

A photograph showing the rear of a fire truck with its two large wheels resting on a dark, porous, flexible pavement surface. The truck's body is red and white. The pavement has a grid-like pattern of interconnected cells.

AirPave[®]

By AirField Systems

Porous Flexible Paving Submittal Package

June 2016

Asphalt base AirPave unfilled and still withstands the load of a fire truck.

CSI # 32 12 43 Porous Flexible Paving

CSI # 32 14 43 Porous Paving

CSI # 32 92 00 Turfs & Grasses

**6,747psi. / 971,568 psf. Sand Filled
exceeding H-20 & H-25 requirements**

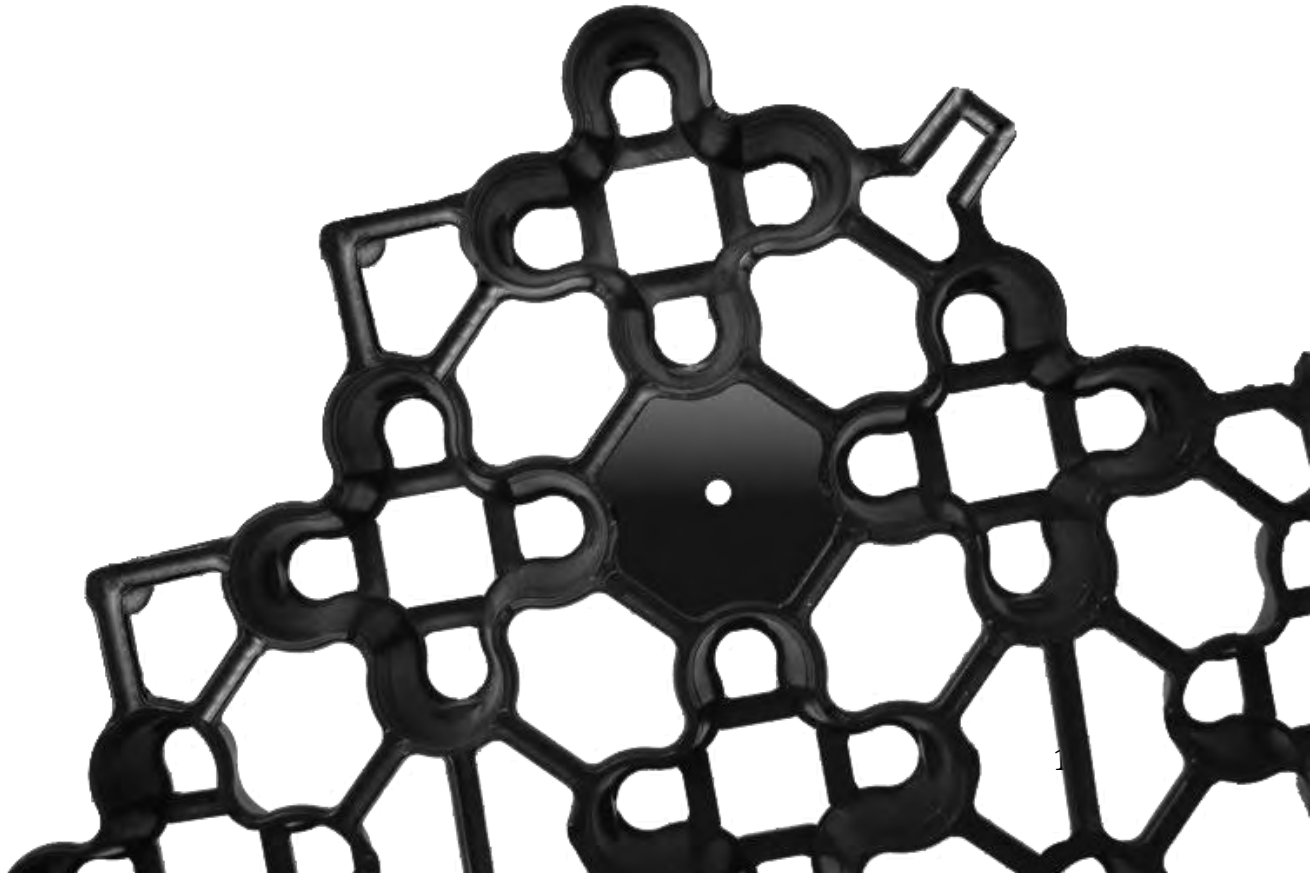


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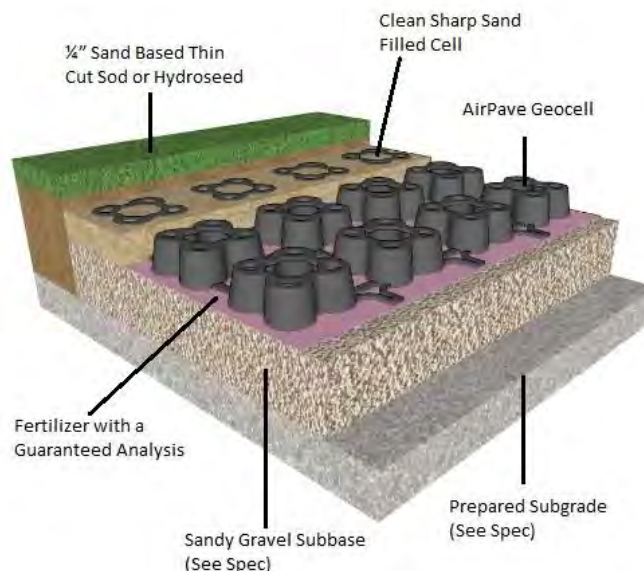
AirPave

By AirField Systems,

A flexible porous paving and drainage system for grass pave fire lanes, reinforced turf paving and swales. With over 400 installations across the country AirPave for grass pave is 233 psi unfilled, **6,747 psi sand filled** and is made of 100% recycled content which can contribute to LEED™ points.

AirPave always ships with enough for 2 layers of the guaranteed analysis fertilizer needed. One for the sub base to be worked in before compaction and watered. And the other to be added on top of the sand filled grid and watered in before the turf grass is installed. We believe if done properly it will set up the project for the best possible result.

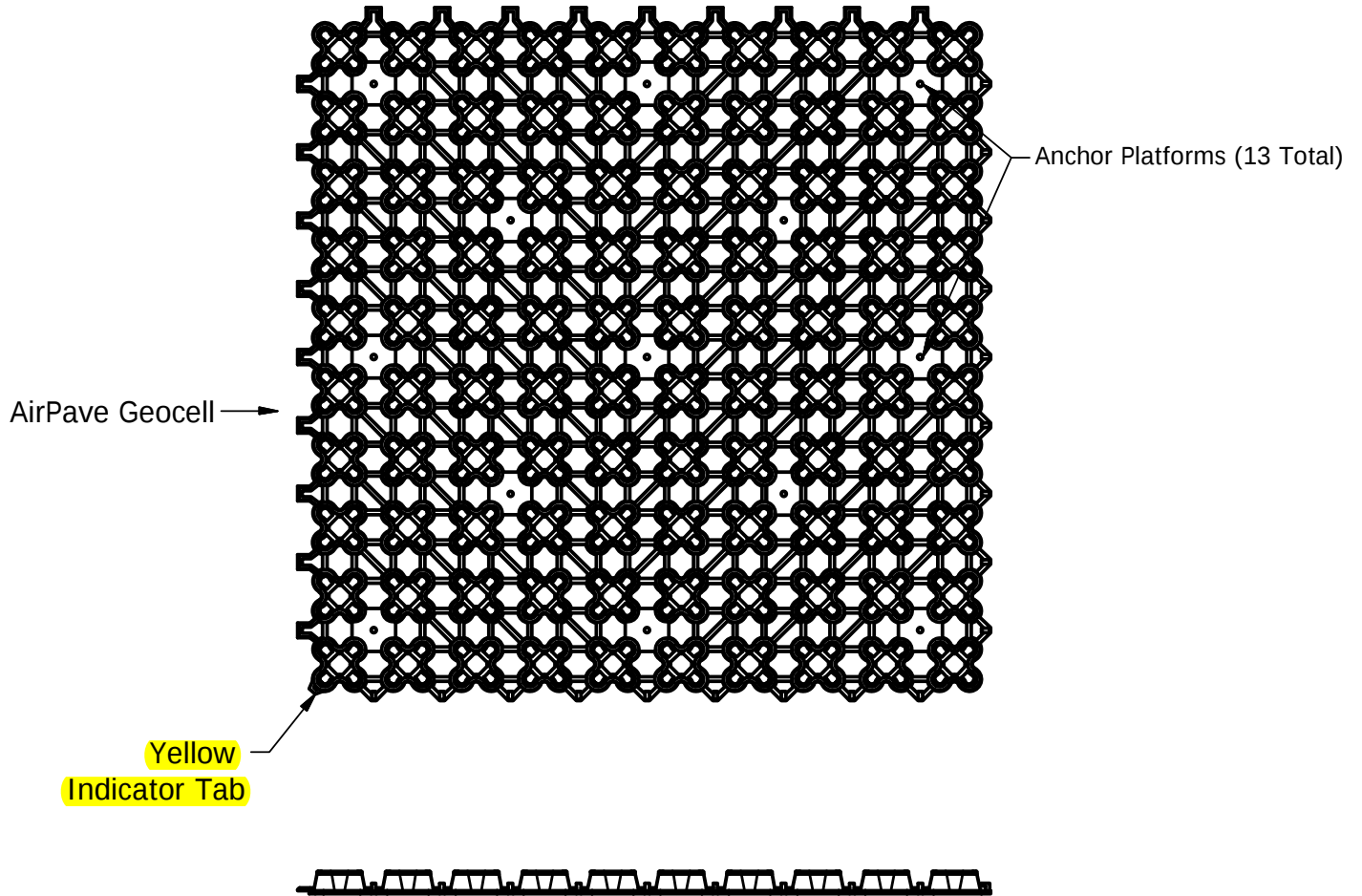
AirPave can save the owner up to \$0.80 per square foot or more over our nearest competitors. CSI Master Format #32 12 43, #32 92 00 and #32 14 43.



