



Note to Specifier (NTS): This is an example Landscape Soil Materials & Methods specification adapted from King County WTD Guide Spec. To be tailored for each specific project.

(NTS): For any questions, please contact King County SWD Organics Circular Economy PM at compost@kingcounty.gov

(NTS): Last updated 04/03/2024

SECTION 02920

LANDSCAPE SOIL MATERIALS AND METHODS

PART 1 GENERAL

1.01 SUMMARY

- A. This Section specifies the planting soils and mulches for planting, lawn and bioretention facilities.

1.02 QUALITY ASSURANCE

- A. **Control:** Provide one individual who shall be present at all times during execution of this portion of the work, who is thoroughly familiar with the type of materials being installed, the proper materials and methods for their installation, and the proper timing for installation.

1.03 GENERAL TESTING AND SUBMITTAL REQUIREMENTS

- A. The Contractor shall not place any soils or soil mixes until the Engineer has reviewed and approved the submittals outlined below, and the Mockups described in 3.01.
 - 1. All test results must be from product sampled and tested less than 90 days prior to date of first application on project.
 - 2. All testing costs shall be the responsibility of the Contractor.
- B. At least 10 Working Days prior to placement of any soils specified herein, the Contractor shall submit to the Engineer the following:
 - 1. Mineral Aggregate, Sand and Sandy Loam Analysis. Grain size analysis results of the Mineral Aggregate, Sand and Sandy Loam portion of each soil mix, including the percentages of particles passing each of the sizes specified in PART 2. MATERIALS. Analyses must be performed by an accredited laboratory, in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils.
 - 2. Compost Analysis. Quality analysis results for the compost portion of each soil mix, performed in accordance with U.S. Composting Council TMECC methods, as specified in Section 2.0.
 - 3. Fertilizers: Manufacturer's analysis.
 - 4. Mix Analysis. Test results from an accredited soil laboratory, including the following parameters:
 - a. Grain size including the sizes specified for each mix and ingredient, using ASTM D 422, Standard Test Method for Particle Size Analysis of Soils.
 - b. Total Nitrogen and Soluble Nitrogen (NO₃ + NH₃)
 - c. Phosphorous
 - d. Potassium
 - e. pH
 - f. Buffered soil reaction.

- g. Organic Matter % (Loss on Ignition method)
 - h. Conductivity dS/M
 - i. CEC and Base Saturation.
 - j. Calcium
 - k. Sulfur
 - l. Boron
 - m. Weed seed (for Playfield Soil Mix for Active Use Turf Areas)
5. Recommendations. Fertilizer, lime and amendment recommendations for the soil mix, specific to each specified plant type (turf, shrubs/groundcovers, annuals or Bioretention applications) and soil application depth; from the accredited laboratory, an accredited Soil Scientist or Agronomist.
 6. Mix Samples. Two one (1) gallon samples of each soil mix.
 7. Certificates. The Manufacturer's Certificate(s) of Compliance from the Supplier of the soil mixes, and (if different) the Suppliers of the compost, including their name(s) and address(es).
 8. Laboratory Information. Include the following information about each testing laboratory:
 - a. name of laboratory including contact person,
 - b. address,
 - c. phone contact,
 - d. e-mail address.
 - e. qualifications of laboratory and personnel including date of current certification by STA, ASTM, AASHTO, or approved equal.
- C. Acceptance of Delivered Soils. The Contractor shall not place any soils or soil mixes until the Engineer has reviewed and confirmed the following:
1. Soil mix delivery ticket(s). Delivery tickets must show that the full delivered amount of soil matches the product type, volume and Manufacturer named in the submittals.
 2. Visual match with submitted samples. Delivered product will be compared to the submitted sample, to verify that it matches the submitted sample.
 3. The Engineer may inspect any loads of soil on delivery and stop placement if they determine that the delivered soil does not appear to match the submittals; and require sampling and testing of the delivered soil before authorizing soil placement. All testing costs shall be the responsibility of the contractor.
- D. Referenced Standards: This Section incorporates by reference the latest revision of the following documents. These references are a part of this Section as specified and modified. In case of conflict between the requirements of this Section and those of a listed document, the requirements of this Section shall prevail.

