



Section 32 91 13.23 INSTALLATION GUIDELINES – ESCS STRUCTURAL SOIL MIX FOR LOAD BEARING TURF (FIRE LANES & EVENT LAWNS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections apply to work of this section.

1.2 SUMMARY

- A. Section Includes:
 - 1. This is a restricted specification for load bearing structural soil for fire lanes and may be modified for applications including event lawns (SSM).
- B. Related Sections:
 - 1. Section 312000 "Earth Moving" for excavation, filling and backfilling, and rough grading.
 - 2. Section 319100 "Planting Soils" for plants.
 - 3. Section 329300 "Plants" for border edge restraints.
 - 4. Section 334600 "Subdrainage" for subsurface drainage.

1.3 DEFINITIONS

- A. SSM: Abbreviation for structural soil mix for fire lanes and event lawns
- B. Finish Grade: Elevation of finished surface of planting soil.
- C. Subgrade: Surface or elevation of subsoil remaining after excavation. It can also be the top elevation of a fill or backfill.
- D. Subsoil: All soil beneath the topsoil layer of the soil profile and typified by the lack of organic matter and soil organisms.
- E. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.
- F. ESCS: Lightweight Aggregates manufactured by the Rotary Kiln method using select components of shale, clay or slate.

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1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. ESCS Structural Soil for Load Bearing Fire Lanes and Event Lawns: Include manufacturer's installation instructions specific to project.

1.5 INFORMATIONAL SUBMITTALS- based on regional and structural soil mix (SSM) blending differences.

- A. Qualification Data: For qualified Installer.
 - 1. Product Certificates: For soil amendments and fertilizers from the manufacturer.
 - 2. Material Test Reports: For imported or manufactured topsoil.
- B. Submit manufacturer's technical product data and certified laboratory test results for the following:
 - 1. ASTM C330 Expanded Shale, Clay and Slate (ESCS) Lightweight Aggregate
 - 2. Root Zone Soil
 - 3. Compost (if specified)
 - 4. Geotechnical grid or approved equal
 - 5. Add a base course of suitable aggregate (if deemed necessary by soil tests)
- C. Sample: Provide one (1) quart of each kind of structural soil in heavy-duty clear, resealable plastic freezer storage bags labeled, "Fire Lane Media", and the type and the project name.

1.6 QUALITY ASSURANCE

- A. Provide structural soil mix (SSM) prepared by a firm that is regularly engaged in the production of the specified items.
- B. Pre-installation Conference: Conduct at the Project site.

1.7 DELIVERY, STORAGE AND HANDLING:

- A. When stockpiling finished planting mix, cover with plastic tarps to prevent moisture loss.
- B. Install planting mix within 48 hours of delivery
- C. Do not deliver or place soil in frozen, wet, or muddy conditions.

PART 2 – PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENTS

- A. Provide a Structural Soil Mix (SSM) using the components below, options are given for regional blending differences.

1. The Structural Soil Mix shall be a special pre-mixed blend of 65-75% graded Expanded Shale, Clay and Slate (ESCS) Lightweight Aggregate and 25%-35% approved sandy loam -compost blend (blended).

ASTM C330 Lightweight Aggregate by ESCS Supplier	65% -75%
Root Zone Sand Blend	20%-35%
Certified Compost*	5% typical by volume

2. * Percentages may vary to meet testing requirements, gradations and blending procedures may vary by region. It is important to select the specific gradation to allow the void space between aggregate particles (by volume) to be filled with the sand/compost medium. The coarse aggregates must be in contact with each other to support the weight without compacting the sand/compost medium in between. Contact local ESCS suppliers for additional information on specific blends.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Rotary Kiln Expanded Lightweight Aggregate (ESCS)

1. ASTM C330: ASTM Gradation as supplied by Lightweight Manufacturer
2. Test for degradation loss using Los Angeles Abrasion testing in accordance with **ASTM C-131 modified method FM 1-T096**. No more than 40% of the weight of the aggregate must be lost to degradation.

B. Sandy Loam Soil classification

C. Compost

1. Compost must be certified and derived from a non-sewage sludge feedstock source. The addition of yard waste to the composting process must also meet certification requirements.
2. Finished compost must be screened to minus 3/8", protected, and free from any outside contaminants during and after screening and curing.
3. Metals and contaminants must meet or exceed US EPA Standard 40

D. Geotechnical Grid

1. If required by soil tests, an approved geotechnical grid may be installed.

E. Base Course

1. The base course, if required by soil tests and/or fire lane use, shall be approved by engineer.

PART 3 – EXECUTION

3.1 MIXING PROCEDURES

A. Structural Soil

1. Mechanically mix the soil and compost thoroughly.
2. Saturate the ESCS with water and mechanically mix all components by the prescribed ratios until the ESCS particles are completely coated.
3. When stockpiling the finished mix, cover the pile with a plastic tarp to prevent drying out or soil separation from rain.
4. Install the mix within 48 hours after mixing.

