SUSTAINABLE
DESIGN
with

# AirDrain

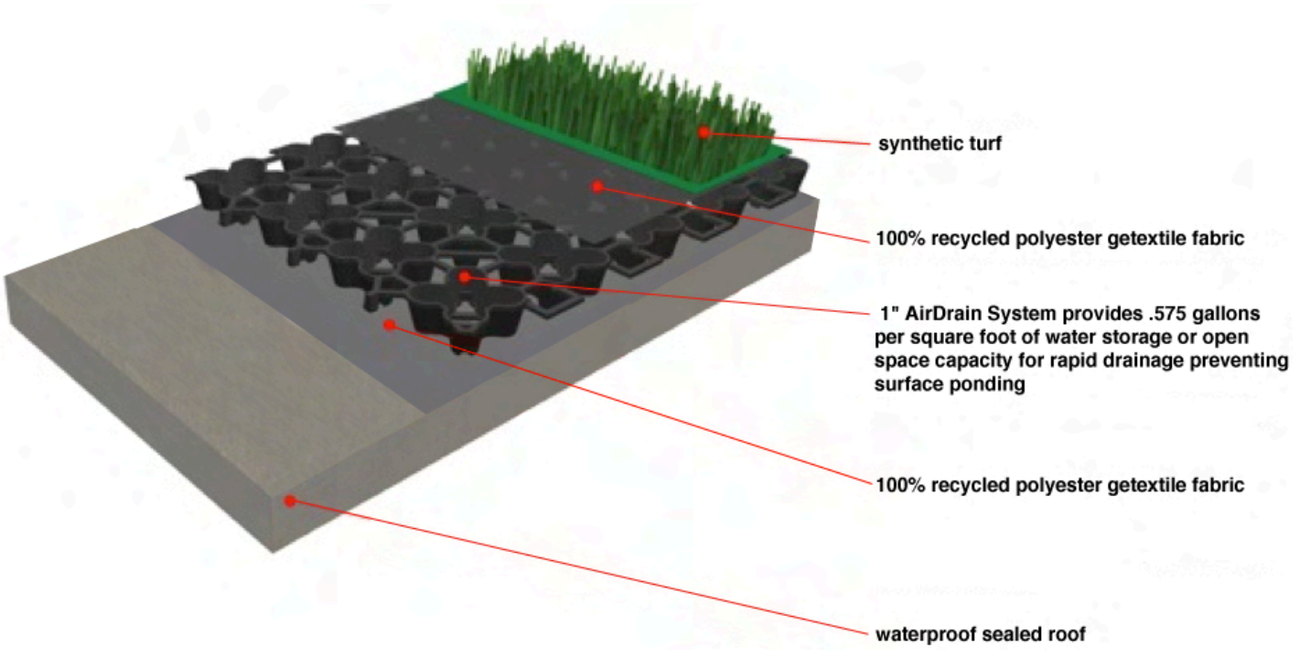
## by AirField Systems

THE ADVANCED GEOCELL FOR ROOFTOP SPORTS FIELD CONSTRUCTION

RAPID DRAINAGE, COLLECTION, RETENTION AND REUSE FOR NATURAL AND ARTIFICIAL TURF

# AirDrain for SPORTS FIELD ROOFS

With limited space on campus, high schools and colleges are turning to rooftop sports surfaces to create multi-use green areas. Building a rooftop sports field with an AirField System provides drainage under 100% of the playing surface, prevents ponding, and moves water efficiently for reuse elsewhere on campus.




Sustainability, durability, long life, and superior drainage at a value you'll love for football, soccer, baseball, lacrosse, and field hockey rooftop sports fields.

**Benefits of an AirField rooftop turf drainage system include:**

- Helps to maintain a constant Gmax
- Dramatically increases drainage
- Installation time measured in days instead of weeks
- Longer drainage system life - field can be replaced without replacing the drainage system
- Water reclamation and reuse
- Helps qualify for green building credits
- Smaller carbon and development footprint
- 100% vertical drainage under the entire field surface
- Minimizing water related injuries
- Reduced site disturbance
- 100% recycled drainage geocell
- Reduced maintenance
- Less infill migration

# ASTM Testing Proves the AirDrain Synthetic Turf Drainage Doubles as a Drainage Layer and Shock Pad

Whether installed on an aggregate base, concrete or asphalt the **AirDrain** drainage grid helps provide you with a consistent **GMAX** (as seen below) across the entire field. Some factors that might influence a change in **GMAX** would be an inconsistency of the infill or wear of the synthetic turf fibers. Unlike traditional shock pads / e-layer the **AirDrain** is 1" high, has a 92% air void. This unmatched vertical and lateral drainage all but eliminates standing water.