<u>Reference</u>	<u>Title</u>
ASTM D1557	Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb./ft ³ (2,700 kN-m/m ³))
TMECC	Test Methods for the Evaluation of Composting and Compost (TMECC)
ASTM D 422	Standard Test Method for Particle Size Analysis of Soils, with hydrometer test of fraction finer than 2mm

1.04 TIMING OF WORK

- A. Work shall proceed as rapidly as the site becomes available, consistent with specified seasonal limitations for the planting.



- B. Soils shall not be worked when saturated, frozen, or in the presence of standing or ponding water. When a handful of soil is squeezed tightly it shall not release free water, nor form a clump that does not crumble into aggregates when poked with a finger or dropped on the ground from a 3 foot height.

1.05 PRODUCT HANDLING

- A. Delivery and Storage:
 1. Furnish standard products in manufacturer’s standard containers bearing original labels showing quantity, analysis, and name or manufacturer.
 2. Store products with protection from weather or other conditions which would damage or impair the effectiveness of the product.

PART 2 MATERIALS

2.01 SOILS

The following soils and soil mixes are specified on plans or by the Engineer, according to project needs, and are all subject to the General Testing and Submittal Requirements of 1.03:

1. **Planting Soil (2.02).** An imported mix of USDA Sandy Loam and Composted Organic Amendment, for planting beds, planted medians and passive-recreation turf areas.
2. **Winter Mix (2.03).** An imported mix of USDA Sandy Loam, clean sand and Composted Organic Amendment, for turf areas that receive moderate pedestrian traffic, planting beds requiring enhanced drainage, and where the Sandy Loam component is relatively high in clay.
3. **Playfield Soil Mix (2.04).** An imported mix of clean graded Sand and Composted Organic Amendment, to optimize drainage in sports fields, event lawns and other active use turf applications.
4. **Bioretention Soil (2.05).** An imported mix of graded Mineral Aggregate and compost specified to meet the infiltration and filtration requirements of stormwater management structures. (Note: Alternative Bioretention Soil Mixes may be specified where the application is within one-quarter mile of phosphorous sensitive surface water bodies).
5. **Reused Amended Site Soil (2.06).** Soil from the project site that is amended with compost in place or stockpiled during grading operations and then reapplied and amended with compost, as needed to meet minimum organic matter content requirements.

2.02 PLANTING SOIL

- A. The Planting Soil Mix shall consist of, by volume, 67% USDA Sandy Loam, and 33% Composted Organic Amendment per 2.07.
 1. The USDA Sandy Loam component shall meet the following sieve analysis, using ASTM D 422, Standard Test Method for Particle Size Analysis of Soils, with hydrometer test of fraction finer than 2mm:

Screen Size	Percent Passing
¾"	100
1/2"	95-100
1/4"	85-100
#10	60-95
Sand	60-75 of fraction passing #10
Silt	10-25 of fraction passing #10
Clay	6-15 of fraction passing #10

- B. The Planting Soil Mix shall meet the following:
 - 1. pH range of 5.5 - 7.5.
 - 2. Organic matter content of 8-13%
 - 3. EC of less than 2.0 mmhos/cm
 - 4. CEC greater than 10.
 - 5. Free from debris, deleterious material, weed seeds and propagules, and foreign matter that is detrimental to plant growth.
- C. Fertilizers:
 - 1. Add fertilizers of the types and quantity as recommended by an accredited soils testing laboratory to bring the planting mix to optimum fertility for the planting type and soil depth.
 - 2. Add plant fertilizer tablets to the planting holes of shrubs and trees.
 - 3. Fertilizers shall meet the general requirements of 2.09 and the recommendations of the testing laboratory.