3.2 PREPARATION

A. GENERAL

1. The contractor shall have the proper machinery and manpower necessary to perform the job within the contract time. The workmen shall be trained in the necessary crafts and be familiar with the specified requirements and methods needed for proper performance of the work in this section.
2. The contractor shall obtain necessary approvals before placing each SSM layer.
3. The contractor must provide access for and cooperate with the testing laboratory.
4. Locate and confirm the location of all underground utility lines and structures prior to the start of any excavation. The cost of all repairs shall be at the contractor's expense.
5. Consult the final construction documents for the staking, dimensions and final elevations of the SSM installation.
6. If required for a fire lane boundary, a continuous concrete edge with approximately 12" width and of sufficient depth as to provide rigid support for compaction of the SSM components shall be required. Construction details by others.
7. Contractor shall limit offsite drainage entering SSM where possible to avoid washouts.

B. PREPARING SUBGRADE

1. The subgrade shall be prepared according to these procedures:
 - a. Remove all organic matter, debris, loose material and large rocks.
 - b. Dig out soft and mucky spots then replace with suitable material.

- c. Loosen hard spots and uniformly compact the subgrade to 95% standard proctor.
2. The subgrade shall have a minimum cross slope of 1% and an optimum grade of 2%.
3. Refer to local fire lane code for maximum slope or no more than 8% if not specified.

C. PERFORATED UNDERDRAIN SYSTEM (if used)

1. The underdrain system shall be installed, included with sock or soil separator fabric, according to drawing and specifications, and connected to the storm drain.

3.3 PLACING STRUCTURAL SOIL MIX (SSM) BY CONTRACTOR

A. GENERAL

1. Adequacy of the final compaction shall be determined in the field by the engineer by proof roll.
2. Place the geotechnical grid and base course where specified.
3. The SSM shall be placed and compacted to provide a finished depth of no less than 6", or additional depth required for cool season turf (8-12") Construction equipment, other than for compaction, shall not operate on the exposed structural soil mix. Over-compaction should be avoided.
4. Optional for grades steeper than 8% slope - Turf support rings shall be installed immediately after the last lift is compacted and tested. No equipment traffic will be allowed on the compacted material until the sod has been placed.
5. Irrigation systems are to be installed and tested prior to final course installation to avoid disturbing the compaction of the mix.

B. COMPACTING

1. Use of portable vibratory plate compacting machine.
 - a. Place structural soil mix in horizontal lifts not exceeding 12 inches. Use a minimum of four passes, of not less than 2 seconds per pass, before moving the vibratory plate to the next adjacent location. Additional passes may be required and should be determined in the field by the engineer to insure stability of the layer. Continue placing and compacting lifts until the specified depth is reached.
2. Use of vibratory steel roller for large areas.
 - a. For large spaces, a vibratory steel roller approved by the engineer can be used. Horizontal lifts should not exceed 12" compacted. The minimum number of passes is two and maximum number is four. Additional passes may be required and should be determined in the field by the engineer to insure stability of the layer.

- b. No vehicles or heavy equipment are permitted on the root zone layer course until the turf is completely established.

PART 4 – NATURAL GRASS SOD INSTALLATION

4.1 PRODUCTS

- A. Only sod grown in a sand or sandy loam base soil shall be used in this application.

4.2 EXECUTION

- A. Place sod directly on the structural soil mix (SSM) as specified by the Landscape Architect.
 - 1. There shall be a uniform transition from the adjacent paved and/or turf areas onto the sodded SSM areas. The finish grade of the SSM shall allow for the thickness of the sod relative to the adjoining areas.
 - 2. The SSM may, in the opinion of the landscape architect, need to be charged with water prior to the placement of sod.
 - 3. Sod shall be rolled and irrigated as needed immediately after placement.
 - 4. Prior to final approval, all irregularities, depressions, soft spots, and other deficiencies found by the engineer shall be corrected to meet the requirements of these specifications without additional compensation.
 - 5. Do not allow vehicular traffic on the sod until the sod's roots have established enough that it cannot be easily pulled up from the media.