Benefits of an AirPave grass paving system include:

- A 40% or more material cost savings over most competitors
- Up to 45% cost savings on shipping, compared with rolled grass paving systems
- **2 Layers of Sustane Fertilizer with a guaranteed analysis provided with every project.**
- AirPave has been installed in over 400 flexible porous paving projects
- AirPave is made with 100% recycled copolymer polypropylene plastic with an impact modifier added to achieve a (NO-BREAK) plastics classification and a minimum 3% carbon black added for UV protection.
- Loading capability is equal to 233 psi empty and **6,747 psi when filled with clean sharp sand, over an appropriate base depth that provides adequate support for project design loads exceeding H-20 & H-25 requirements.**
- AirPave is shipped on pallets with 114 parts equal to 798 sq. ft. per pallet. Each part is 32"x32"x1", weighs 3.10 lbs and is 8% solid.

*This drawing, specifications and the information contained herein is for general presentation purposes only. All final drawings and layouts should be determined by a licensed engineer(s).



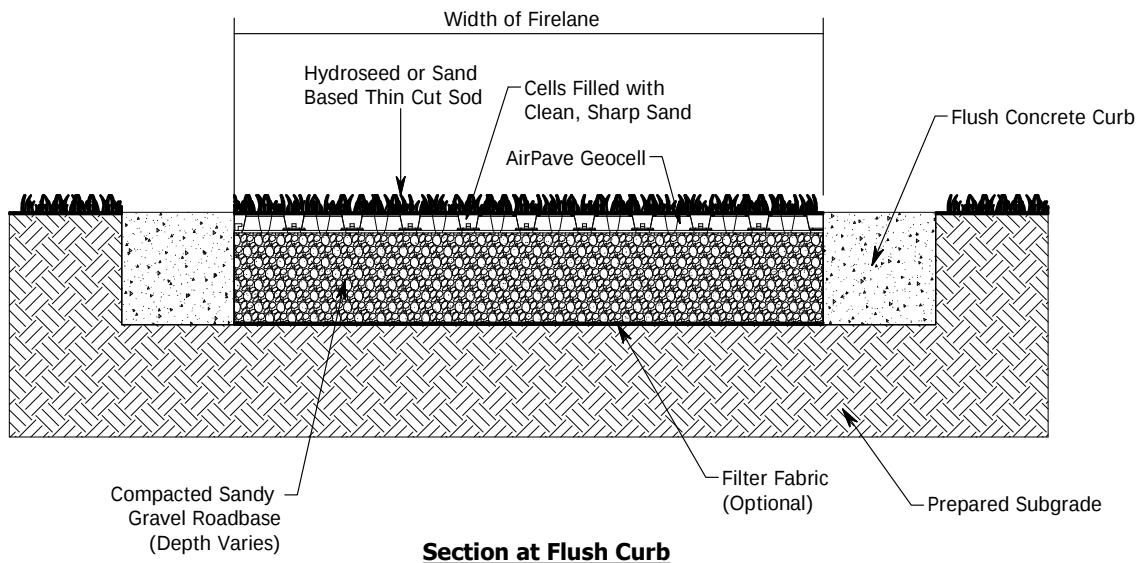
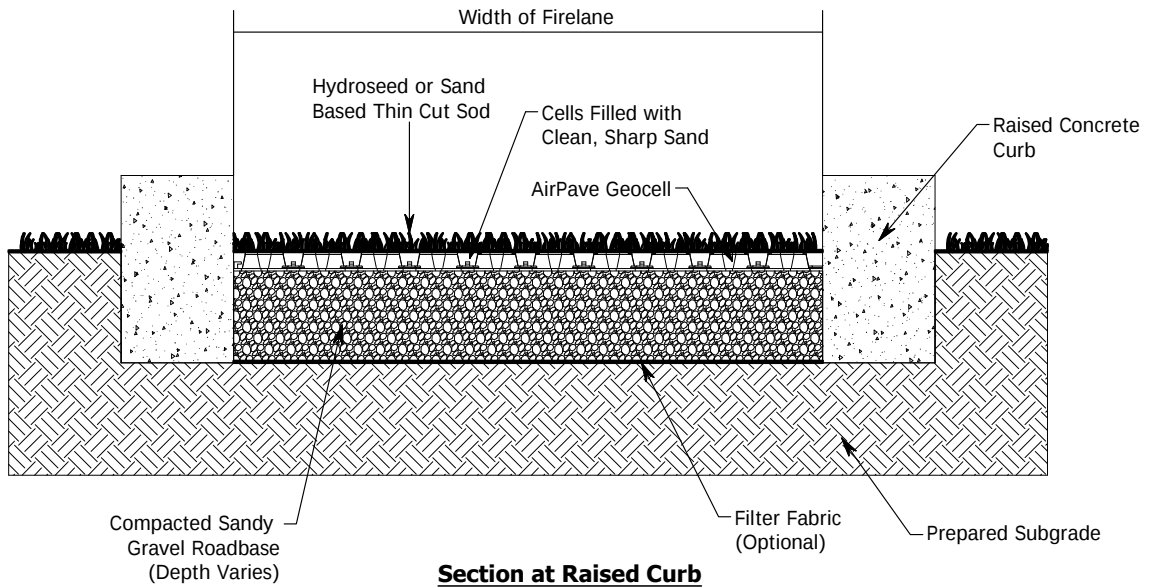
Unit Panel Specifications:

Size:	32" x 32" x 1"
Weight:	3.1 lb
Strength:	233 psi (unfilled) 6747 psi (filled)
Resin:	100% Recycled (PIR) Copolymer with Impact Modifier "No Break" Polymer Material
Color:	Black (3% carbon black added for UV Protection)

