in excess

of l0 feet in width and pits in excess of 30 feet in either length or width are classified as open excavation.

3. Rock excavation in open excavations includes removal and disposal of materials and obstructions encountered that cannot be dislodged and excavated with modern, track-mounted, heavy-duty excavating equipment without drilling, blasting, or ripping. Rock excavation equipment is defined as caterpillar Model No. 973 or equivalent track- mounted loader, rated at not less than 210 HP flywheel power and developing minimum of 45,000-pound breakout force (measured in accordance with SAE J732).

    a. Typical of materials classified as rock are boulders 1/2 cu. yd. or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits.

    b. Intermittent drilling, blasting, or ripping performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation.

4. Do not perform rock excavation work until material to be excavated has been cross-sectioned and classified by Geotechnical Testing Agency. Such excavation will be paid on basis of contract conditions relative to changes in work.
5. Rock payment lines are limited to the following:

    a. Two feet outside of concrete work for which forms are required, except footings.

    b. One foot outside perimeter of footings.

    c. In pipe trenches, 6 inches below invert elevation of pipe and 2 feet wider than inside diameter of pipe, but not less than 3 feet minimum trench width.

    d. Outside dimensions of concrete work where no forms are required.

    e. Under slabs on grade, 6 inches below bottom of concrete slab.

F. Excavation for Structures

1. Excavation shall extend two (2) feet from the neat lines of structures to the face of bank or shoring to allow working space and inspection, except where concrete is to be deposited directly against excavated surfaces.
2. Conform to elevations and dimensions shown within a tolerance of 0.10 feet.
3. All loose material shall be removed from excavations, and bottoms shall be carefully leveled to grade.
4. Do not excavate to full depth when rain or freezing conditions are imminent. Protect completed foundation soil surface from frost.
5. The Contractor shall furnish 48 hours advance notification to the Geotechnical Testing Agency of times when footing excavations are to be completed so that the bearing quality of bottoms may be inspected and/or tested. Place no forms or concrete before approval of the excavation by the Geotechnical Testing Agency.
6. The Geotechnical Testing Agency shall inspect the open excavation to verify the bearing capacity of supporting undisturbed soil. Natural and fill soils are to have a minimum bearing capacity of 3,000 psf (pounds per square foot).
7. If the Geotechnical Testing Agency determines that unsatisfactory soil is present, or that bearing capacity at the indicated elevation is inadequate, continue excavation and replace with approved compacted load-bearing structural fill material as directed by the Geotechnical Testing Agency. Such excavation shall be classified as additional work and payment shall be made in accordance with the General Conditions.
8. If foundation subgrade is found to be unstable or directly on rock, the existing soils/rock

shall be removed to a minimum depth of two feet below the proposed bottom elevation, or to a depth where firm to stiff natural soils or rock is encountered. Replace undercut areas with approved compacted load-bearing structural fill material in accordance with these specifications and as directed by the Geotechnical Engineer.

G. Excavation for Trenches

1. Trenches shall be of minimum width necessary to lay pipes and shall be excavated to exact depth and grade. Trench bottoms shall have proper and uniform grade between inverts.
2. Bottoms of all trenches shall be trimmed by hand, so that the lower one-third of pipe is continuously supported on undisturbed or compacted soil with the slope of the pipe uniform between established elevations. Bottoms of all trenches shall be hand recesses at bells, pipe couplings, valves and other protuberances.
3. Where rock or shale is encountered, the trench shall be excavated deeper as indicated below, and a layer of rock-free gravel (1/4-inch maximum size) shall be hand tamped over the trench bottom. This bed shall be a minimum of 4 inches thick for pipes 8 inches and smaller, 6 inches for pipes 10 to 20 inches, and 9 inches for pipes 24 inches and larger. Additional similar material shall be packed around the pipe to a depth of approximately 1/2 of the diameter of the pipe.
4. Whenever wet or otherwise unstable soil that is incapable of properly supporting the pipe is encountered in the bottom of the trench, such soil shall be removed to the depth required and the trench backfilled to the proper grade with a coarse sand, fine gravel, or other approved material.

H. Excavation for Pavements

1. Cut surface under pavements to comply with cross-sections, elevations and grades as indicated.

I. Stability of Excavations

1. General: Comply with local codes, ordinances, and requirements of agencies having jurisdiction.

2. Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
3. Shoring and Bracing: Silty on-site soils are considered Type B per OSHA excavation regulations. The sidewalls of excavations deeper than 4 feet must be sloped, benched, or adequately shored per OSHA regulations. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.

    a. Provide permanent steel sheet piling or pressure-creosoted timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops a minimum of 2'-6” below final grade and leave permanently in place.

J. Dewatering

1. The contractor shall pump out or otherwise remove any water which may be found in the excavation, and he shall provide drainage ditches, under-drains, flumes, well points, and

pumping equipment, as necessary, to keep the excavation entirely clear of water while the foundations are being built or other operations are being performed requiring a dry condition. Do not use trench excavations as temporary drainage ditches.

2. All discharge resulting from de-watering of excavations shall be collected and diverted to facilities for removal of sediment or into a sediment filter bag and discharged over a level vegetated area. Such facilities shall be reviewed and approved by the Engineer before their construction. Water shall be conveyed to areas specified by the Engineer on-site. No water shall be run directly to streams or drains.

K. Cold Weather Protection

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

3.5 FILLING AND BACKFILLING

A. General: Place soil material in layers to required subgrade elevations, for each area classification listed below, using materials specified in Part 2 of this Section.

1. Under grassed areas, use satisfactory excavated or borrow material.
2. Under walks and pavements, use subbase material, satisfactory excavated or borrow material or a combination.
3. Under steps, use subbase material.
4. Under footings and foundations use select fill material or approved imported load-bearing structural fill material.
5. Under building slabs, use drainage fill material.
6. Under piping and conduit and equipment, use subbase materials where required over rock bearing surface and for correction of unauthorized excavation. Shape excavation bottom to fit bottom 90 degrees of cylinder.
7. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and that are carried below bottom of such footings or that pass under wall footings. Place concrete to level of bottom of adjacent footing.

    a. Concrete is specified in Division 3.
    b. Do not backfill trenches until tests and inspections have been made and backfilling is authorized by Geotechnical Testing Agency. Use care in backfilling to avoid damage or displacement of pipe systems.

