SPECIFICATION:

SECTION 9.0: Bio-Retention / Rain Garden Soil Mix

9.1 Description:

This work shall consist of preparing an engineered soil mix containing all the physical chemical and biological properties required in the rootzone of a bio-retention pond. The mix will be specifically designed to meet water retention, filtration and pollutant removal associated with Georgia Water Quality (WQ) standards associated with the 85 percentile 1.2 inch storm event. This mix can be pre-blended offsite or blended on-site with existing soil if conditions permit and is approved by site Engineer and/or Architect.

9.2 Materials (component specifications)

The materials will consist of four components listed below which must meet the corresponding testing standards for each component.

A: 3/16 Hydrocks Rotary Kiln Expanded Clay (15% by volume)

1. ASTM C-29 Dry Loose Unit Weight: 37.0 pcf or less

2. Loose Unit weight at SSD 43.6 pcf or less

3. Absorption—ASTM C127 22% or greater

4. Cation Exchange Capacity (NH4-sat/) 26.70 meg/100g or greater

5. ASTM C-136 Sieve Analysis #3/8 to 0

3/8”- 0 (3/8-3/16)

Sieve Size	% Passing	ASTM Specification
½ in.	100	100
3/8 in.	99.5	80-100
#4	23.3	5-40
#8	4.2	0-20
#16	1.4	0-10

6. Only non-hazardous fuels such as coal or natural gas may be used to process the clay.

7. The amount of clay lumps shall not exceed 2% by dry weight.

B: Nutrient Grade Compost: Quality compost must be manufactured by a composter enrolled in the United States Compost Council's (Seal of Testing Assurance (STA) program. (20% by volume)

1. Compost must meet the following parameters as tested by an STA approved lab using the Test Methods for Evaluating Compost and Compost Manufactures Method.

Plant Nutrients	% Dry Weight Basis	TMECC Method
Nitrogen	> 1.2	4.02-D
Phosphorus	> 0.50	Calc.
Potassium	> 0.50	Calc.
Calcium	>0.90	4.05
Magnesium	>0.20	4.05

2. Organic Matter Content	> 50%	5.07-A
3. Soluble Salts ds/m (mmhos/cm)	<5.0	4.08-A
4. Particle Size % under 9.5mm	95% or greater	2.02-B
5. Stability Indicator		
Respiration Rate	Very Stable < 2	5.08 B
Biological Available Carbon	Very Stable < 2	5.08 F
6. Maturity Indicator (bioassay)		
Percent Emergence	85% or greater	5.05
Relative Seedling Vigor	85% or greater	5.05-A
7. pH Value (range in units)	5.7- 7.6	4.11-A
8. Select Pathogens Pass/Fail	Pass	Standard Method 9221E
US EPA Class A Standards		
40CFR 503.32(a)		

C: Coarse, clean River sand or mined sand meeting the following gradation. (40% by volume)

C33 Sand Gradation Table

Sieve Size	Passing %	Sieve Size	Passing%
3/8”	100	10 mm	100
No. 4	95-100	5 mm	95-100
No. 8	85-100	2.5 mm	80-100
No. 16	50-85	1.25 mm	50-90
No. 30	25-60	.63 mm	25-65
No. 50	0-30	.315 mm	10-35
No. 100	2-10	.16 mm	2-10

D: **Screened Topsoil from existing site (preferred) or imported. (25% by volume)**

1. Screened Topsoil from Site-

a. It is the recommended and preferred to screen existing topsoil/subsoil from initial grading through a 1” screen and stockpile for use in the Bio-Retention mix.

b. Soil should be tested prior to screening and stock piling to ensure it is free from containments that would inhibit plant growth or harm water quality.

2. Imported Topsoil- If site conditions and/or on-site soil is not suitable for use then an imported topsoil may used that meets the following conditions.

a. Soil shall be a sandy-loam to clay loam based soil as classified on the “USDA classification system” as determined by mechanical analysis. It shall be of uniform composition, and free of stones greater than one-half inch, lumps, plants, and their roots, debris and other extraneous matter over one inch in diameter.

b. Soil should be tested prior to screening and stock piling to ensure it is free from containments that would inhibit plant growth or harm water quality.

9.2 Mixing

1. Contractor shall ensure that all components meet the parameters outlined in section 9.1.
2. Material can be mixed either on-site or off-site using a front end loader to create a uniform mix according to the ratios outlined in section 9.1.

9.3 Delivering and Storage

1. Do not deliver or store soils in frozen, wet, or muddy conditions.
2. Protect soils and mixes from absorbing excess water and from erosion at all times. Do not store materials unprotected from large rainfall events.

9.4 Installation for Bio-Retention Mix

1. Bio-retention mix should be installed using one of the following methods to avoid compaction of pore space- blown in with pneumatic blower truck, conveyed into the cell via a conveyer belt, or methods that do not require that mechanical equipment be used in the bio-retention cell. All leveling and grading shall be done without placing heavy equipment on the bio-retention soil to avoid compaction.
2. Bio-Retention soil shall be watered thoroughly via natural rain events or irrigation to allow soil to settle. Additional soil should then be installed to bring soil to required depth and grade as outlined in the detailed drawings. This process should be repeated 3 times to ensure all settling has occurred.
3. After completing these steps the Bio-Retention cells shall be ready for the introduction of specified plant materials. Use of heavy mechanical equipment should not be used in the installation of the plant material to avoid over compaction of the Bio-Retention Soil

End of section