2.03 WINTER MIX FOR MODERATE USE TURF AREAS AND PLANTING BEDS REQUIRING ENHANCED DRAINAGE

- A. Winter Mix shall consist of, by volume, 50% USDA Sandy Loam meeting the requirements of 2.02.A.1, 25% sand meeting the requirements of 2.08.B. and 25% Composted Organic Amendment per 2.07,
- B. The Winter Mix shall meet the following:
 - 1. pH range of 5.5 - 7.5.
 - 2. Organic matter content of 4-8%
 - 3. EC of less than 2.0 mmhos/cm
 - 4. CEC greater than 10
 - 5. Free from debris, deleterious material, weed seeds and propagules, and foreign matter that is detrimental to plant growth.
- C. Fertilizers:
 - 1. Add fertilizers of the types and quantity as recommended by an accredited soils testing laboratory to bring the Winter Mix to optimum fertility for the planting type and soil depth.
 - 2. Add plant fertilizer tablets to the planting holes of shrubs and trees.
 - 3. Fertilizers shall meet the general requirements of 2.09 and the recommendations of the testing laboratory.

2.04 PLAYFIELD SOIL MIX FOR ACTIVE USE TURF AREAS

- A. The Playfield Soil Mix shall consist of by volume 60% Sand meeting the requirement of 2.08.C., and 40% Composted Organic Amendment per 2.07.
- B. The Playfield Soil Mix shall meet the following:
 - 1. pH range of 5.5 - 7.5.
 - 2. Organic matter content of 3-6%
 - 3. EC of less than 2.0 mmhos/cm
 - 4. CEC greater than 5
 - 5. Free from debris, deleterious material, weed seeds and propagules, and foreign matter that is detrimental to plant growth.
- C. Fertilizers:

1. Add fertilizers of the types and quantity as recommended by an accredited soils testing laboratory to bring the playfield soil to optimum fertility for the turf type and soil depth.
2. Fertilizers shall meet the general requirements of 2.09 and the recommendations of the testing laboratory.

2.05 BIORETENTION SOIL MIX

General: The default Bioretention Mix specified in this section must be modified for applications within one-quarter mile of phosphorus sensitive receiving waters, if site soil does not meet suitability criteria for runoff treatment or if the design includes an underdrain. In those situations, High Performance Bioretention Soil Mixes are required <https://apps.ecology.wa.gov/publications/documents/2110023.pdf>. Refer to project Drawings for details of mix requirements, drain layers and liners.

- A. Bioretention soil shall consist of by volume two parts Composted Organic Amendment per 2.06.A. (approximately 35 to 40 percent by volume) and three parts Mineral Aggregate per 2.08.D. (approximately 60 to 65 percent). The mixture shall be well blended to produce a homogeneous mix.
- B. The Bioretention Soil Mix shall meet the following:
 1. Organic matter content shall be 3-6 percent,
 2. pH range of 5.5 - 7.5.
 3. EC of less than 2.0 mmhos/cm
 4. CEC greater than 5.
 5. Shall be free from debris, deleterious material, weed seeds and propagules, and foreign matter that is detrimental to plant growth.

2.06 REUSED AMENDED SITE SOIL

- A. General. Site soils may be amended in place, or stockpiled during grading or excavation operations, and amended to be used in place of Planting Soil.
 1. Reused Amended Site Soil shall meet the requirements of 2.02.A. Planting Soil.
 2. Reused Amended Site Soil may vary from the particle sizes specified in 2.02.A.1. per direction from the Engineer and Owners Soil Consultant (if applicable).
 3. Testing and Submittals. Testing and submittals shall comply with all provisions of 1.03 and 2.02.
- B. Source. Reused Amended Site Soil shall be native topsoil taken from within the Project Site where construction excavation or grading is to be performed.
 1. The general limits of the material to be utilized for topsoil will be indicated in the Contract.
 2. The Engineer will make the final determination of the areas where the most suitable soil for reuse exists within these general limits, and depth of excavation.
 3. The Contractor shall reserve this material for the specified use.
 4. Protection. Soil to be amended and used in place shall be protected from construction traffic and other activities that could compact or contaminate it, as directed by the Engineer and Owners Soil Consultant (if applicable). Protection shall include clear delineation of areas using barriers, signage and instructions to Contractors employees and sub-contractors.
 5. Stockpiles. Soil stockpiles shall be formed, located and protected from weather and contamination as directed by the Engineer and Owners Soil Consultant (if applicable). Protect project stockpiles of soil or compost during wet weather conditions to prevent saturation of materials prior to placement or imminent operations. Protection measure shall include storage on dry free-draining surfaces to prevent flooding or wicking of excessive moisture into piles, shaping stockpiles to shed moisture, and covering with plastic tarps secured against partial or complete removal by winds.