AirPave Cross Section Typical

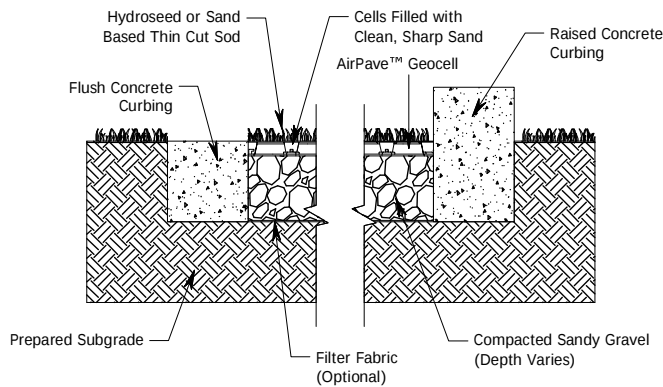
Scale 0.12:1

For AirPave Systems

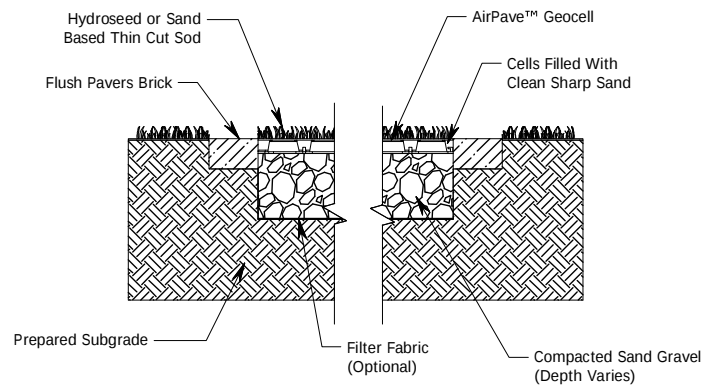


Airpave Typical Firelane Detail

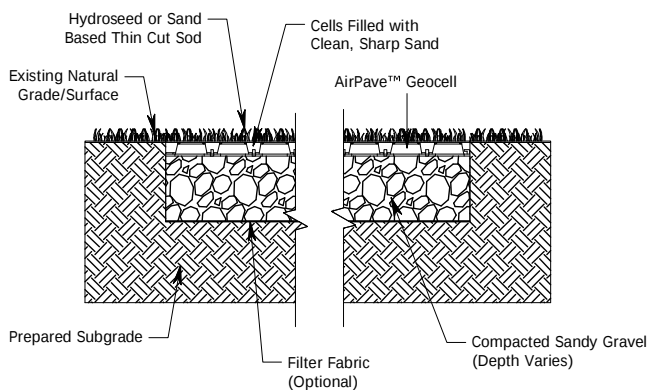
For AirPave Grass System



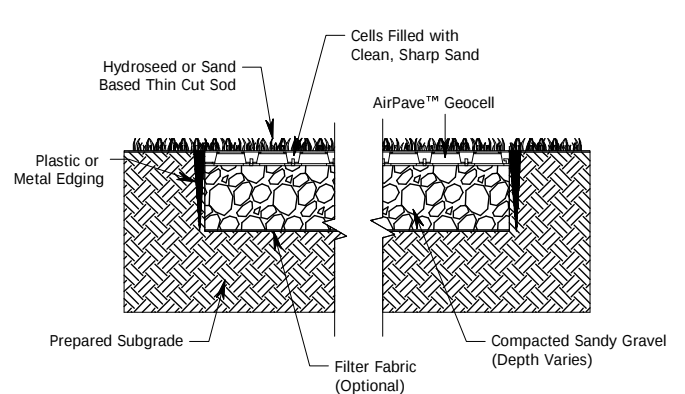
AirPave™ Concrete Curb Edging



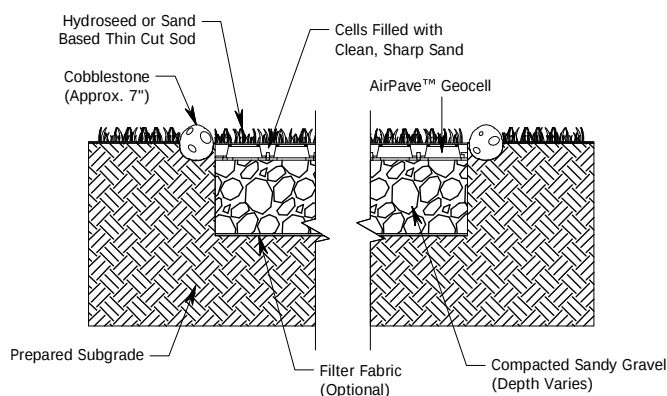
AirPave™ Flush Brick Edging



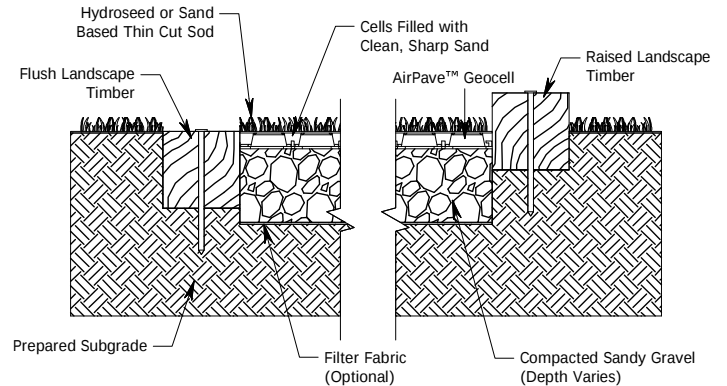
AirPave™ Flush Natural Edging



AirPave™ Metal or Plastic Edging

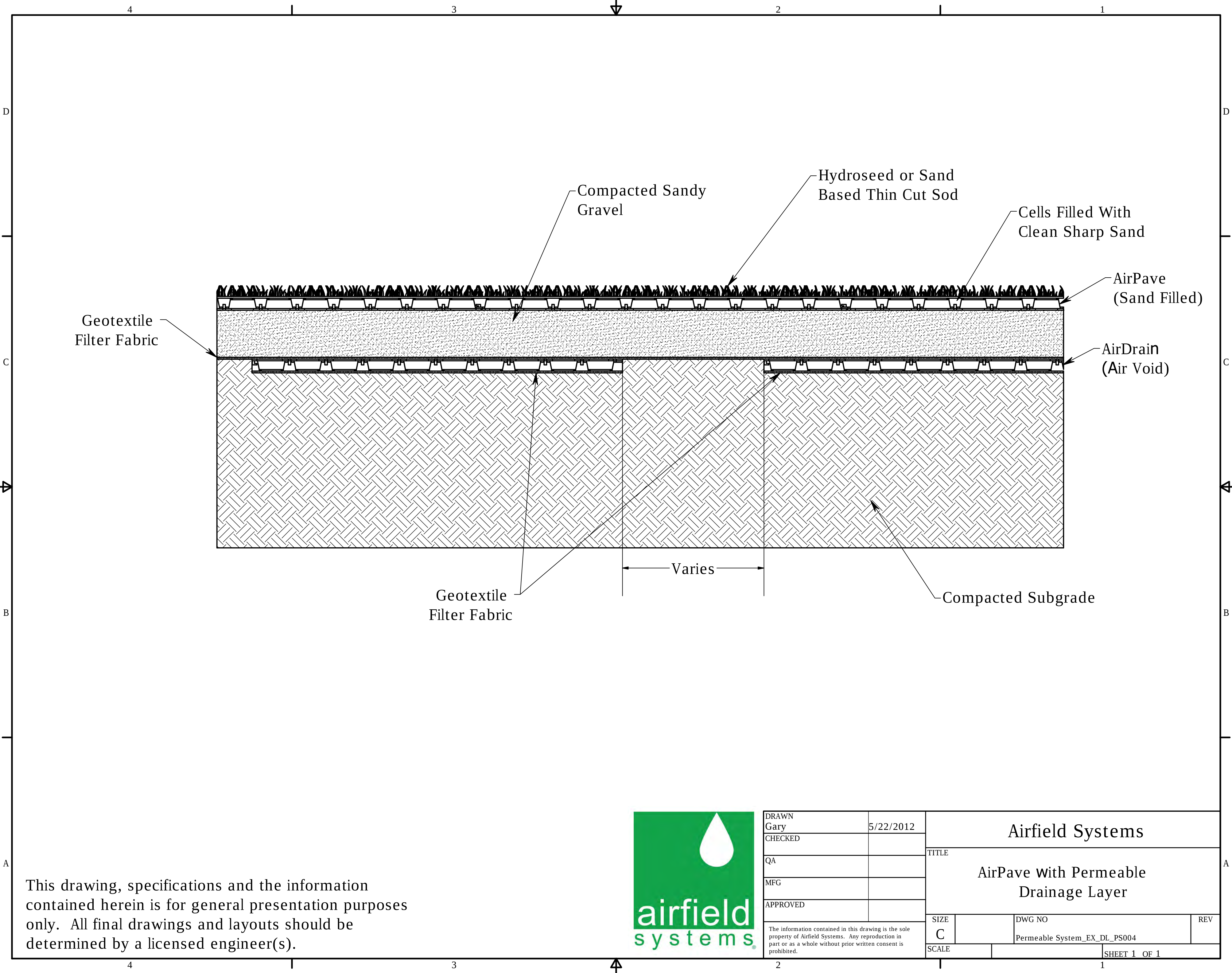


AirPave™ Cobblestone Edging



AirPave™ Landscape Timber Edge Raised/Flush

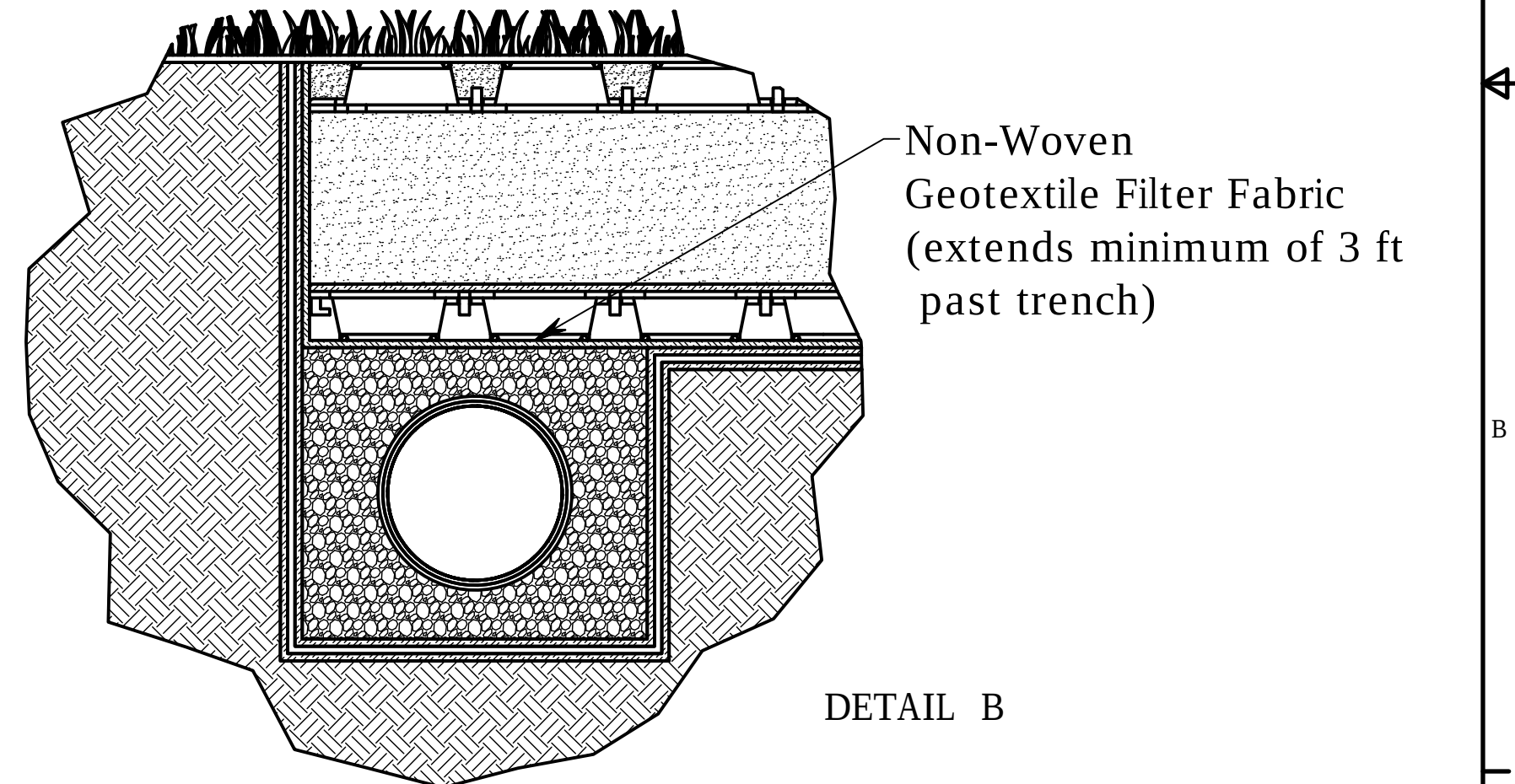