8. Provide 4-inch-thick concrete base slab support for piping or conduit less than 2'-6” below surface of roadways. After installation and testing of piping or conduit, provide minimum 4-inch-thick encasement (sides and top) of concrete prior to backfilling or placement of roadway subbase.

B. Backfill excavations as promptly as progress of the Work permits, but not until completion of the following:

1. Acceptance of construction below finish grade including, where applicable, damp proofing, waterproofing, and perimeter insulation.
2. Inspection, testing, approval, and recording locations of underground utilities have been performed and recorded.
3. Removal of concrete formwork.
4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.

5. Removal of trash and debris from excavation.
6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

C. Placing and compacting

1. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
2. When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.
3. Place backfill and fill materials in layers not more than 8 10 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 6 inches in loose depth for material compacted by hand-operated tampers.
4. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
5. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.
6. Control soil and fill compaction, providing minimum percentage of density specified for each area classification indicated below. Correct improperly compacted areas or lifts as directed by Geotechnical Testing Agency if soil density tests indicate inadequate compaction.

    a. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density, in accordance with ASTM D698:

        Under structures, building slabs and steps, pavements, and utilities compact top 12 inches of subgrade and each layer of backfill or fill material at 98 percent maximum density.

        Under walkways, pavements, and utilities compact top 6 inches of subgrade and each layer of backfill or fill material at 95 percent maximum density.

        Under vegetated or unpaved areas, compact top 6 inches of subgrade and each layer of backfill or fill material at 85 percent maximum density.

        Under walkways, pavements, and utilities compact top 6 inches of subgrade and each layer of backfill or fill material at 95 percent maximum density.

        Under bioretention areas, no compaction shall be permitted. Areas of the bioretention area compacted during the course of construction shall be harrowed or disced to restore permeability in accordance with Bioretention area specifications. If permeability cannot be restored, over-excavation and backfill with clean, open-graded stone may be required.

    b. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water

from appearing on surface during or subsequent to compaction operations.

1) Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
2) Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.
3) If aeration does not reduce the moisture content to an acceptable level, admixtures (lime, fly-ash, cement, or dry granular soil) will be required to modify moisture and aid in compaction. If admixtures are used, laboratory testing must be performed to determine the appropriate admixture(s) amounts, maximum dry density, and optimum moisture content.

3.6 FIELD QUALITY CONTROL

A. Notify Geotechnical Testing Agency for inspection and approval of subgrades and fill layers before subsequent construction is permitted thereon. Allow testing service to inspect and approve each subgrade and fill layer before further backfill or construction work is performed.

A. Perform field density tests in accordance with ASTM D1556 (sand cone method) or ASTM D 2167 (rubber balloon method), as applicable.

1. Field density tests may also be performed by the nuclear method in accordance with ASTM D2922 ASTM D6938, providing that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D1556. In conjunction with each density calibration check, check the calibration curves furnished with the moisture gages in accordance with ASTM D3017.
2. If field tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Geotechnical Testing Agency.

C. Footing Subgrade: For each strata of soil on which footings will be placed, perform at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata when acceptable to Engineer.

D. Paved Areas: Perform at least one field density test of subgrade for every 2,000 sq. ft. of paved area or building slab, but in no case fewer than three tests. In each compacted fill layer, perform one field density test for every 2,000 sq. ft. of overlaying building slab or paved area, but in no case fewer than three tests.

E. Foundation Wall Backfill: Perform at least one test for each 50 feet or less of wall length, but not fewer than two three tests.

F. Backfill at Retaining Wall: Perform at least one test for each 50 feet or less of wall length but not fewer than two three tests.

G. Trench Backfill: Perform at least one test for each 50 feet or less of trench length, but not fewer than two three tests.

H. If in opinion of Geotechnical Testing Agency, based on testing service reports and inspection, subgrade or fills that have been placed are below specified density, perform additional

compaction, or remove and replace compacted fill material until specified compaction is achieved.

3.7 GRADING

A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated or between such points and existing grades.

B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes and as follows:

1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 foot above or below required subgrade elevations.
2. Walks: Shape surface of areas under walks to line, grade, and cross-section, with finish surface not more than 0.10 foot above or below required subgrade elevation.
3. Pavements: Shape surface of areas under pavement to line, grade, and cross-section, with finish surface not more than 1/2 inch above or below required subgrade elevation.

C. Grading Surface of Fill under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2 inch when tested with a 10-foot straightedge. The Surveyor shall verify that grades, slopes, and levels are in conformance with the drawings and specifications.

D. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

3.8 PAVEMENT SUBBASE COURSE

A. General: Subbase course consists of placing subbase material, in layers of specified thickness, over subgrade surface to support a pavement base course.

1. Refer to other Division 32 sections for paving specifications.

B. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.

C. Shoulders: Place shoulders along edges of subbase course to prevent lateral movement.

D. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each subbase course layer. Compact and roll at least a 12-inch width of shoulder simultaneous with the compaction and rolling of each layer of subbase course.

E. Placing: Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.

1. When a compacted subbase course is indicated to be 6 inches thick or less, place material in a single layer. When indicated to be more than 6 inches thick, place material in equal layers, except no single layer more than 6 inches or less than 3 inches in thickness when compacted.

3.9 TEMPORARY SEEDING

A. Temporary seeding and mulching shall be required on all freshly graded areas immediately following earthmoving procedures. Seed-free straw or salt hay mulch shall be applied at a rate of 1 ton per acre (40 lbs. per 1000 square feet) over temporary seeded areas. Straw bale barriers shall be placed in swale areas until vegetation is established.
B. Temporary seeding shall consist of sod, a blend of turf-type tall fescue and Kentucky Blue Grass (100 percent by weight) or equivalent and shall be placed at 30 lbs per acre or 10 lbs per 1,000 square feet.
C. Should temporary seeding not be possible or not establish itself properly, mulch as described above, pending fine grading or permanent seeding.

