

Section 32 12 43
(1997 Section 02795)

PERMEABLE, FLEXIBLE and PLANTABLE PAVEMENT SYSTEM

PART 1: GENERAL

1.01 Description

- A. Work shall consist of furnishing all material, labor, services and related items to complete the installation of Drivable Grass[®] a permeable, plantable and flexible pavement system in accordance with these specifications.
- B. Work includes installing the materials in reasonably close conformity with the lines, grades, design, and dimensions shown in the construction drawings.

1.02 Related Sections

- A. Section 31 10 00 - Site Clearing
- B. Section 31 20 00 - Earth moving
- C. Section 32 14 00 - Unit Pavers
- D. Section 32 80 00 - Irrigation
- E. Section 32 91 13 - Soil Preparation
- F. Section 32 92 00 - Turf and Grass
- G. Section 03 30 00 - Cast in place concrete

1.03 Reference Documents

- A. ASTM D-422 - Particle Size Analysis
- B. ASTM D-698 - Laboratory Compaction Characteristics of Soil - Standard Proctor
- C. ASTM D-1557 - Laboratory Compaction Characteristics of Soil – Modified Proctor
- D. ASTM C-39/39M – Std. Test Method for Compressive Strength of Cylindrical Concrete Specimens
- E. ASTM C-33 Std. Spec. for Concrete Aggregates
- F. ASTM C31/ C31M Standard Practice for Making and Curing Concrete Test Specimens in the Field
- G. ASTM C 150 Std. Spec for Portland Cement
- H. ASTM C94 / C94M Std. Spec. for Ready – Mixed Concrete
- I. ASTM C 1157 Std. Performance Specification for Hydraulic Cement
- J. ASTM C595 Std. Spec. for Blended Hydraulic Cement
- K. ASTM C618 Std. Spec. for Coal Fly Ash and Raw or Calcined Natural Pozzolan for use in Concrete*
- L. ASTM C1611 / C1611M Std. Test Method for Slump Flow of Self-Consolidating Concrete
- M. ASTM C989 Std. Spec. for Ground Granulated Blast-Furnace Slag for use in Concrete and Mortars *
- N. ASTM C979 Std. Spec. for Pigment for Integrally Colored Concrete
- O. ACI 201 American Concrete Institute- Report on Durability
- P. ACI 211 American Concrete Institute- Std. Practice for Selecting Proportions for Normal, Heavy Weight, and Mass Concrete

* Denotes regional applicability

1.04 Submittals/Certification

- A. Procedures: Comply with Section 01 33 00 – Submittal Procedures.
- B. Product Data: Submit manufacturer's product data, including installation instructions.
- C. Samples: Submit manufacturer's sample of permeable, flexible and plantable pavement system.
- D. Warranty: Submit manufacturer's standard warranty.

1.05 Quality Assurance

- A. Installer Qualifications: An experienced installer who has successfully completed installations of pavers or other pavement systems on projects of similar or larger scope and magnitude.
- B. Single Source Responsibility: Obtain one color, type and variety of permeable, plantable and flexible pavement system mats from a single lot manufactured by a single source. Materials shall be available and be consistent in quality, appearance and physical properties without delaying progress of work.
- C. Prior to commencing the work of this section, verify the accuracy of layout and grading. Verify that all sub-grades and base course aggregate conditions are as specified. Notify the Engineer of any discrepancies and coordinate the correction of those discrepancies with other trades as necessary.

1.06 Delivery, Storage and Handling

- A. Deliver materials to site in manufacturer's original palletized configuration with labels clearly identifying product style number, color, name and manufacturer.
- B. Check all materials upon delivery to assure that the proper type, grade, color, and certification have been received.
- C. Store materials in clean, dry area in accordance with manufacturer's instructions.
- D. Protect all materials from damage due to jobsite conditions and in accordance with manufacturer's recommendations. Damaged materials shall not be incorporated into the work.