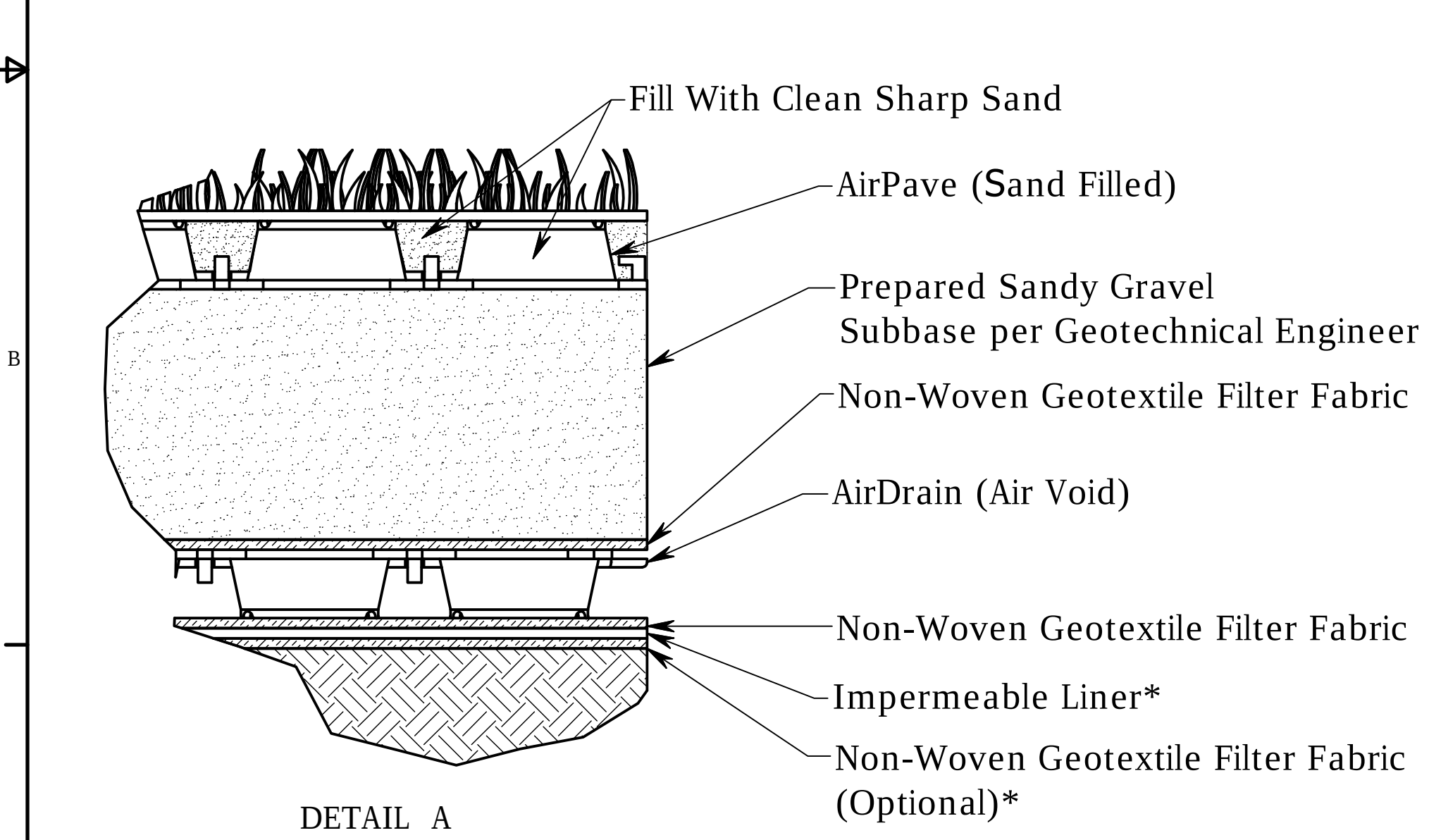
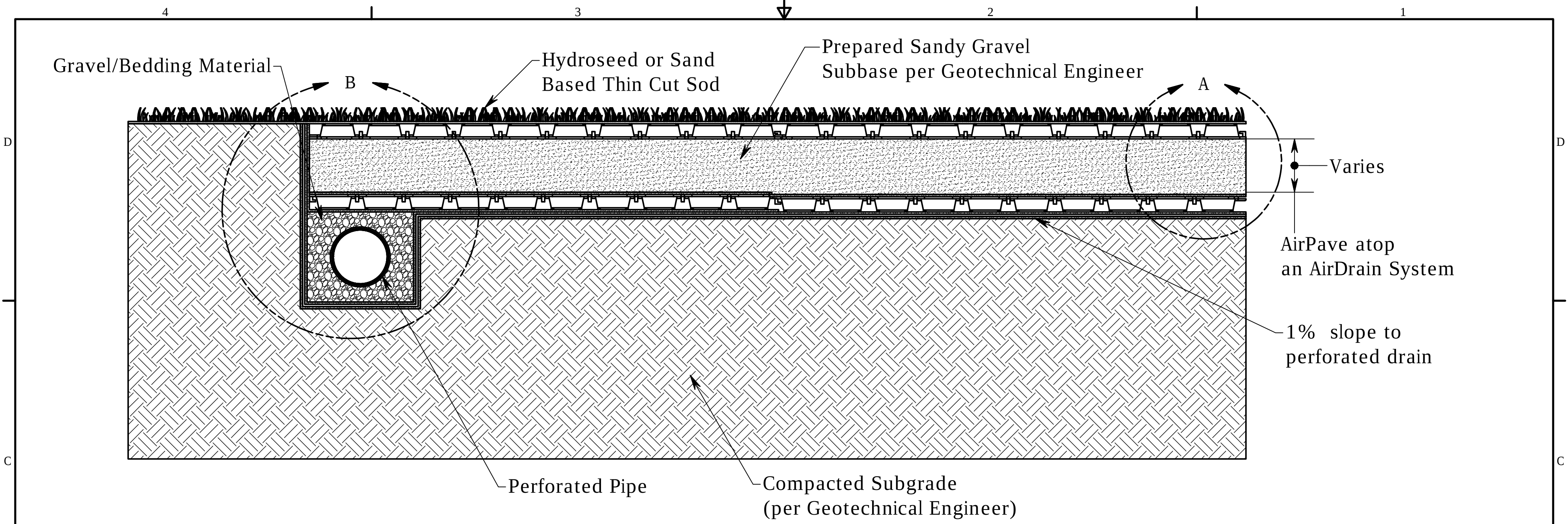
AirPave™ Permeable Edging Options



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DRAWN Gary	5/22/2012	Airfield Systems		
CHECKED				
QA		AirPave with Permeable Drainage Layer		
MFG				
APPROVED		SIZE C	DWG NO Permeable System_EX_DL_PS004	REV
The information contained in this drawing is the sole property of Airfield Systems. Any reproduction in part or as a whole without prior written consent is prohibited.		SCALE	SHEET 1 OF 1	



*Per Geotechnical Engineer

Select for poor draining soils or where additional water transport is needed.