3.10 FINISH GRADING

A. Spreading of planting soil and finish grading shall be coordinated with the work of the Landscape Contractor and the seeding dates described in Section 32 93 00, Plants. No work shall be performed until after verification of slopes and grades as described in this Section and until after approval by the Architect.

B. Verify that the rough grades meet requirements for tolerances, materials, and compaction.

C. Correct washouts, swales, berms, and other irregularities to provide a smooth, uniform surface without low places where water will stand.

D. Surface of subgrades shall be loosened and made friable by cross-discing or harrowing to a depth of 2" (inches). Stones and debris more than 1-1.5" (inches) in any dimension shall be raked up and grade stakes and rubbish removed.

E. Planting Soil shall be per Section 32 91 15, Soil Preparation.

F. Permanent seeding work shall be begun within one week of the completion of fine grading. If grading is completed at a time of the year when seeding work is not to be done or if this is otherwise not possible, mulch entire area with seed-free salt straw or salt hay at a rate of one ton per acre. Anchor mulch with a mulch binder approved by Architect.

G. Any discrepancies which occur due to misgrading or to disturbance or erosion shall be regraded and re-rolled to the satisfaction of the Architect.

3.11 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal to Designated Areas on Owner's Property: Transport acceptable excess excavated material to designated soil storage areas on Owner's property. Stockpile soil or spread as directed by Architect.

B. Removal from Owner's Property: Remove waste materials, including unacceptable excavated material, trash, and debris, and legally dispose of it off Owner's property. The Contractor is responsible for obtaining a legal disposal site and necessary permits (as required) for disposal of excess earthwork materials and debris. The Contractor also agrees to hold the Owner harmless from all damages, fines, etc. arising out of improper disposal, if not otherwise provided by law.

3.12 CERTIFICATION

A. Upon completion of this portion of the work, and as a condition of its acceptance, deliver to the Architect written reports from the soils engineer and the surveyor.

1. The Geotechnical Testing Agency shall certify that the compaction requirements have been obtained. State in the report the area of fill or embankment, the compaction density obtained, and the type or classification of fill material placed.
2. The Surveyor shall certify that the layout, grades, slopes, and levels are in conformance with the drawings and specifications as outlined in this Section.

END OF SECTION

SECTION 329113

SOIL PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes planting soils for planting areas only, specified according to performance requirements of the mixes.

B. Related Requirements:
1. Section 329200 "Turf and Grasses" for placing planting soil for turf and grasses.
2. Section 329300 "Plants" for placing planting soil for plantings.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM) Standards as listed in Specification.

1.4 DEFINITIONS

A. AAPFCO: Association of American Plant Food Control Officials.

B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or unamended soil as indicated.

C. CEC: Cation exchange capacity.

D. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.

E. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.

F. Imported Soil: Soil that is transported to Project site for use.

G. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.

H. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of analytical data.

I. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."

J. Planting Soil: Imported soil or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

K. RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.

L. SSSA: Soil Science Society of America.

M. 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.

N. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

O. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.

P. USCC: U.S. Composting Council.

1.5 ACTION SUBMITTALS

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

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

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For each testing agency.

B. Preconstruction Test Reports: For preconstruction soil analyses specified in "Preconstruction Testing" Article.

C. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.

1. Laboratories: Subject to compliance with requirements, qualified independent soil testing services include, but are not limited to:

a. Penn State College of Agricultural Sciences, Agricultural Analytical Services Lab
111 Ag Analytical Services Lab, University Park, PA 16802
Phone: 814-863-0841
Email: aaslab@psu.edu
www.agsci.psu.edu

b. Rutgers Soil Testing Laboratory
Rutgers, The State University of New Jersey
57 US Highway 1, New Brunswick, NJ 08901-8554
Phone: 848-932-9295
Email: soiltest@njaes.rutgers.edu
https://njaes.rutgers.edu/soil-testing-lab/

2. Multiple Laboratories: At Contractor's option, work may be divided among qualified testing laboratories specializing in physical testing, chemical testing, and fertility testing.

1.8 PRE-CONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction soil analyses on existing on-site soil and imported soil.
1. Notify Landscape Architect at least seven (7) days in advance of the dates and times when laboratory samples will be taken.

B. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.
1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.9 PRE-CONSTRUCTION SOIL-SAMPLING REQUIREMENTS

A. General: Extract soil samples according to requirements in this article.

B. Sample Collection and Labeling: Have samples taken and labeled by Contractor in presence of Landscape Architect under the direction of the testing agency.
1. Number and Location of Samples: Minimum number of representative soil samples to be determined by testing agency for each soil to be used or amended for landscaping purposes.

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

1.10 PRE-CONSTRUCTION TESTING REQUIREMENTS

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

B. Physical Testing:
1. Soil Texture: Soil-particle, size-distribution analysis by the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":
a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
b. Hydrometer Method: Report percentages of sand, silt, and clay.
2. Bulk Density: Analysis according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
3. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
4. Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
5. Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods"; at 85 percent compaction according to ASTM D698 (Standard Proctor).

C. Chemical Testing:
1. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
2. Clay Mineralogy: Analysis and estimated percentage of expandable clay minerals using CEC by ammonium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
3. Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and vanadium. If RCRA metals are present, include recommendations for corrective action.
4. Phytotoxicity: Test for plant-available concentrations of phytotoxic minerals including aluminum, arsenic, barium, cadmium, chlorides, chromium, cobalt, copper, lead, lithium, mercury, nickel, selenium, silver, sodium, strontium, tin, titanium, vanadium, and zinc.