- C. Unwanted Vegetation. In the production of Reused Amended Site Soil, all herbaceous vegetative matter shall become a part of the topsoil, excluding woody brush and trees.
 - 1. Woody vegetation shall be removed and ground or disposed of as directed in the contract.
 - 2. Contractor shall mow or otherwise reduce the height of the native vegetation such to a height not exceeding 4 inches.
 - 3. Plants on the King County Noxious Weed Lists nor invasive root-propagating plants including but not limited to horsetail, ivy, clematis, knotweed, etc., shall not be incorporated in the topsoil. Such plants shall be removed and disposed.

2.07 COMPOSTED ORGANIC AMENDMENT

A. Compost

- 1. Quality. Compost production and quality shall comply with Chapter 173-350 WAC, be certified by the US Composting Council Seal of Testing Assurance (STA) Program, and meet the criteria in the following sections:
- 2. Regulatory Standards. Compost products shall be the result of the biological degradation and transformation of feedstocks as specified below, under controlled conditions designed to promote aerobic decomposition, per WAC 173-350-220, <https://apps.leg.wa.gov/WAC/default.aspx?cite=173-350-220>
- 3. Submittals. The Contractor shall submit the following information for approval:
 - a. A copy of the Solid Waste Handling Permit issued to the supplier by the Jurisdictional Health Department as per WAC 173-350 (Minimum Functional Standards for Solid Waste Handling), or for Biosolids composts a copy of the Coverage Under the General Permit for Biosolids Management issued to the manufacturer by the Department of Ecology in accordance with WAC 173-308 (Biosolids Management).
 - b. Lab analyses demonstrating that the Materials comply with the processes, testing, and standards specified in WAC 173-350 and these Specifications. An independent STA Program certified laboratory shall perform the analysis.
 - c. A list of the feedstocks by percentage present in the final compost product.
 - d. A copy of the producer's current STA certification as issued by the U.S. Composting Council.
- 4. Testing Requirements. The compost supplier shall test all compost products within 60 Calendar Days prior to application for the parameters listed in the following sections, at the supplier's expense.
 - a. Samples shall be collected using the Seal of Testing Assurance (STA) sample collection protocol.
 - b. The sample shall be tested by an independent STA Program certified laboratory.
- 5. Gradation. Compost shall meet the particle size gradations specified for Fine Compost, Medium Compost Blend, or Coarse Compost Blend, as directed on project drawings.

Compost shall meet the following size gradations when tested in accordance with the U.S. Composting Council "Testing Methods for the Examination of Compost and Composting" (TMECC) Test Method 02.02-B, "Sample Sieving for Aggregate Size Classification":

- a. **Fine Compost.** Fine Compost is typically used for soil amendment.

Fine Compost shall meet the following gradation by dry weight:

	Min.	Max.
Percent passing	2"	100%

Percent passing 1"	99%	100%
Percent passing 5/8"	90%	100%
Percent passing 1/4"	75%	100%
Maximum particle length		4"

- b. **Medium Compost Blend.** Medium Compost Blend is typically used for amending clay soils, for amending soils where predominantly native species of the Pacific Northwest will be planted, or surface mulching.

Medium Compost shall be a blend of 60-100% approved Compost and 0-40% clean ground Wood Chip per 2.11.C, or Bark per 2.11.D. The Medium Compost Blend shall meet the following gradation by dry weight:

	Min.	Max.
Percent passing 2"	100%	
Percent passing 1"	90%	100%
Percent passing 5/8"	75%	100%
Percent passing 1/4"	50%	80%
Maximum particle length		6"

- c. **Coarse Compost Blend.** Coarse Compost Blend, typically used for erosion control or surface mulching, shall be a blend of 60-100% approved Compost and 0-40% clean ground Wood Chip per 2.11.C, or Bark per 2.11.D. The Coarse Compost Blend shall meet the following gradation by dry weight:

	Min.	Max.
Percent passing 3"	100%	
Percent passing 1"	70%	100%
Percent passing 1/4"	40%	60%
Maximum particle length		6"