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AirField Systems
8028 N. May Avenue, Suite 201
Oklahoma City, OK 73120
Call: (405) 359-3775
<http://www.airfieldsystems.com/>



DRAWN Gary	5/20/2012	Airfield Systems		
CHECKED				
QA		AirPave Permeable Paving atop an Impermeable AirDrain System		
MFG				
APPROVED		SIZE C	DWG NO Permeable System_DL_PS005	REV 12
The information contained in this drawing is the sole property of Airfield Systems. Any reproduction in part or as a whole without prior written consent is prohibited.		SCALE	SHEET 1 OF 1	



SECTION 32 12 43

FLEXIBLE POROUS PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Base course of sandy gravel, over sub-base prepared by others.
- B. Porous flexible paving and anchors.
- C. Sand cover.
- D. Turf cover for paver units.
- E. Fertilizer

1.2 RELATED SECTIONS

- A. Section 31 20 00 - Earth Moving.
- B. Section 33 46 19.13 - Underslab Drainage Piping.
- C. Section 32 10 00 - Bases, Ballasts, and Paving.
- D. Section 32 30 00 - Site Improvements.
- E. Section 32 84 23 - Underground Sprinklers.
- F. Section 32 90 00 - Planting.

1.3 REFERENCES

- A. AASHTO M6 - Standard Specification for Fine Aggregate for Hydraulic Cement Concrete.
- B. ASTM C 33 - Standard Specification for Concrete Aggregates.
- C. United States Golf Association (USGA) - Greens section sand mix "The Root Zone Mixture."

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Submit manufacturer's shop drawings including laying pattern and anchoring.
- D. LEED Submittals: Provide documentation of how the requirements of Credit will be met:
 - 1. List of proposed materials with recycled content. Indicate post-consumer recycled content and pre-consumer recycled content for each product having recycled content.
 - 2. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.
- E. Samples: Submit two 10 inch square samples of Porous Flexible Paving Units product specified.
- F. Manufacturer's Certificates: Certify base course, sand fill materials and products meet or exceed specified requirements.
- G. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic fertilizing and maintenance.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer with a minimum for five years documented experience with the products specified.
- B. Installer Qualifications: Installer experienced in performing work of this section that has specialized in installation of work similar to that required for this project. Installer must also be able to provide skilled workman with satisfactory record of performance on landscaping or paving projects of comparable size and quality.
- C. Pre-Installation Meetings:
 - 1. Convene a pre-installation meeting a minimum of two weeks prior to start of porous paving systems.
 - 2. Verify project requirements, subbase and base conditions, manufacturer's installation instructions and coordination with other related work.
 - 3. Require attendance of parties directly affecting work of this section, including the Contractor, Architect, engineer, and installer. Manufacturer's representative may attend by phone conference as needed.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Protect porous paver units from damage during delivery and store under tarp when time from delivery to installation exceeds 30 days.
- C. Keep supplied fertilizer with a Guaranteed Analysis in a dark and dry location.

- D. Protect materials during handling and installation to prevent damage.

1.7 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions recommended by manufacturer for desired results. Do not install products under conditions outside manufacturer's absolute limits.
- B. Do not begin installation of porous pavements until all hard surface paving adjacent to porous pavement areas, including concrete walks and asphalt paving, is completed.
- C. Install turf when ambient air temperature is at least 55 degrees F.
- D. In cold weather, do not use frozen materials or materials coated with ice or frost, and do not build on frozen base or wet, saturated or muddy subgrade.
- E. Protect partially completed porous paving against damage from other construction traffic when work is in progress.
- F. Protect turf paving from traffic until grass root system has matured for at least 3 to 4 weeks. Use barricades to only permit accessible by emergency and fire equipment

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Airfield Systems, which is located at: 8028 N. May Ave. Suite 201 ; Oklahoma City, OK 73120; Tel: 405-359-3775; Web:www.airfieldsystems.com ; Email: michaelb@airfieldsystems.com or tparker@airfieldsystems.com
- B. Substitutions: Not permitted.

2.2 MATERIALS

- A. Base Course: Sandy gravel material from local sources commonly used for road base construction and conforming to the following sieve analysis and requirements:
 - 1. Sieve Analysis:
 - a. 100 percent passing sieve size 1 inch (25 mm).
 - b. 90-100 percent passing sieve size 3/4 inch (19 mm).
 - c. 70-80 percent passing sieve size 3/8 inch (9 mm).
 - d. 55-70 percent passing sieve size #4.
 - e. 45-55 percent passing sieve size #10.
 - f. 25-35 percent passing sieve size #40.
 - g. 3-8 percent passing sieve size #200.
 - 2. For turf pavers, provide materials nearly neutral in pH (range from 6.5 to 7.2) to provide adequate root zone development for turf.
 - 3. Material may be either "pit run" or "crusher run." Crusher run material will generally require coarse, well-draining sand conforming to AASHTO M6 or ASTM C 33 to be added to mixture (20 to 30 percent by volume) to ensure long-term porosity.

4. Alternative materials such as crushed shell, limerock, or crushed lava may be used for base course use, provided they are mixed with sharp sand (20 to 30 percent) to ensure long term porosity, and are brought to proper compaction. Without added sand, crushed shell and limerock set up like concrete and become impervious.
- B. Porous Flexible Paving Units: AirPave Geocell Grass Paving Units.
1. Materials:
 - a. Lightweight injection-molded copolymer polypropylene plastic units using impact modifier.
 - b. Plastic is 100 percent post-consumer recycled copolymer polypropylene resin using a polymer impact modifier, with minimum 3 percent carbon black added for UV protection.
 - c. Chemical resistance: Excellent.
 - d. UV resistance: High.
 - e. Toxicity: Non-Toxic.
 2. Performance Properties:
 - a. Loading capability is equal to 233 psi empty capacity and 6,747 psi when filled with sand, over an appropriate base depth that provides adequate support for project design loads.
 3. Dimensions:
 - a. AirPave Grid: 31.784 inches by 31.880 inches by 1.000 inches or 7.03 SF.
 - b. Weight (Nominal): 3.10 lbs per paver grid, 8 percent solid.
- C. Paver Unit Anchors: 8 inch Chisel Point Pins 6 gauge BB Wire with 1.5 inch round attached washer, as required by the Architect or licensed geotechnical engineer to secure units in place
- D. Sand Cover:
1. Coarse, well-draining sand (washed concrete sand conforming to AASHTO M6 or ASTM C-33.
 2. United States Golf Association (USGA) greens section sand mix "The Root Zone Mixture."
 3. Other Soil Mix as recommended by the manufacturer.
- E. Grass: Coordinate with Section 32 92 26.13 - Stolonizing
1. Sodding: Sod: Use a 1/4 inch shallow cut rolled sod from a reputable local grower. Species should be wear resistant, free from disease, and in excellent condition. Sod shall be grown in sand or sandy loam soils only with less than 15 percent clay content. Sod grown in soils of clay, silt, or high organic materials such as peat, will not be accepted.
 2. Seeding: Use seed materials, of the preferred species for local environmental and projected traffic conditions, from certified sources. Seed shall be provided in containers clearly labeled to show seed name, lot number, net weight, percentage weed seed content, and guaranteed percentage of purity and germination. Pure Live Seed types and amount shall be as shown on plans. Mulch using wood or paper cellulose types of commercial mulch materials used in hydroseeding operations. Mulches of straw, pine needles, etc. will not be acceptable because of their low moisture holding capacity.
 3. Hydro Seeding: Approved seed mix and mulch using wood or paper cellulose types of commercial mulch materials for hydroseeding operations.

- F. Fertilizer with Guaranteed Analysis: [Sustane Natural Fertilizer](#) with guaranteed analysis of 4-4-4+Fe and provided with AirPave paving system. Applying Fertilizer per spec is critical to the success of the project.
- G. Firelane Signage and Markings: Identify entrance and physical location of firelanes using signs if gates, curbs, bollards, and other built elements do not adequately indicate firelanes; comply with requirements of local fire authorities.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Before beginning installation, verify site conditions are as indicated on the Drawings. Notify the Architect if site conditions are not acceptable. Do not begin preparation or installation until unacceptable conditions have been corrected.
 - 1. Complete all hard surface paving adjacent to flexible paving areas, including concrete walks and asphalt paving prior to installation of flexible paving.
- B. Obtain approval of local fire authorities of sub-base prior to installation of base course for flexible porous paving.
- C. Ensure that sub-base Specified in Section 32 10 00 - Bases, Ballasts, and Paving is adequate to receive designed base course, wearing course, and the required design loads. Ensure that grading and soil porosity of the sub-base will provide adequate subsurface drainage.