D. Fertility Testing: Soil fertility analysis according to standard laboratory protocol of SSSA NAPT NEC-67, including the following:
1. Percentage of organic matter.
2. CEC, calcium percent of CEC, and magnesium percent of CEC.
3. Soil reaction (acidity/alkalinity pH value).
4. Buffered acidity or alkalinity.
5. Nitrogen ppm.
6. Phosphorous ppm.
7. Potassium ppm.
8. Manganese ppm.
9. Manganese-availability ppm.
10. Zinc ppm.
11. Zinc availability ppm.

12. Copper ppm.
13. Sodium ppm.
14. Soluble-salts ppm.
15. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
16. Other deleterious materials, including their characteristics and content of each.

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

F. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.
1. Fertilizers and Soil Amendment Rates: State recommendations in weight per 1,000 sq. ft. for 6-inch depth of soil.
2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per 1000 sq. ft. for 6-inch depth of soil.

1.11 POST-CONSTRUCTION TESTING

A. Post-Construction Testing Service: Engage a qualified testing agency to perform post-construction analyses on amended planting soil with compost incorporated.
1. Notify Landscape Architect seven (7) days in advance of the dates and times when laboratory samples will be taken.

B. Post-Construction Soil Analyses: For each amended soil, perform testing on soil samples and furnish soil analysis and a written report by a qualified testing agency performing the testing according to “Soil-Sampling Requirements” and “Testing Requirements” articles.
1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.12 POST-CONSTRUCTION SOIL-SAMPLING REQUIREMENTS

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

B. Fertility Testing:
1. Percentage of organic matter.
   a. Organic matter content must be 4% minimum.
2. CEC, calcium percent of CEC, and magnesium percent of CEC
3. Soil reaction (acidity / alkalinity pH value).
   a. pH levels must be between 5.5 and 6.0. Lower pH by using elemental sulfur product. Peat moss or copper sulfate may not be used to lower pH.
4. Buffered acidity or alkalinity.
5. Nitrogen ppm.
6. Phosphorus ppm.
7. Potassium ppm.
8. Manganese ppm.
9. Manganese-availability ppm.

10. Zinc ppm.
11. Zinc-availability ppm.
12. Copper ppm.
13. Sodium ppm.
14. Soluble-salts ppm.
    a. Soluble-salts measurement must be less or equal to 2 mmho/cm.
15. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
16. Other deleterious materials, including their characteristics and content of each.
17. Percolation test to ensure adequate drainage and proper mixing of compost.

C. Recommendations: The analysis tests shall show recommendations for soil additives or fertilizers to correct soil mixes' deficiencies as necessary.

D. Deficiencies: Nutrient deficiencies shall be corrected at time of installation.

1.13 DELIVERY, STORAGE, AND HANDLING

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

B. Bulk Materials:
1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Do not move or handle materials when they are wet or frozen.
4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

PART 2 - PRODUCTS

2.1 PLANTING SOIL

A. Planting Soil: Existing, on-site surface soil with the duff layer, if any, retained; and stockpiled on site and modified to produce viable planting soil, or imported, naturally formed or manufactured soil from off-site sources consisting of fertile, friable, naturally fine sandy loam, (USDA classification for soil consisting of 10-20 percent clay, 30-50 percent silt and 50-70 percent fine sand, particle 0.10-0.25 mm.) pH range of 5.5 to 7, 4 percent organic material minimum, and with sufficient structure to give good tilth and aeration
1. Using preconstruction soil analyses and materials specified in other articles of this Section, amend existing, on-site surface soil to become planting soil complying with the requirements.
2. For off-site sources, take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches deep, not from agricultural land, bogs, or marshes; and that do not contain undesirable organisms or disease-causing plant pathogens.Soil shall not contain any noxious weeds or invasive plants, including, but not

limited to, quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass.

3. Planting Soil shall not include any of the following:
   a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
   b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand 1-inch or larger.
4. Amend existing or imported soil with materials specified in other articles of this Section to become planting soil complying with the following requirements:
   a. Particle Size Distribution by Separates:
      - Fine Sand: 50% to 70% percent by dry weight.
      - Silt: 30% to 50% percent by dry weight.
      - Clay: 10% to 20% percent by dry weight.
   b. Percentage of Organic Matter: Minimum 4% by volume.
   c. Soil Reaction: pH of 5.5 to 7 in accordance with pH range of plants specified.
   d. CEC of Clay Fraction: Maximum 15 meq/100 mL at pH of 7.0.
   e. Soluble-Salt Content: 5 to 10- dS/m measured by electrical conductivity.
   f. RCRA Metals: Below maximum limits established by the EPA.
   g. Phytotoxicity: Below phytotoxicity limits established by SSSA.
5. Acceptable ranges for base saturation percentages are:

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

B. Unacceptable Properties
   1. Clean soil of the following:
      a. Unacceptable Materials: concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, litter or other extraneous materials that are harmful to plant growth.
      b. Unsuitable Materials: stones 1-inche or larger in any dimension, noxious seeds, sticks, brush, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 8% by dry weight of the imported soil.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
   1. Class: T, with a minimum of 99 percent passing through a No. 8 sieve and a minimum of 75 percent passing through a No. 60 sieve.

B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Perlite: Horticultural perlite, soil amendment grade.

E. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve.

F. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C33/C33M.