6. pH. The pH shall be between 6.0 and 8.5 when tested in accordance with TMECC 04.11-A, "1:5 Slurry pH".
7. Physical Contaminants. Manufactured inert material (concrete, ceramics, metal, etc.) shall be less than 0.5 percent by weight as determined by TMECC 03.08-A "percent dry weight basis". Film plastics shall be 0.1% or less, by dry weight.
8. Weeds. Compost shall be free of seeds and propagules of Noxious Weeds listed on the King county Noxious Weed List: <https://kingcounty.gov/services/environment/animals-and-plants/noxious-weeds/laws/list.aspx>
9. Organic Content. Organic matter content shall be 40-65 percent by dry weight basis, as determined by TMECC 05.07A, "Loss-On-Ignition Organic Matter Method".
10. Salinity. Soluble salt contents shall be less than 5.0 mmhos/cm tested in accordance with TMECC 04.10-A, "1:5 Slurry Method, Mass Basis".
11. Maturity. Maturity shall be greater than 80% in accordance with TMECC 05.05-A, "Germination and Vigor".
12. Stability. Stability shall be 7 or below in accordance with TMECC 05.08-B, "Carbon Dioxide Evolution Rate".
13. Feedstocks.
 - a. The compost product must originate a minimum of 65 percent by volume from recycled plant waste as defined in WAC 173-350-100 as "Yard waste", "Crop residues", and "bulking agents". A maximum of 35 percent by volume of "post-consumer food waste" as defined in WAC 173-350-100 may be substituted for

recycled plant waste. The Engineer may approve compost products containing biosolids or manure feedstocks for specific projects or soil blends, but these feedstocks are not allowed unless specified, and not allowed in compost used for Bioretention Soils.

- b. A minimum of 51% by volume of the feedstock shall originate from an organic waste system within King County, which includes organic waste originating from all cities and unincorporated areas within King County.
14. C:N. Fine Compost shall have a carbon to nitrogen ratio of less than 25:1 as determined using TMECC 04.01 "Total Carbon" and TMECC 04.02D "Total Kjeldhal Nitrogen". The Engineer may specify a C:N ratio up to 35:1 for projects where the plants selected are entirely Puget Sound native species. Medium Compost shall have a carbon to nitrogen ratio between 17:1 and 35:1. Coarse Compost shall have a carbon to nitrogen ratio of 25-35:1.

2.08 AGGREGATES FOR SOIL MIXES

A. General:

- 1. Mineral aggregates for soil mixes shall be free of wood, waste, coating, or and deleterious material. All mineral aggregate passing the No. 200 sieve size shall be non-plastic.
- 2. Mineral Aggregate shall be analyzed by an accredited lab using the sieve sizes noted below, and shall meet the following gradation:

B. SAND FOR WINTER MIX

- 1. Sand shall be free of deleterious materials and meet the following specifications within reasonable variations:

Sieve Size	Percent Passing
3/8"	100
1/4"	95-100
No. 10	85-100
No. 100	10-30
No. 200	<5

C. SAND FOR PLAYFIELD MIX

- 1. Sand shall be free of deleterious materials and meet the following specifications within reasonable variations:

Sieve Size	Percent Passing
3/8"	100
1/4"	95-100
No. 10	85-95
No. 30	60-75
No. 60	50-60
No. 100	20-30
No. 200	<5

D. MINERAL AGGREGATE FOR BIORETENTION

1. Sand shall be free of deleterious materials and meet the following specifications within reasonable variations:

Sieve Size	Percent Passing
1 inch	100
No. 4	60 - 100
No.10	40 - 100
No. 40	15 - 50
No. 200	2 - 5

2.09 FERTILIZERS

A. General:

1. Standard commercial grade of organic or inorganic fertilizer containing the amounts of total nitrogen, available phosphoric acid, and water-soluble potash specified below.
2. Furnish in standard unopened containers with weight, name of plant nutrients, and manufacturer's statement of analysis clearly marked, in accordance with state and federal laws.

B. Fertilizers for hydroseeded Planting Areas shall be included in the hydroseeding slurry and specified based on soil testing results.

1. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, phosphorous, and potassium in the following composition:
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing lab.

C. Planting Tablets: Tightly compressed chip type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.

1. Size: 10-gram tablets.
2. Nutrient Composition: 20 percent nitrogen – with 5-10% in water soluble forms, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.
3. Use appropriate number of tablets for plant container size, based on product label.

2.10 LIME

A. General:

Agricultural grade mineral soil conditioner containing 35 percent minimum magnesium carbonate and 49 percent minimum calcium carbonate, 100 percent passing No. 65 sieve.

2.11 MULCH

The following Mulch materials shall be specified on plans or by the Engineer, according to project needs, and are all subject to the General Testing and Submittal Requirements of 1.03:

A. Compost

1. Quality. Compost production and quality shall comply with all requirements of 2.06.
2. Blends. Compost for mulch may be blended with up to 40% clean Wood Chip or Bark to comply with the requirements of Medium Compost Blend 2.07.A.5.b or Coarse Compost Blend 2.07.A.5.c.

A. Bark

1. Quality. Bark mulch shall consist of ground bark from freshwater fir, pine, or hemlock trees. The bark shall not contain salts, resin, tannin, or any other deleterious material in quantities that would be detrimental to plant life.
2. Gradation. Bark shall be ground so that on a loose volume basis, a minimum of 90 percent passes a 1-inch sieve, and no more than 55 percent passes a 1/4 inch sieve.

B. Wood Chip

1. Quality. Wood Chip shall be derived from mechanical grinding or shredding of the above-ground portions of trees. It shall contain wood, wood fiber, bark, branches, and leaves; but shall not contain visible amounts of soil. It shall be free of weeds and weed seeds including but not limited to plants on the King County Noxious Weed List : <https://kingcounty.gov/services/environment/animals-and-plants/noxious-weeds/laws/list.aspx>, and of invasive plant portions capable of resprouting, including but not limited to horsetail, ivy, clematis, knotweed. Wood Chip may not contain more than 0.5% by weight of manufactured inert material (plastic, concrete, ceramics, metal, etc.).
2. **Gradation.** Wood Chip, when tested, shall meet the following loose volume gradation:

Sieve Size	Percent Passing	
	Minimum	Maximum
2"	95	100
1"	75	100
1/4"	0	40
Maximum particle length		8 inches

C. Wood Fiber for Hydroseeding

1. Quality. Wood fiber for Hydroseeding shall be specially processed 100 percent wood fiber, with tackifier added during the manufacturing process, and dyed a suitable color to facilitate inspection of placement of the Material. Wood fiber for Hydroseeding shall contain no growth or germination-inhibiting ingredients. It shall be manufactured in such a manner that after addition and agitation in slurry tanks with water, the fibers in the Material become uniformly suspended to form a homogenous slurry. When hydraulically sprayed on the ground, the Material shall allow the absorption and percolation of moisture.
2. Gradation. 30% of the fibers shall be 0.15 inches long or longer.
3. Each package of cellulose fiber shall be marked by the manufacturer to show the air dry weight content.

PART 3 EXECUTION

3.01 SOIL INSTALLATION MOCKUPS:

- A. Before placing each major soil preparation type, Contractor shall create a Mockup area demonstrating proposed soil placement, amendment and consolidation methods for the type, to be observed and approved by the Engineer and Owners Soil Consultant (if applicable).
 1. The size of each Mockup shall be adequate to demonstrate typical finished conditions using the chosen methods and equipment.
 2. Compacted densities in the Mockup soil will be tested by Engineer or Owners Soil Consultant to establish compliance with specified density.



3. Compaction testing method shall be chosen by the Engineer or Owners Soil Consultant, using cone penetrometer, core density analysis, or nuclear densometer; depending on project needs and resources.
- B. Contractor shall not proceed with soils placement or consolidation until the Engineer or Owners Soil Consultant provides written approval of the Mockup methods.
- C. The Mockup area shall be preserved and protected through project completion, to serve as a benchmark for density testing of subsequent installations.
 1. Frequency of density testing in completed areas shall be determined by the Engineer or Owners Soil Consultant.
 2. Mockup areas may be incorporated into the finished project.