3.2 PREPARATION

- A. Subgrade Preparation:
 - 1. Prepare subgrade as specified in Section 32 10 00 - Bases, Ballasts, and Paving. Verify subgrade in accordance with porous paving system manufacturer's instructions.
 - 2. Excavate area allowing for unit thickness and the engineered base depth (where required).
 - 3. Provide adequate drainage from excavated area if area has potential to collect water, when working with in-place soils that have poor permeability.
 - 4. Provide a subdrainage system as specified in Section 33 46 19.13 - Underslab Drainage Piping.
 - 5. Ensure in-place soil is relatively dry and free from standing water.
 - 6. Uniformly grade base.
 - 7. Level and clear base of large objects, such as rocks and pieces of wood.
- B. Base Course: Place base course material over prepared sub-base to grades indicated on the Drawings. Place in lifts not to exceed 6 inches (150 mm), compacting each lift separately to 95 percent Modified Proctor. Leave 1 inch (25 mm) of depth below final grade for porous paver unit and gravel fill.
- C. Base Preparation:
 - 1. Leave minimum 25 mm (1 inch) to 35 mm (1.5 inches) for porous flexible paving units and sand/sod fill to final grade.
 - 2. Spread all [Sustane fertilizer mix](#) at the rate of 25 kg per 100 m² (25 lbs per 1,000 SF) evenly over the surface of the base course with a hand-held, or wheeled, rotary spreader. Place fertilizer mix should be immediately before installing the porous flexible paving units.
<http://www.sustane.com/products/landscape/bolster-granular-4-4-4-3fe>

3.3 INSTALLATION

- A. Paving Units: Install Porous Flexible Paving Units in accordance with manufacturer's instructions.
1. Install by placing units with connectors and the pinning platforms flush against the prepared subbase with the larger diameter clover openings (cup side down) and pinning platforms facing downwards (grid side down). Place the first unit panel to the field's upper left hand corner. Orient the paving unit materials with the integral indicator tab (painted yellow) to the panel's bottom left hand corner. Proper sequencing and orientation of panels will result in a more rapid installation.
 2. Install unit panels across the field in a rowed pattern. Staggering of rows will allow for multiple row completion by a multi-manned crew. Secure the first panel to the base with pins and commence with panels 1-2, 1-3 and so on with one directional pull to secure. After each one directional pull secures the panel connectors together, slightly push back each panel to allow for contraction space at each connector. Verify each integral connector is snapped in place with sufficient contraction room allowed as panel installation proceeds.
 3. Once the first row has progressed across the project, start with the second row. By maintaining proper panel orientation, the top edge panel connectors will drop into the previously installed panel receptors after the one directional pull secures the panel.
 4. Panels can be shaped to individual field areas as needed with an appropriate cutting device. If you have many parts to trim use a circular saw with a no melt, plastic cutting saw blades.
 5. Anchor units to base course on curves, slopes, high traffic areas and any other areas as required.
 6. Anchor units using paver unit anchors. Tops of clovers shall be between 6 mm to 13 mm (0.25 inch to 0.5 inch) below the surface of adjacent hard-surface pavements.
- B. Sand: Place sand in clovers by back-dumping directly from a dump truck, or from buckets mounted on tractors, which then exit the site by driving over clovers already filled with sand. Spread sand laterally from the pile using flat bottomed shovels and/or wide asphalt rakes filling the clovers. Use a stiff bristled broom for final finishing of the sand uniformly over the clovers. Compact sand by using water from hose, irrigation heads, or rainfall, with the finish grade no less than the top of clovers and no more than 6 mm (0.25 inch) above top of clovers.
1. Spread all Sustane fertilizer mix at the rate of 25 kg per 100 m² (25 lbs per 1,000 SF) evenly over the surface of the sand filled AirPave with a hand-held, or wheeled, rotary spreader.
<http://www.sustane.com/products/landscape/bolster-granular-4-4-4-3fe>
- C. Grass: Coordinate with Section 32 92 26.13 - Stolonizing and in accordance with porous paving manufacturer's instructions.
1. Hydroseeding/hydro-mulching: Mix a combination of water, seed and fertilizer homogeneously in a purpose-built, truck-mounted tank. Spray the seed mixture uniformly onto the site at required rates. Following germination of the seed, areas lacking germination larger than 20 cm by 20 cm (8 inches by 8 inches) shall be reseeded immediately. Seeded areas shall be fertilized and kept moist during development of the turf plants.

2. Thin Cut Sod: Install directly over sand filled clovers, filled no higher than the top of the clovers. Place sod strips with very tight joints, moistened and rolled to create good contact for growth. Fertilize and keep moist during root establishment (minimum of 3 weeks). Protect from any traffic for a period of 3 to 4 weeks or until the root system has penetrated and established well below the porous paving units.
3. Seeding: Place grass seed at recommended rates per grass type. Place a light dusting of commercial topsoil mix, not to exceed 1/4 inch (25 mm) above the clovers and seed mix to aid germination rates. Fertilize and keep moist seeded areas during development of the turf plants.

3.4 MAINTENANCE

- A. Remove and replace segments of porous paving units where three or more adjacent clovers are broken or damaged, reinstalling as specified, so no evidence of replacement is apparent.
- B. Maintain grass in accordance with manufacturer's instructions and as specified in Section 32 92 26.13 - Stolonizing Lawns and Grasses.

3.5 PROTECTION

- A. Protect turf area from any traffic for a period of 4 to 8 weeks, or until the grass is mature enough to handle traffic.
- B. Perform cleaning during the installation of work and upon completion of the work. Remove all excess materials, debris, and equipment from site. Repair any damage to adjacent materials and surfaces resulting from installation of this work.
- C. Repair or replace damaged products before Substantial Completion.

END OF SECTION

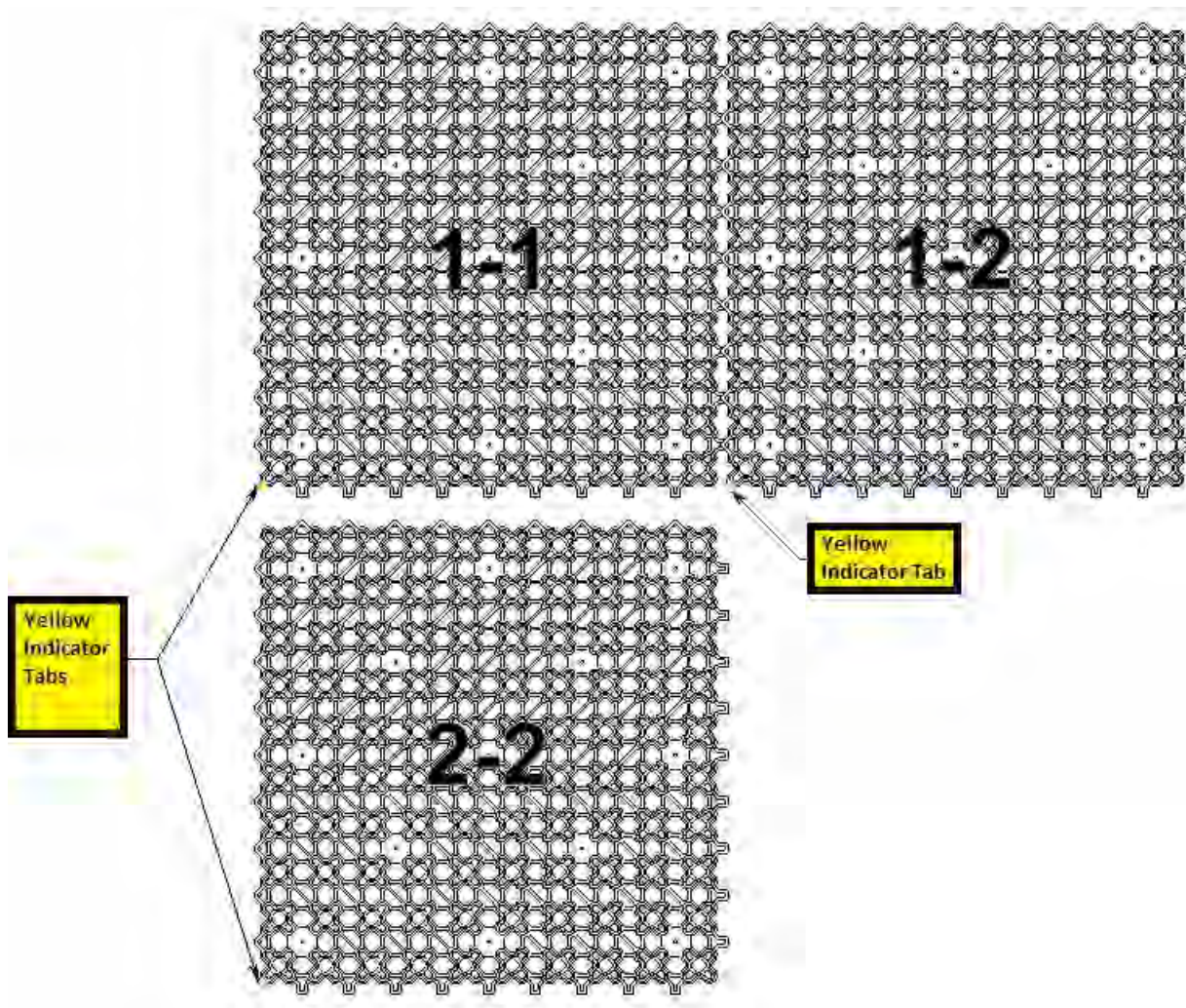
DISCLAIMER: The preceding and following drawings and/or general installation guidelines are provided only to show a concept design for installation and are not instructions for any particular installation. These drawings and general instructions are not complete and are provided only to assist a licensed Geo-Technical Engineer, a Landscape Architect and/or Civil Engineer in preparing actual construction and installation plans. These drawings and instructions must be reviewed by a licensed Geo-Technical Engineer, a Landscape Architect and/or Civil Engineer and adapted to the condition of a particular installation site and to comply with all state and local requirements for each installation site. THESE DRAWINGS AND/OR GENERAL INSTRUCTIONS DO NOT MODIFY OR SUPPLEMENT ANY EXPRESS OR IMPLIED WARRANTIES INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IF APPLICABLE RELATING TO THE PRODUCT.