G. Diatomaceous Earth: Horticultural diatomaceous earth, soil amendment grade.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:
   1. Feedstock: Compost may be derived from: agricultural, food, or industrial residuals; biosolids (treated sewage sludge); yard trimmings; source-separated or mixed solid waste. The product shall contain no substances toxic to plants and shall be reasonably free (< 1% by dry weight) of man-made foreign matter. The compost will possess no objectionable odors and shall not resemble the raw material from which it was derived. Do not use compost that has received the addition of liming agents or ash by-products. The product shall be certified through the U.S. Composting Council's (USCC) Seal of Testing Assurance (STA) Program.
   2. Reaction: pH of 5.5 to 8
   3. Soluble-Salt Concentration: Less than 5 dS/m.
   4. Moisture Content: 35 to 55 percent by weight.
   5. Particle Size: 100 percent passing through a 1/2-inch sieve.
   6. The compost supplier shall test all compost products within 90 Calendar Days prior to application. Samples shall be collected using the Seal of Testing Assurance (STA) sample collection protocol. The sample collection protocol can be obtained from the U.S. Composting Council, 4250 Veterans Memorial Highway, Suite 275, Holbrook, NY 11741 Phone: (631) 737-4931, www.compostingcouncil.org.
      a. The sample shall be sent to an independent STA Program approved laboratory. The compost supplier shall pay for the test. A copy of the approved independent STA Program laboratory test report shall be submitted to the Landscape Architect prior to initial application of the compost. Seven days prior to application, the Contractor shall submit a sample of each type of compost to be used on the project to the Landscape Architect.
   7. Compost not conforming to the above requirements or taken from a source other than those tested and accepted shall be immediately removed from the project and replaced at no cost to the Owner.
   8. The Contractor shall submit the following information to the Landscape Architect for approval:
      a. The supplier shall verify in writing and provide lab analyses that the Materials comply with the processes, testing, and standards specified in these Specifications. An independent STA Program certified laboratory shall perform the analysis.
      b. A copy of the producer's STA certification as issued by the U.S. Composting Council.

2.4 FERTILIZERS

A. As required by soil analysis and recommendations.

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

PART 3 - EXECUTION

3.1 GENERAL

A. Place planting soil and fertilizers according to requirements in other Specification Sections.

B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.

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

D. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff of airborne dust to adjacent properties and walkways.

3.2 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil, or apply manufactured soil on site in its final, blended condition. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Subgrade Preparation: Till subgrade to a minimum depth of 4 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
   1. Apply, add soil amendments, and mix approximately half the thickness of unamended soil over prepared, loosened subgrade according to "Mixing" Paragraph below. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil.

C. Mixing: Spread unamended soil to total depth indicated on Drawings, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.
   1. Amendments: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them with unamended soil to produce planting soil.
      a. Mix lime and sulfur with dry soil before mixing fertilizer.
      b. Mix fertilizer with planting soil no more than seven days before planting.
   2. Lifts: Apply and mix unamended soil and amendments in lifts not exceeding 8 inches in loose depth for material compacted by compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

D. Compaction: Compact each blended lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D698.

E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.3 PROTECTION

A. Protection Zone: Identify protection zones as indicated on Drawings.

B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:
   1. Storage of construction materials, debris, or excavated material.
   2. Parking vehicles or equipment.
   3. Vehicle traffic.
   4. Foot traffic.
   5. Erection of sheds or structures.
   6. Impoundment of water.
   7. Excavation or other digging unless otherwise indicated.

C. If planting soil or subgrade is over-compacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Landscape Architect and replace contaminated planting soil with new planting soil.

3.4 CLEANING

A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.

B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.
   1. Legally dispose of excess subsoil and unsuitable materials off-site.

END OF SECTION

SECTION 329200

TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Seeding.
2. Sodding.
3. Turf renovation.
4. Erosion control materials.

B. Related Requirements:

1. Section 329113 "Soil Preparation" for information regarding planting soils.
2. Section 329300 "Plants" for trees, shrubs, ground covers, and other plants.

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

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

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

D. Planting Soil: Imported soil or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 "Soil Preparation" and drawing designations for planting soils.

E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.4 ACTION SUBMITTALS

A. Planting & Installation Schedule: Submit proposed planting and installation schedule, indicating dates for completion of work items, soil testing, , and installation of each type of turfgrass during normal seasons for such work in area of site.
   1. Correlate Plant & Installation Schedule with specified maintenance periods to provide maintenance from date of Substantial Completion. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.
   2. Submit letter notifying Owner and Landscape Architect of completion of planting work and requesting inspection to determine acceptability for Substantial Completion and beginning of Warranty Period.
   3. Submit letter to Owner and Landscape Architect requesting a final inspection of planting work for Final Acceptance at end of Warranty Period.

B. Turf Maintenance Schedule: Submit proposed turf maintenance schedule, indicating frequency of maintenance visits and scheduled maintenance activities to occur during visits.
   1. Plant maintenance shall include watering of plants. Loss of turf due to inadequate watering will be considered negligence of maintenance services and will require replacement at no cost to Owner.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

   1. Certification of each seed mixture for turfgrass seed. Include identification of source and name and telephone number of supplier.

C. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.

D. Product Certificates: For fertilizers, from manufacturer.

E. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1.6 CLOSEOUT SUBMITTALS

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

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.

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

1.8 DELIVERY, STORAGE, AND HANDLING

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

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in Turfgrass Producers International (TPI) "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

C. Bulk Materials:
1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

1.9 FIELD CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of planting completion.
1. Spring Planting: March 15 – June 15
2. Fall Planting: September 1 – November 15

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

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 not for less than the following periods:
1. Seeded Turf: Ninety (90) days from date of Substantial Completion.
a. When initial maintenance period has not elapsed before end of planting season, or turf is not fully established, continue maintenance during next planting season.
2. Sodded Turf: Thirty (30) days from date of Substantial Completion.

a. When initial maintenance period has not elapsed before end of planting season, or turf is not fully established, continue maintenance during next planting season.

PART 2 - PRODUCTS

2.1 TURFGRASS SEED

A. Turfgrass Seed: Certified, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.

B. Turfgrass Species, Cool-Season Grass: Sod of grass species as follows, with not less than 85 percent germination, not less than 95 percent pure seed, and not more than 0.5 percent weed seed:

Seed Type	Proportion by Weight	Minimum Purity	Minimum Germination
Turf-Type Tall Fescue (3 Varieties Min.)	60%	95%	80%
Perennial Rye Grass	30%	95%	85%
Kentucky Bluegrass	10%	90%	80%

2.2 TURFGRASS SOD

A. Turfgrass Sod: Certified, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.

B. Turfgrass Species, Cool-Season Grass: Sod of grass species as follows, with not less than 85 percent germination, not less than 95 percent pure seed, and not more than 0.5 percent weed seed:
   1. Mixture: 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.