1.07 Project Conditions

- A. Review installation procedures and coordinate Drivable Grass[®] installation with other work around installation area.
- B. All adjacent hardscape, paving, and mow curbs/strips required by construction documents shall be completed prior to the installation of the Drivable Grass[®] paving mats.
- C. Gradients for Drivable Grass[®] paving mats can vary from flat to 12%, depending upon vehicle type and use of paved area. For steeper conditions, consult with a qualified civil engineer. For firelanes, consult local fire department for maximum allowable gradients.
- D. Cold weather applications:
 - i. Coordinate maintenance contracts.
 - ii. Snowplow equipment operators should be educated about the underlying surface prior to beginning snow removal. Snowplow equipment should be fitted with teflon runners, which will help keep the snowplow blade from damaging the product.
 - iii. For sites that will require the use of heavy-duty snowplowing machinery, install mow curb/strips prior to installation of Drivable Grass[®] paving mats. Drivable Grass[®] should be depressed ½" below the top of the mow curb/strip to protect the product from the snowplow blade.
 - iv. Do not use frozen materials or materials mixed or coated with ice or frost.
 - v. Do not build on frozen, wet, or muddy subgrade

- E. Protect partially completed paving against damage from other construction traffic when work is in progress and until grass root system has had time to mature (about 3 to 4 weeks). Projects using aggregate infill instead of planting are drivable upon completing infill.
- F. Areas adjacent to Drivable Grass[®] installation should be protected during construction.

PART 2: PRODUCTS

2.01 Manufacturer

- A. Soil Retention Products, Inc., 2501 State Street, Carlsbad, CA 92008. Phone: 760-966-6090 and 800-346-7995, fax: 760-966-6099, website: www.soilretention.com, e-mail: sales@soilretention.com.

2.02 Permeable, Flexible, Plantable Pavement System

- A. Permeable, Flexible, Plantable Pavement System: Drivable Grass[®]
 - a. Nominal Dimensions in inches (l x w x h) 24 x 24 x 1.5
 - b. Gross Area of Each Mat in square feet 4
 - c. Weight of Each Mat in pounds 45
 - d. Plantable Area in percent 60 (100 for sod)
 - e. Mats per pallet (each) 60
 - f. Area Covered per Pallet in square feet 240
- B. Color Buff/tan, Grey, Terra Cotta* **
 - a. Flexibility (minimum radius of curvature in inches) 12
 - b. Concrete Compressive Strength @ 28 days in psi 5000
 - c. Propriety Grid Reinforcement Engineered Plastic

*Terra Cotta available as standard color from CA only

**Other colors available for special order all regions

- C. Filter Fabric – Appropriate filter weave fabric by Mirafi Inc. or equal, if required by engineer.
- D. Base Aggregate – Crushed permeable base, crushed miscellaneous base (CMB), crushed aggregate base (CAB), crushed rock or similar structural material normally used as a base course for pavement systems and meeting the gradation and or permeability requirements shown on the drawings.
- E. Bedding Course – Approximately 1” minimum thick clean sharp sand for non-planting applications. Use 1.5” to 3” thick clean sharp sand for planting applications. Clean sharp sand for planting to be comprised of a moderate percentage (20%) of granular organic or other plant nutrients for heavy duty applications and 30% granular organic material for light duty applications. Sand shall be clean, non-plastic, and free from deleterious or foreign matter. The sand shall be sharp or manufactured from crushed rock. Do not use limestone screenings or stone dust. Grading of samples shall be done according to ASTM C 136. The particles shall be sharp and conform to the grading requirements shown below:

ASTM C33 CSA A23.1-M94	
Sieve Size	Percent Passing
3/8 in. (9.5 mm)	100
No. 4 (4.75 mm)	95 to 100
No. 8 (2.36 mm)	85 to 100
No. 16 (1.18 mm)	50 to 85
No. 30 (0.600 mm)	25 to 60
No. 50 (0.300mm)	0 to 30
No. 100 (0.15mm)	2 to 10