Proper Sequencing and Orientation of AirPave GeoCell Panels for Rapid Installation

Pallet Staging: AirPave pallets cover approximately 798sqft. per pallet and should be staged accordingly within the installation area to minimize the amount of time to stage the AirPave grid. AirPave pallets are typically placed every 65 feet across and 15-20 feet back from each other. (Call AirField with questions that you might have about proper staging and installation.)

All Installations must start in the Top Left Corner of the project and work Left to Right to be installed properly.

1. Orientate the AirPave GeoCell materials with the integral indicator tab to the panel's bottom left corner (painted yellow). **Install the AirPave units by placing units with connectors and the pinning platforms flush against the prepared subbase. If the female connectors do not go over the male connectors then the orientation is incorrect, please call AirField Systems Immediately at 405-359-3775**



2. Install the AirPave panels across the field in a rowed pattern. Staggering of rows will allow for multiple row completion by a multi-manned crew.

3. Secure the first panel to the base with pins (Only in AirPave grass pave installations) and commence with panels 1-2, 1-3, and so on with one directional pull to secure. (Optional)
4. Once the first row has progressed across the project, start with a second row. Have a person staging the panels in groups of three snapped together along the row. The crew can then install the left side of the panel while elevating slightly the top portion (so the male and female connectors don't touch each other) once the left side has been snapped with a pull along the row direction, the top portion should fall into place and with a bottom vertical pull holding the inside of parts 1 & 3 snap all three parts in place.



5. AirPave panels can be shaped to individual field areas as needed with appropriate cutting device.
 - A. If only a few parts need to be trimmed, use tin snips.
 - B. If many parts require trimming, set up a table and use a circular saw with a no melt, plastic cutting saw blade.
6. AirPave units placed on curves and slopes shall be anchored to the base course, using 8 inch (203 mm) Chisel Point Pins 6 gauge BB Wire and 1 1/2 (35 mm) round attached washers, as required to secure units in place.

DISCLAIMER: The preceding and following drawings and/or general installation guidelines are provided only to show a concept design for installation and are not instructions for any particular installation. These drawings and general instructions are not complete and are provided only to assist a licensed Geo-Technical Engineer, a Landscape Architect and/or Civil Engineer in preparing actual construction and installation plans. These drawings and instructions must be reviewed by a licensed Geo-Technical Engineer, a Landscape Architect and/or Civil Engineer and adapted to the condition of a particular installation site and to comply with all state and local requirements for each installation site. THESE DRAWINGS AND/OR GENERAL INSTRUCTIONS DO NOT MODIFY OR SUPPLEMENT ANY EXPRESS OR IMPLIED WARRANTIES INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IF APPLICABLE RELATING TO THE PRODUCT.

Delineation and Marking on the AirPave System for Grass Fire Lanes

It is easy for your site to provide delineation to separate handicapped parking spaces, regular parking spaces, fire lane routes, or for other needs. You really have unlimited options to stripe, mark, or delineate the AirPave system for grass paving. Choose your favorite methods based on product, traffic frequency, aesthetics, and function.



Embedded Bricks • Railroad Ties • Raised Concrete Strips
Bumper Stops • Rocks and Other Durable Landscape Material
Bushes • Shrubs • Ground Cover • Landscape Lighting

AirPave Specifications

General Information			
General			
Construction		Injection Molded Copolymer	
Composition		Copolymer Polypropylene Using Impact Modifier	
Dimensions		31.784" x 31.880" x 1.000" (7.03 sq ft.)	
Unit Weight		3.100 lbs.	
Forms		Pellets	
Shipping			
Parts Per Pallet		114	
Pallet Dimensions		33" x 33" x 48"	
Pallet Weight		390 lbs.	
Area Per Pallet		798 sq. ft.	
Pallets Per Trailer		114 (3 wide x 2 tall x 19 deep)	
Area Per Trailer		90,972 sq. ft.	
ASTM and ISO Properties ¹			
Physical		Nominal Value	Test Method
Specific Gravity		0.940	ASTM D792
Melt Mass-Flow Rate (230°C/2.16 kg)		20 g/10 min	ASTM D1238
Mechanical		Nominal Value	Test Method
Density		57.490 lb/ft3	ASTM D1505
Tensile Strength (Yield, 73°F)		2,145 psi	ASTM D638
Tensile Elongation (Yield, 73°F)		16%	ASTM D638
Flexural Modulus (73°F)		100,175 psi	ASTM D790
Compression Strength (73°F)		233 psi	ASTM D6254
Impact		Nominal Value	Test Method
Notched Izod Impact (73°F, 0.125 in)		-	ASTM D256
Thermal		Nominal Value	Test Method
Deflection Temperature Under Load 264 psi, Unannealed		160°F	ASTM D648
Expansion/Contraction Index ¹			
Temperature	Humidity	Length	Width
100°F	98%	31.881"	31.817"
-5°F	0%	31.765"	31.713"
Change		.116"	.104"
Joint Expansion/Contraction Capacity		.420"	.572"
Safety Factor		362%	550%
Examples of Usage			
Application		Required Strength	Safety Factor
Auto		40 psi	x 168
Truck		110 psi	x 61
DC10		250 psi	x 27
Space Shuttle		340 psi	x 19

¹Independent laboratory testing conducted by TRI/Environmental, Inc., TSI/Testing Services, Inc. and Wassenaar.

AirPave Highway and Bridge Load Strength

With an unfilled compression strength of 233 psi (1606.47 kPa) and an incredible filled strength of 6,747 psi (46,518.94 kPa) the AirPave GeoCell has been independently tested to exceed AASHTO load requirements for highways and bridges with a multiple safety factor at even the highest level.

Vehicle Type	Maximum Weight Per Axle		AASHTO Load Class	Surface Pressure		Dynamic Load	
	lbs.	kg		psi	kPa	Psi	kPa
ATV (Trail Vehicle Only)	1,200	544.31	-	3	20.68	1.45	30.02
Passenger Vehicle	3,000	1,360.78	H10	7.5	51.71	2.17	44.95
Light Truck	3,000	1,360.78	H10	7.5	51.71	2.17	44.95
Pickup	4,000	1,814.37	H10	10	68.95	2.57	53.25
80 Hp Tractor	5,700	2,585.48	H10	14.25	98.25	3.26	67.35
Service Vehicle	7,000	3,175.15	H10	17.5	120.66	3.78	78.13
100 Hp Tractor	11,000	4,989.52	H10	27.5	189.61	5.38	111.32
Van Delivery Truck	16,000	7,257.48	H15	40	275.79	7.39	152.80
Rural Fire Truck	22,000	9,979.03	H15	55	379.21	9.79	202.57
Large Delivery Truck	24,000	10,886.22	H15	60	413.69	10.60	219.16
Semi Delivery Truck	24,000	10,886.22	H15	60	413.69	10.60	219.16
Garbage Truck (Single Axle)	26,000	11,793.40	H25/HS25	65	448.16	11.40	235.76
Loaded Dump Truck	30,000	13,607.77	H25/HS25	75	517.11	13.00	268.94
Heavy Delivery Truck	32,000	14,514.96	H25/HS25	80	551.58	13.80	285.53
Heavy Semi Truck	32,000	14,514.96	H25/HS25	80	551.58	13.80	285.53
Standard Log Truck	33,600	15,240.70	H25/HS25	84	579.16	14.45	298.80
Concrete Transit Truck	38,000	17,236.51	H25/HS25	95	655.00	16.21	335.31
Garbage Truck	42,000	19,050.88	H25/HS25	105	723.95	17.81	368.49
Dump Truck	43,000	19,504.47	H25/HS25	107.5	741.19	18.22	376.78
Off Highway Log Truck	43,000	19,504.47	H25/HS25	107.5	741.19	18.22	376.78

Comparative Data Sheet - AirPave vs. Grasspave2

December 27, 2012

Feature	AirPave	Grasspave2
Paver Material*	100% Recycled Copolymer with Impact Modifier	100% Recycled HDPE
Standard Size	32" x 32" x 1" (Palletized)	6.6' x 65.6' x 1" (Rolls)
Weight (lbs per sq. ft.)	0.442	0.42
Standard Color	Black	Optional
Load Strength - installed sand filled	6747 psi	5700 psi
Paver Flexibility	Flexible	Flexible
Soil Coverage at Surface - approx.	100%	100%
Root Area at Base of Unit - approx.	92%	92%
Fertilizer included with guaranteed analysis	Sustane Bolster	None
Cutting Tools for Installation	Pruning Shears	Pruning Shears
Interlocking	Yes	Yes
Expansion and Contraction	Yes	No
Labor Skill Level Needed	1 Laborer	Multiple Laborers
Grass Installation Methods	All	All
Water Absorption (Freezing)	None	None
Oil Absorption	None	None
Affects from Turf Chemicals	None	None
Heat Absorption	None	None
Estimated System Install Time per 1,000 sqft.	3.1 hr Full System	3.1 hr Full System

100% Post Manufactured Content



Recycled

The **AirPave** GeoGrid is made of 100% post-manufactured material, you can feel good about helping the planet [while adding valuable LEED Points](#) to your project! We also add an impact modifier for incredible strength and superior performance in extreme heat and cold - on top of the already durable **AirPave** design.