2.3 FERTILIZERS

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

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

2.4 PLANTING SOIL

A. See Section 323913 “Soil Preparation.”

2.5 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley. Do not use field hay as it may contain weed seeds.

2.6 PESTICIDES

A. General: Pesticide, registered and approved by the 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. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

2.7 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.

PART 3 - EXECUTION

3.1 EXAMINATION

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

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

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by 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. General: Prepare planting area for soil placement and mix planting soil according to Section 32911 "Soil Preparation."

B. Newly Graded Subgrades: Loosed subgrade to a minimum depth of 8 inches. Remove stones larger than 1 1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner’s property.
   1. Spread planting soil to a depth of 6 inches 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.

C. 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 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.

D. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

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

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

A. Prepare area as specified in "Turf Area Preparation" Article.

B. For erosion-control blanket, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

C. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.

1. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
2. Do not use wet seed or seed that is moldy or otherwise damaged.
3. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate of 3 to 4 lb/1000 sq. ft.

C. Rake seed lightly into top 1/8-inch of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets installed and stapled according to manufacturer's written instructions.

E. Protect seeded areas with slopes between1:6 and 1:4 with erosion control fiber mesh installed and stapled to manufacturer’s written instructions.

F. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.
1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.

G. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch (4.8 mm), and roll surface smooth.

3.6 SODDING

A. Lay sod within 24 hours of harvesting unless a suitable preservation method is accepted by Landscape Architect prior to delivery time. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to soil or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
1. Lay sod across slopes exceeding 1:3.
2. Anchor sod on slopes exceeding 1:6 with wood pegs spaced as recommended by sod manufacturer but not less than two anchors per sod strip to prevent slippage.

C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2-inches below sod.

3.7 TURF RENOVATION

A. Renovate existing turf where indicated or where existing turf is damaged due to construction activities.

B. Renovate turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.
   1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
   2. Install new planting soil as required.

C. Remove sod and/or seed and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

D. Remove topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.

E. Mow, dethatch, core aerate, and rake existing turf.

F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

I. Apply soil amendments and initial fertilizer required for establishing new turf and mix thoroughly into top 4-inches of existing soil. Install new planting soil to fill low spots and meet finish grades.
   1. Soil Amendment(s): Apply soil amendment(s) according to requirements of Section 329113 "Soil Preparation."
   2. Initial Fertilizer: Slow-release fertilizer applied according to manufacturer's recommendations.

J. Apply seed and protect with straw mulch and sod as required for new turf.

K. Water newly planted areas and keep moist until new turf is established.

3.8 TURF MAINTENANCE

A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
   1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
   2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
   3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and/or turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.
   1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
   2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
   1. Mow installed sod to a height of 1-1/2 to 2 inches.

D. Turf Postfertilization: Apply slow-release fertilizer after initial mowing and when grass is dry.
   1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.9 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Landscape Architect:
   1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
   2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.10 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to 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 Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.11 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

D. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION

SECTION 329300

PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Trees (Understory).
   2. Shrubs.
   3. Fertilizers.
   4. Mulches.
   5. Tree Watering Bags.

B. Related Requirements:
   1. Section 329113 "Soil Preparation" for information regarding planting soil.
   2. Section 329200 "Turf and Grasses" for turf (lawn).

1.3 REFERENCES

A. American National Standards Institute (ANSI):
   1. Z60.1 – American Standards for Nursery Stock
   2. A300 – Standards for Tree Care Operations

B. United States Department of Agriculture (USDA):
   1. Plant Hardiness Zone Map

C. American Society for Testing and Materials (ASTM) Standards as listed in Specification.

1.4 DEFINITIONS

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

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

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

D. Finish Grade: Elevation of finished surface of planting soil.

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

F. Planting Area: Areas to be planted.

G. Planting Soil: Imported soil or manufactured soil that has been modified with soil amendments and/or fertilizers to produce a soil mixture best for plant growth. See Section 329115 "Soil Preparation (Performance Specification)" for drawing designations for planting soils.

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

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

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

K. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.5 COORDINATION

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

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Plant Materials: Contractor shall provide a confirmed Plant Schedule verifying quantities, sizes, quality, and sources for all specified plant materials.
      a. Contractor shall provide confirmed Plant Schedule to Landscape Architect a minimum of six (6) weeks prior to anticipated Plant Installation.
   2. Plant Photographs: For plant material not tagged in field by Landscape Architect, include color photographs in digital format of each required species and size of plant material as it will be furnished to Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 10 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.
      a. Landscape Architect reserves the right to reject plant material based on photographs that do not meet specification requirements or appear damaged, diseased, or otherwise unhealthy.

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

1. Plant Material: Bill of sale indicating full scientific name, quantity, plant size, and name of growing nursery for all plant material.
2. Organic and Compost Mulch: 1-quart (1-L) volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

C. Planting & Installation Schedule: Submit proposed planting and installation schedule, indicating dates for completion of work items, plant tagging, soil testing, digging of woody plants, and installation of each type of landscape work during normal seasons for such work in area of site.
1. Correlate Plant & Installation Schedule with specified maintenance periods to provide maintenance from date of Substantial Completion. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.
2. Submit letter notifying Owner and Landscape Architect of completion of planting work and requesting inspection to determine acceptability for Substantial Completion and beginning of Warranty Period.
3. Submit letter to Owner and Landscape Architect requesting a final inspection of planting work for Final Acceptance at end of Warranty Period.

D. Plant Maintenance Schedule: Submit proposed plant maintenance schedule, indicating frequency of maintenance visits and scheduled maintenance activities to occur during visits.
1. Plant maintenance shall include watering of plants. Loss of plants due to inadequate watering will be considered negligence of maintenance services and will require plant replacement at no cost to Owner.
2. A one-year watering plan shall be submitted as part of Plant Maintenance Schedule.

1.7 INFORMATIONAL SUBMITTALS

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

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

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

C. Sample Warranty: For special warranty.

1.8 CLOSEOUT SUBMITTALS

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

1.9 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.