3.02 PREPARATION OF SUB-GRADE:

- A. Subgrade shall be established at level specified on plan.
- B. Prior to placement of specified topsoil or amendment, subgrade shall be thoroughly scarified a minimum of 4 inches deep; by ripping, rototilling, or plowing. Rip or plow in multiple passes in perpendicular directions.
- C. Finished subgrade shall be cleaned of all debris including concrete, stumps, sticks, roots and rocks or lumps larger than 3 inches in any dimension; and inspected and approved by the Engineer before soil mix is placed.

3.03 SOIL PLACEMENT AND AMENDMENT

- A. General.
 1. Do not place, cultivate, or work on saturated soils. When a handful of soil is squeezed in hand, the resulting clump must easily crumble into multiple aggregates when poked or dropped on the ground from a height of 3 feet. Soil is too wet and shall not be worked if the clump dents when poked or holds together when dropped.
 2. Prepared subgrades and placed soil lifts shall be protected from compaction by foot or equipment traffic between and following operations, using barriers, signage, and other means specified by the Engineer or Owners Soils Consultant. No equipment or materials shall be stored on prepared subgrades or placed soil lifts.
 3. Contractor shall coordinate with the Engineer or Owners Soils Consultant to plan soil delivery traffic and placement in a manner that minimizes compaction of placed soils. At completion of soil placement operations, haul paths shall be ripped, plowed or rototilled to eliminate compaction.
 4. Tree Protection Areas. Do not grade, cultivate or place soil within Tree Protection Areas identified on plans or designated by project Arborist. Consult Certified Arborist, Landscape Architect, or Owners Soils Consultant to determine soil preparation and planting methods within Tree Protection Areas.
 5. Contractor shall apply and shape soil lifts in such a manner that planting areas have a continuously sloped final surface allowing for drainage, as indicated on plans. Ridges and ridge lines shall be the approximate centerpoint, or centerline(s), of each planting area.
- B. Composted Organic Amendment tilled into existing site soil.
 1. For Casual Use Lawn Areas, default application is 1.75 inches of Compost, unless otherwise specified on plans.

2. For Planting Beds, default application is 3 inches of Compost, unless otherwise specified on plans.
 3. Place specified depth of Compost on surface, and rototill, rip or plow to fully blend with soil to a minimum 8 inch depth, or deeper if specified on plan. Make multiple passes in perpendicular directions to create a homogenous blend.
 4. Fertilizers, lime and other amendments shall be evenly broadcasted over the entire area at rates recommended by soil test, either with the Compost prior to cultivation or prior to raking at finish grading, or applied with hydroseed mixture. Fertilizer tabs shall be included with each shrub and tree transplant.
 5. Consolidate as specified in 3.04.
 6. Finish Grading. Rake to clean surface of all debris including concrete, stumps, sticks, roots and rocks or lumps larger than 1.5 inches in any dimension. Leave surface even and readily able to accommodate planting installation.
- C. Planting Soil or Winter Mix for Casual Use Lawns Areas:
1. Place a total of 8 inches of Planting Soil, in two equal 4 inch lifts.
 2. First lift. Place 4 inches of Planting Soil. Rototill, rip or plow to thoroughly mix into 4 inches of prepared sub-grade. Make multiple passes in perpendicular directions to create a homogenous blend.
 3. Following placement of first lift, surface shall be cleaned of all debris including concrete, stumps, sticks, roots and rocks or lumps larger than 3 inches in any dimension prior to placement of second lift.
 4. Second lift. Place 4 inches of Planting Soil. Rototill to 6" depth, to thoroughly mix with top 2 inches of first lift. Make multiple passes in perpendicular directions to create a homogenous blend.
 5. Fertilizers and lime shall be evenly broadcasted over the entire area at rates recommended by soil test, either with the second lift prior to cultivation or prior to raking at finish grading, or applied with hydroseed mixture.
 6. Consolidate as specified in 3.04.
 7. Finish Grading. Rake to clean surface of all debris including concrete, stumps, sticks, roots and rocks or lumps larger than 1.5 inches in any dimension. Leave surface even and readily able to accommodate lawn installation.
- D. Planting Soil or winter Mix for Landscape Planting Areas:
1. Place a total of 12 inches of Planting Soil, in two equal 6 inch lifts.
 2. First lift. Place 6 inches of Planting Soil. Rototill, rip or plow to thoroughly mix into 4 inches of prepared sub-grade. Make multiple passes in perpendicular directions to create a homogenous blend.
 3. Following placement of first lift, surface shall be cleaned of all debris including concrete, stumps, sticks, roots and rocks or lumps larger than 3 inches in any dimension prior to placement of second lift.
 4. Second lift. Place 6 inches of Planting Soil. Rototill to 8" depth, to thoroughly mix with top 2 inches of first lift. Make multiple passes in perpendicular directions to create a homogenous blend.
 5. Fertilizers and lime shall be evenly broadcasted over the entire area at rates recommended by soil test, either with the second lift prior to cultivation or prior to raking at finish grading. Fertilizer tabs shall be included with each shrub and tree transplant.
 6. Consolidate as specified in 3.04.
 7. Finish Grading. Rake to clean surface of all debris including concrete, stumps, sticks, roots and rocks or lumps larger than 1.5 inches in any dimension. Leave surface even and readily able to accommodate planting installation.