- F. Infill – Infill for planting applications will consist of clean sharp sand and have a moderate percentage (20%) of granular organic or other plant nutrients for heavy duty applications and 30% granular organic material for light duty applications. Infill not intended to support vegetation is likely to consist of 3/8" minus stone, decomposed granite, stone dust, etc., depending on application and aesthetic needs.
- G. Concrete Mow Curb - As required by the engineer and specifications and included on the drawings.
- H. Grass - Check with local sod and seed suppliers for preferred mixtures for subject site and use.
- I. Mulch - (Needed only for seed, stolon or plug applications) shall be of wood or paper cellulose types. Mulches of straw, pine needles, etc.. will not be acceptable because of their low moisture holding capacity.
- J. Fertilizer - A commercial "starter" fertilizer shall be used. Check with local grass supplier for recommendations.

PART 3: EXECUTION

3.01 Subgrade Preparation

- A. Vertical depth to accommodate structural section (if applicable) of base aggregate, sand layer, and Drivable Grass[®] mat thickness.
- B. Excavate to the lines and grades shown on the construction drawings.
- C. Install any mow strips or curbs as specified.
- D. Proof roll foundation area as directed to determine if remedial work is required.
- E. Owner's representative shall inspect the excavation and approve prior to placement of base material or fill soils.
- F. Over-excavation and replacement of unsuitable subgrade soils with approved compacted fill shall be compensated as agreed upon with the Owner.

3.02 Installation of Aggregate Base and Sand Setting Bed

- A. Install and compact aggregate base as required by the contract drawings.
- B. Install irrigation lines and sprinklers to the specified depth and location within the aggregate base as required by the contract drawings.
- C. Install, level and compact a thin sand bedding course upon which permeable, flexible and plantable pavement system will be installed. A 1" (min.) layer of clean sharp sand can be used for non-planted applications that require driving. Use a 1.5" to 3" layer of clean sharp sand for areas that are to be planted. Sand shall be amended with a small amount of granular organics or fertilizer to facilitate grass growth. Amended sand shall consist of 80% clean sharp sand and 20% granular organic material for heavy duty applications and 70% clean sharp sand and 30% granular organic material for light use applications. Non-driving applications such as drainage swales can be installed on rock.

3.03 Install Drivable Grass[®] Pavement System

- A. Install permeable, flexible, and plantable pavement system in accordance with the manufacturer's guidelines.
- B. Install system to the line, grades and locations required by the contract documents.
- C. Butt mats against each other leaving no significant gaps.

3.04 Fill System with Infill Material

- A. Fill permeable, flexible and plantable pavement system in accordance with the manufacturer's installation instructions.
- B. Infill for planting to be comprised of 80% clean sharp sand and 20% granular organic material for heavy duty applications and 70% clean sharp sand and 30% granular organic material for light use applications.

- C. For systems without vegetation, mats may be filled with DG, sand, crushed rock, or decorative stone, as required by the specifications. A layer of filter weave fabric installed above sand bedding course is recommended to deter weed growth and soil loss under the mats.
- D. Spread infill uniformly across the mats by sweeping or other approved method.

3.05 Vegetate Mat System

- A. Install planting materials as specified in the construction drawings. Seeding, sodding, stolonizing, and plugging, may be acceptable provided that planting is conducted in accordance with the project documents.
- B. Installed planting areas, excluding sod, shall be covered by a light layer of organic mulch as a topper to preserve moisture and promote germination and/or plant establishment.

3.06 Erosion Control

- A. Provide dust and erosion control protection plan in accordance with the contract documents.
- B. During plant establishment no significant run on water shall be allowed. For aggregate infill, no significant run on silty water shall be allowed.

3.07 Field Quality Control

- A. The Owner shall engage inspection and testing services, including independent laboratories, to provide quality assurance and testing services during construction. This does not relieve the Contractor from securing the necessary construction control testing during construction when required by the contract documents.
- B. Qualified and experienced technicians and engineers shall perform testing and inspections services.
- C. As a minimum, quality assurance testing should include subgrade soil inspection, aggregate base quality, thickness, and compaction, and observation of construction for general compliance with design drawings and specifications.