1. Professional Membership: Installer shall be a member in good standing of either the National Association of Landscape Professionals or AmericanHort.
2. Experience: Engage an experienced Installer who has completed planting work similar in material, design, and extent to that indicated for this Project and with a record of successful plant establishment for a minimum of three (3) years.
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Pesticide Applicator: State-licensed, commercial.

B. Nursery Qualifications: A nursery specializing in growing and cultivating the plant specified in this Section with a minimum of six (6) years' experience.
1. Nurseries shall be members of the American Association of Nurserymen and Pennsylvania Landscape and Nurserymen's Association, or equivalent State organization(s).
2. Nurseries shall be within same plant hardiness zone and having similar climate conditions as Project Site. Zone shall be as defined on United States Department of Agriculture Plant Hardiness Zone Map.
    a. Nursery shall be located within 75-miles of Project site. Plant sources greater than this distance will not be accepted without written approval by Landscape Architect.

C. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

D. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

E. Plant Material Observation: Landscape Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality.
1. Landscape Architect may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
2. Notify Landscape Architect of sources of planting materials at least seven days in advance of delivery to site.

F. Substitutions: Substitutions will only be considered after review of plant availability with Landscape Architect. Submit request for substitutions in writing to Landscape Architect. **Substitutions will only be accepted with written approval by Landscape Architect.**

1.10 HARVESTING, DELIVERY, STORAGE, AND HANDLING

A. Tree Tagging: Landscape Architect may accompany Contractor to nursery to select and tag trees. Landscape Architect may choose to select and tag shrubs.
1. Landscape Architect shall select plants for proper visual formation. Contractor shall inspect selected plants for disease and other requirements of Contract Documents. Prior to nursery trip, Contractor shall have pre-selected Nursery(s) to ascertain the sufficient plants in size and species required, and provided the confirmed Plant Schedule to Landscape Architect.

2. The Landscape Architect may tag trees and shrubs of each species as a representative sample. Trees and shrubs delivered to the Project site without tags, and shrubs that do not equally match the quality of tagged samples, shall be rejected.

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

C. Bulk Materials:
1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

E. Handle planting stock by root ball.

F. The Contractor must verify that one of the following methods is used to protect plant material in transit:
1. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
   a. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
2. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

G. Deliver plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
2. Do not remove container-grown stock from containers before time of planting.
3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

H. All plant material must have labels showing botanical name on each individual plant. Plants without labels will rejected by Landscape Architect and shall be removed immediately from the Project Site.

I. Notify the Landscape Architect at least three (3) business days in advance of start of Work.

J. The Landscape Architect reserves the right to reject plant materials not meeting the above requirements.

1.11 FIELD CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work. Hand excavate, as required. Maintain grade stakes until parties concerned mutually agree upon removal.

B. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
   1. Spring Planting: March 15 – June 15
   2. Fall Planting: September 1 – November 15
   3. Planting outside of designated timeframes above may only occur with written approval from Landscape Architect.
   4. Planting between June 16 to August 31 is not permitted.

C. Plant trees after finished grades are established and before planting lawns, unless approved otherwise by Landscape Architect.
   1. When planting trees after lawn, protect lawn areas and promptly repair damage caused by planting operations.

D. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

E. Utilities: Determine location of above-grade and underground utilities and perform Work in a manner which will avoid damage. Hand excavate, as required. Maintain grade stakes until parties concerned mutually agree upon removal.
   1. Notify Owner no fewer than three (3) 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.

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

1.12 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Death and unsatisfactory growth, including resulting from lack of adequate maintenance during warranty period.
      b. Structural failures including plantings falling or blowing over.
      c. Faulty performance of tree stabilization edgings and tree grates.
      d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   2. Warranty Periods: From date of Substantial Completion and acceptance of Work by Owner.
      a. Trees, Shrubs, Vines, and Ornamental Grasses: Twelve (12) months.
      b. Ground Covers, Biennials, Perennials, and Other Plants: Twelve (12) months.
   3. Include the following remedial actions as a minimum:
      a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.

b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.
d. Provide extended warranty for period equal to original warranty period, for replaced plant material.
e. At end of Warranty Period, cut bindings around base of trunks and remove loose materials. Redistribute, add, and/or replace mulch as needed.

1.13 MAINTENANCE SERVICE

A. Initial Maintenance Service for Plant Material. 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 acceptable healthy and well-established but not for less than maintenance period below:
1. Maintenance Period for Trees and Shrubs: Twelve (12) months.
2. Ground Covers, Perennials, Ornamental Grasses, and Other Plants: Twelve (12) months.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable and will be rejected and shall be removed from the project site immediately.
2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
3. Acquire plants from nurseries within 100-mile radius of Project Site. Plant sources greater than this distance will not be accepted without written approval from Landscape Architect.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Labeling: Label each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.
1. Plants without labels will be rejected by Landscape Architect and shall be removed immediately from the Project Site.

2.2 TREES

A. Provided balled and burlapped trees, unless container-grown trees are specified on Plant Schedule.

B. Canopy Trees: Provide canopy trees with well-balanced crowns, straight trunks with intact main leaders, undamaged and uncut, and of height and caliper indicated on Plant Schedule, and conforming to ANSI Z60.1.
   1. Tree sizes and conditions shall meet or exceed requirements as specified on Plant Schedule. Contractor may elect to provide trees with larger caliper than specified at no additional cost to Owner.

C. Understory Trees: Provide understory trees that are upright and spreading, branched naturally according to species and type, and of height and container size indicated on Plant Schedule, and conforming to ANSI Z60.1.
   1. Understory trees shall have two to three main stems. Understory trees with four or more main stems may be rejected upon inspection by Landscape Architect.

2.3 SHRUBS

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

2.4 FERTILIZERS

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

2.5 PLANTING SOIL

A. See Section 323913 “Soil Preparation.”

2.6 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of the following:
   1. Type: Triple-Shredded hardwood bark.
   2. Size Range: 3-inch maximum, 1/2-inch minimum.
   3. Color: Natural and undyed.