8. Mulch shall be applied after planting, per plan details.
- E. Sports Fields, Event Lawns and Other Intensive Use Lawns
1. Refer to project Drawings for depth, grading and compaction of lifts.
- F. Bioretention Planting Areas:
- General. This section applies only to unlined Bioretention areas without gravel underdrain layers. Methods must be modified for applications within one-quarter mile of phosphorus sensitive receiving waters if site soil does not meet suitability criteria for runoff treatment or if the design includes an underdrain. Refer to project Drawings for details of mix requirements, installation of drain layers and liners.
1. Exclude Runoff from Cells Until Completion. Runoff shall not be allowed to enter bioretention cells until authorization is given by the Engineer. After excavation to subgrade or placement of Bioretention Soil Mix, if any sediment laden runoff has entered the cell prior to authorization by the Engineer the sediment deposition shall be removed by over excavating the cell by a 3-inch minimum, and an additional 3-inches of Bioretention Soil shall be placed at Contractor's expense.
 2. Depth. At the locations shown on the Drawings, bioretention cells shall be excavated to the depth necessary to accommodate the placement of Bioretention Soil.
 3. Scarification. The Contractor shall scarify the surface of the subgrade to a minimum depth of 3 inches prior to placement of Bioretention Soil
 4. Inspection Prior to Soil Placement. The Contractor shall provide the Engineer the opportunity to inspect the excavation at least 1 working day prior to placement of any material.
 5. Placement. The Contractor shall place Bioretention Soil loosely with a conveyor belt, unless otherwise approved by the Engineer, upon prepared subgrade in accordance with these Specifications and in conformity with the lines, grades, depth, and typical cross-section shown in the Drawings or as established by the Engineer.
 6. Rake soil to final grade.
 7. Consolidation. Final soil depth shall be measured and verified only after the soil has been consolidated using methods approved by the Engineer.
 8. Inspection Prior to Planting. After placement of Bioretention Soil, The Engineer shall perform compaction testing before planting or mulching, The Contractor shall notify the Engineer at least 1 working day in advance of
- G. For Landscape Planting Areas above the underground combined sewage storage tank place Planting Soil Mix to establish finished grades as shown in the drawings.

3.04 COMPACTION:

- A. Compact to 80-85 percent maximum density per ASTM D1557, using methods approved by Project Engineer and demonstrated in 3.01 Soil Installation Mockups.
- B. Default Method: Roll in 2 directions, using a standard, waterfilled type to apply 150 to 300 pounds per square foot ground pressure. The second rolling at right angles to the first.

3.05 FINE GRADING:

- A. Perform fine grading to attain finish grades as shown on the Plans.
- B. Rake surface clear of all rocks, roots, sticks and other debris larger than 1.5-inch diameter. Leave surface even and readily able to accommodate lawn or planting installation.



3.06 MULCH

- A. Mulch material and application depths shall be as specified on project plans.

END OF SECTION