AirPave Co-Polymer with an Impact Modifier Performance and Temperature Durability

Attached you will find the specification of the resin used to produce both the 32 x 32 and the 32 x 18 Geo cells. This material is a co-polymer polypropylene that is 100% recycled resin. In order to be able to produce a consistent recycled resin a PIR (post industrial resin) is used for the base resin. This is the only way to produce a consistent material as opposed to a PCR (post consumer resin) which is dependent on the consumer to supply a consistent material. Using the PIR as a base resin 3% carbon black is added to insure good UV stabilization and metallocene (an ethylene base material) is used as an impact modifier.

Impact Modifier

The impact modifier is added in an amount to achieve a 10.0 Notched Izod Impact which comfortably qualifies this material as a NO BREAK material (4.0 and greater are normally considered no break material). The **AirPave** resin offers an advantage over many ethylene and HDPE products since the **AirPave** resin is often superior when it comes to pliability, warping and internal stress related issues. Referring to the attached specification sheet you will notice that all testing is done to specific ASTM Standards.

Resin Blends

AirPave's blend of resins gives it the ability to perform in extreme temperatures. **AirPave** does not need a temperature above 50 degrees Fahrenheit to be installed or warmed in the sun to be pliable on site for install. In addition, **AirPave's** unique resin blend also helps prevent breakage and cracking in extreme temperatures, thus giving it the ability to withstand repeated freeze thaw cycles.



August 23, 2006

Mail To:

Mr. Charles Blackwood
Airfield Systems, LLC
441 S. Fretz, Suite A
Edmond, OK 73003

Bill To:

<= Same

Dear Mr. Blackwood:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:

Air drain Testing Summary

TRI Job Reference Number:

E2265-09-02

Material(s) Tested:

1 Air drain Sample(s)

Test(s) Requested:

Dimensions/Mass
Density (ASTM D 1505)
Flexural Modulus (ASTM D 790) - Resin Plaque
Tensile Yield Stress (ASTM D 638) - Resin Plaque
Compression Strength (ASTM D 6254) - Unfilled
Compression Strength (ASTM D 6254) - Filled

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Sam R. Allen
Vice President and Division Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com



AIRDRAIN TEST RESULTS

TRI Client: Airfield Systems

Project: Airdrain Testing

Material: Airdrain Sample
Sample Identification: No Label
TRI Log #: E2265-09-02

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.
	1	2	3	4	5	6	7	8	9	10		
Dimensions/Mass												
Length (in)	15.90	15.50	16.05	15.95	16.00	15.90	15.67	15.63	15.57	15.70		
Width (in)	15.80	15.60	15.95	15.50	16.00	15.90	15.60	15.67	15.63	15.62		
Square Feet (ft ²)	1.74	1.68	1.78	1.72	1.78	1.76	1.70	1.70	1.69	1.70	1.72	0.04
Mass (g)	334	322	326	333	328	331	329	323	325	325		
Mass/unit area (oz/sq.yd)	60.8	60.9	58.2	61.4	58.5	59.8	61.4	60.1	60.9	60.6	60.3	1.1
Mass/unit area (g/sq. meter)	2063	2066	1973	2085	1985	2028	2085	2041	2068	2057	2045	39
Density (ASTM D 1505)												
Density (g/cm ³)	0.921	0.921	0.921								0.921	0.000
Tensile Properties (ASTM D 638/GRI GM17, 2 lpm strain rate, Type IV specimen) - Resin Plaque												
Yield Strength (ppi)	2119	2007	2071	2023	2055						2055	44
Break Strength (ppi)	2168	2119	2136	2136	2168						2145	22
Yield Elongation (%)	10	10	10	10	10						10	0
Break Elongation (%)	18	13	18	18	16						16	2
Flexural Modulus (ASTM D 790) - Resin Plaque												
Flexural modulus (psi)	107632	102150	105281	76834	112250	96901					100175	12545
Compression Strength (ASTM D 6254) - Unfilled												
Rib "Layover" Strength (psf)	18641	17984	18148	18542	18689	17982					18331	330
Compression Strength (ASTM D 6254) - Filled												
Rib "Layover" Strength (psf)	> 60,000	> 60,000	> 60,000	> 60,000	> 60,000						> 60,000	

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

Summary of Lab Test Results on AirDrain Geogrid

The attached summary represents the load bearing capacity of five three by three cells filled with sand.

Physical Ring Data (inches):

- Overall Gross Area: $8.608'' \times 8.608'' = 74.098''$
- Individual Cell Gross Area: $2.2175'' \times 2.175'' = 4.9173 \text{ in}^2$ Gross Area
- $\frac{1}{2}$ Circles w/in cell: radius - $0.4034 = 0.2556 \text{ in}^2 \times 4$ individual
- $\frac{1}{2}$ circles w/in cell = 1.0223 in^2
- Net area of single cell = $4.9173 \text{ in}^2 - 1.0223 \text{ in}^2 = 3.895 \text{ in}^2$
- Net area of 3 x 3 sand filled cells (9): $3.895 \text{ in}^2 \times 9 \text{ cells} = 35.055 \text{ in}^2$

Lab Test Data:

Plastic Cells: (Empty) 3x3

- Overall load
 - 17,265 lbs
 - $17,265 \text{ lbs} / 35.055 \text{ in}^2 = 493 \text{ psi}$

****Sand filled box with (3x3) cells inside**

- Overall load (Average of 3)
 - 500,000 lbs per test section (max. machine load)
 - $500,000 \text{ lbs} / 74.098 \text{ in}^2 = 6,748 \text{ psi}$
 - Avg. overall deformation of plastic = $0.08'' - 0.11''$

Notes:

- * - $\frac{1}{2}$ circles in clover were measured with a caliper on top and bottom and the result was averaged.
- ** Sand used to fill cells: Oglebay - Norton Industrial Sand, Inc.
Colorado Springs Plant, Colorado Silica Sand (ANSI/NSF61, V13001, 632 JLP)

A.G. Wassenaar

Geotechnical and Environmental Consultants

Inc.

2180 South Ivanhoe Street, Suite 5
Denver, Colorado 80222-5710

303-759-8100 Fax 303-756-2920

www.agwassenaar.com

November 27, 2006

Airfield Systems, LLC
441 South Fretz, Suite A
Edmond, Oklahoma 73003

DEC 04 2006

Attention: Mr. Charles R. Blackwood, CEO

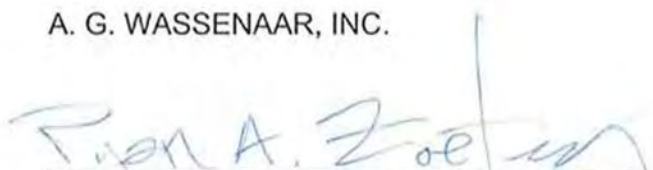
Subject: AirDrain Geogrid Load Testing
Client Delivered Samples
Project Number 91954

Dear Mr. Blackwood:

As requested, we have conducted the AirDrain geogrid load testing on the sample sheets submitted to our office on October 30, 2006. The laboratory cut a total of five test samples from the AirDrain geogrid sheet. The dimensions of the five cut samples for compression testing were three cells by three cells. The laboratory tested two cut samples empty to determine the strength of the plastic cells. The other three cut samples were placed in a box. The cells and interior of the box were filled with sand to the height of the geogrid. The cut samples were tested for compression on a Forney 502F-F96 compression machine. This compression machine has a 500,000 lb. capacity and the average load rate was 60,000 lbs./min. The laboratory results are based on the load capacity of the grid without rupture. There are limiting factors in extrapolating the following results given soil bearing capacities.

Sincerely,

A. G. WASSENAAR, INC.


Ryan A. Zoetewey
Laboratory Manager


Thomas A. Hastings, S.E.T.
Field Services Manager

RAZ/TAH/klw

Statement of Services