B. Leaf Litter: Chopped or shredded leaves, free of weeds, seeds, loam, sand, clay, and other foreign substances. Acquire leaf litter locally from a source approved by Landscape Architect.

2.7 TREE-WATERING BAGS

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

2.8 MISCELLANEOUS PRODUCTS

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

B. Burlap: Non-synthetic, biodegradable.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

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

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Landscape Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.

3.3 PLANTING AREA ESTABLISHMENT

A. General: Prepare planting area for soil placement and mix planting soil according to Section 329113 "Soil Preparation ."

B. Placing Planting Soil: Place and mix planting soil in-place over exposed subgrade.

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

D. Around Existing Trees:
   1. Loosen existing soil surface by hand to a depth required to plant shrubs and / or herbaceous plants.
   2. Do not place more than 10” of planting soil under dripline of existing trees.
   3. Spread two-inch deep layer of compost over soil. Mix thoroughly into top six inches of soil. Excavate and remove existing soil as required to maintain existing grades of landscape beds.

E. Newly Graded Subgrades:
   1. Loosen compacted subgrade with a subsoil ripping tool to a depth of 18-inches and with vertical trenches 24-inches apart. Run subsoil-ripping tool in two directions at right angles to each other.
   2. Spread 2-inch deep layer of topsoil or planting mix over loosened subgrade. Mix thoroughly into top 4-inches of subgrade.
   3. Spread topsoil or planting mix to depths indicated, but not less than required, to meet finish grades after addition of amendments, light rolling, and natural settlement. Do no spread if topsoil or subgrade is frozen, muddy, or excessively wet. Apply soil amendments and fertilizer on surface and mix thoroughly into topsoil.
   4. Spread 2-inch deep layer of compost over topsoil. Mix thoroughly into top 6-inches of soil.
   5. After light rolling and settlement, compact in 6-inch lifts and compact to 85% of maximum dry weight according to ASTM D698, to depth required to meet grades and elevations as indicated on Drawings.

F. Finish Grade: Grade planting beds to a smooth, even surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.
   1. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

G. Stage installation of topsoil or planting mix to avoid travel by equipment over placed topsoil or planting mix.

H. Restore planting beds if eroded or otherwise disturbed

3.4 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits.

1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Scarify subgrade 2-inches, and trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Scarify sides of planting pit smeared or smoothed during excavation.
2. Excavate approximately three times as wide as ball diameter for balled and burlapped and container-grown stock.
3. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
4. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
5. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
6. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
7. Maintain supervision of excavations during working hours.
8. Keep excavations covered or otherwise protected after working hours or when unattended by Installer's personnel.

B. Obstructions: Notify Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

C. Drainage: Notify Landscape Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

3.5 TREE AND SHRUB PLANTING

A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with top of root ball at same elevation relative to ground level as in the nursery.
1. If soil is dry, moisten prepared planting areas before planting. Do not create muddy soil conditions.
2. Backfill: Approved planting soil.
3. Do not remove burlap from balls. After placing some backfill around root ball to stabilize plant, carefully cut and remove rope and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
4. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
5. Place fertilizer feeder packs equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball per manufacturer’s instructions.
    a. Quantity: Three (3) per canopy and understory tree.
6. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. Container-Grown Stock: Set each plant plumb and in center of planting pit or trench with top of root ball level with adjacent finish grades of planting soil.
   1. Backfill: Approved planting soil.
   2. Carefully remove root ball from container without damaging root ball or plant.
   3. Cut pot bound foots to prevent future root girdling.
   4. Place stock on setting layer of compacted planting soil.
   5. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
   6. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball per manufacturer's instructions.
      a. Quantity: One (1) per shrub.
   7. Continue backfilling process. Water again after placing and tamping final layer of soil.

E. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.6 TREE AND SHRUB PRUNING

A. Remove only dead, dying, or broken branches. Do not prune otherwise unless directed by Landscape Architect

B. Do not cut tree leaders unless directed by Landscape Architect.

C. Do not apply pruning paint to wounds.

3.7 PLANTING AREA MULCHING

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

3.8 INSTALLATION OF TREE WATERING BAGS

A. Provide one device for each tree.

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

3.9 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.

B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

D. Plant maintenance shall include watering of plants. Loss of plants due to inadequate watering will be considered negligence of maintenance services and will require plant replacement at no cost to Owner. A one-year watering plan shall be submitted as part of Plant Submittals.
   1. Install and maintain temporary drip irrigation piping and hoses to convey water from sources to planting areas and to keep plantings uniformly moist.

E. Fertilize trees approximately one year after installation between October and December, or between February and April. Unless otherwise indicated by soil test results, apply at a rate of 2 pounds of actual nitrogen per 1,000 square feet. Make insertion points approximately 2’-6” apart, at a depth of 6 inches. Apply fertilized in the ball and backfill area, and to approximately 1 foot outside of the planting hole.\

3.10 REPAIR AND REPLACEMENT

A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Landscape Architect.
   1. Submit details of proposed pruning and repairs.
   2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
   3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Landscape Architect.

B. Remove and replace trees that are more than 25 percent dead or in an unhealthy condition or are damaged during construction operations that Landscape Architect determines are incapable of restoring to normal growth pattern.
   1. Provide new trees of same size and species as those being replaced for each tree unless otherwise directed by Landscape Architect.

3.11 CLEANING AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

D. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

E. At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

3.12 FINAL INSPECTION

A. Inspection to determine completion and acceptance of planted areas will be made by the Landscape Architect, upon Contractor's request. Provide notification at least ten (10) business days before requested inspection date. Inspection comments will be submitted to the Contractor in writing.

B. Planted areas will be accepted provided all requirements, including the maintenance period have been complied with and plant materials are alive and in a healthy, vigorous condition.

C. Upon acceptance of Work, the Owner will assume plant maintenance and the plant material Warranty period will begin.

D. An additional inspection will be made near the end of the Warranty period to determine if plant materials need to be replaced. Plants shall be in a health, vigorous growing state and free of disease and insects.

END OF SECTION