## Some of the Benefits of an AirField Synthetic Turf Drainage System include:

• AirDrain creates and helps maintain a constant Gmax for artificial turf (See below)

• Shock absorption reduces the strain on joints and ligaments

• AirDrain is only limited by the drainage capacity of the profile above it and the exit drain

• AirDrain can be reused when the synthetic turf must be replaced

• Can help qualify for LEED and other green building credits

• A smaller carbon and development footprint with reduced site disturbance

• Water harvesting reclamation and reuse is possible

• AirDrain is a 100% recycled copolymer with the impact modifier metallocene qualifying it as a “No Break” plastic

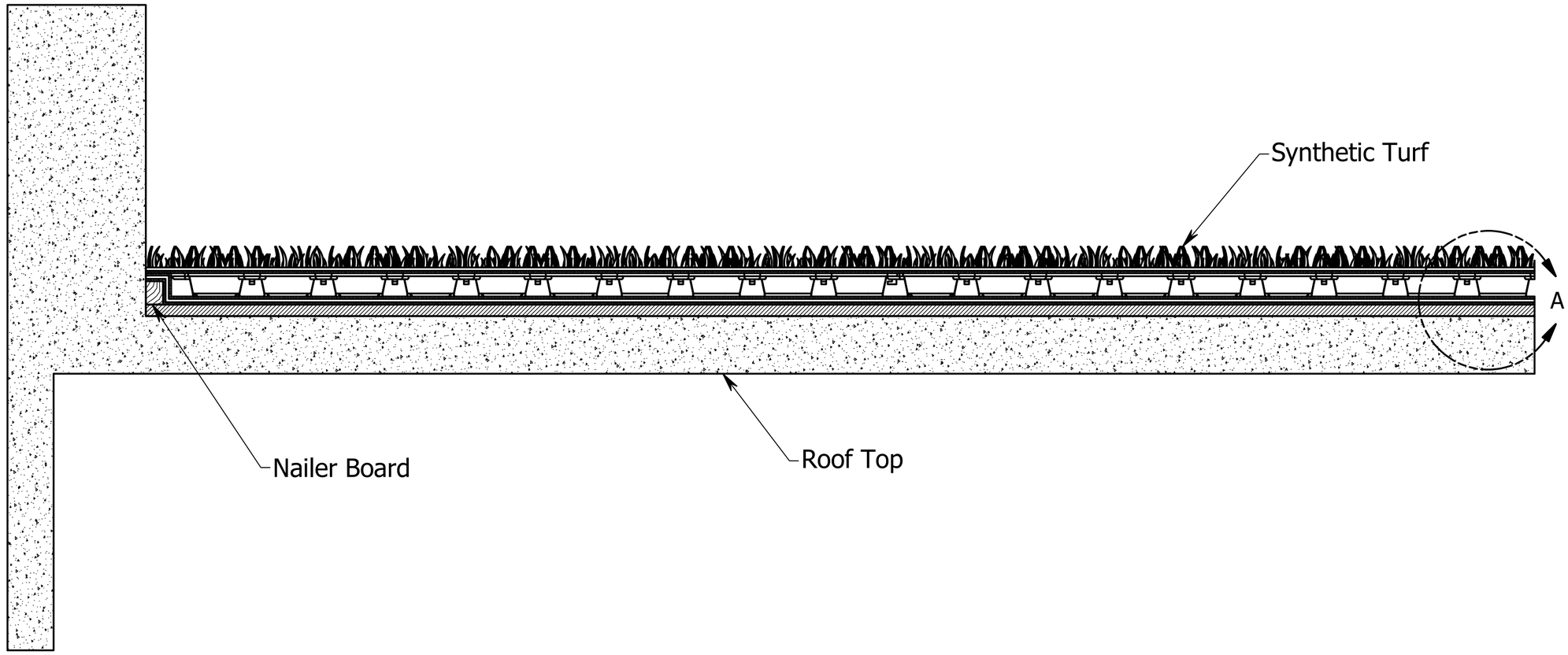
*** **AirDrain** can be made to the following specification “**Flammability UL 94, 30% Fiberglass Reinforced, High Impact, Flame Retardant Polypropylene Copolymer Resins**” for Rooftop applications. FLAMMABILITY @ 0.100 in V-0/5VA* UL94*

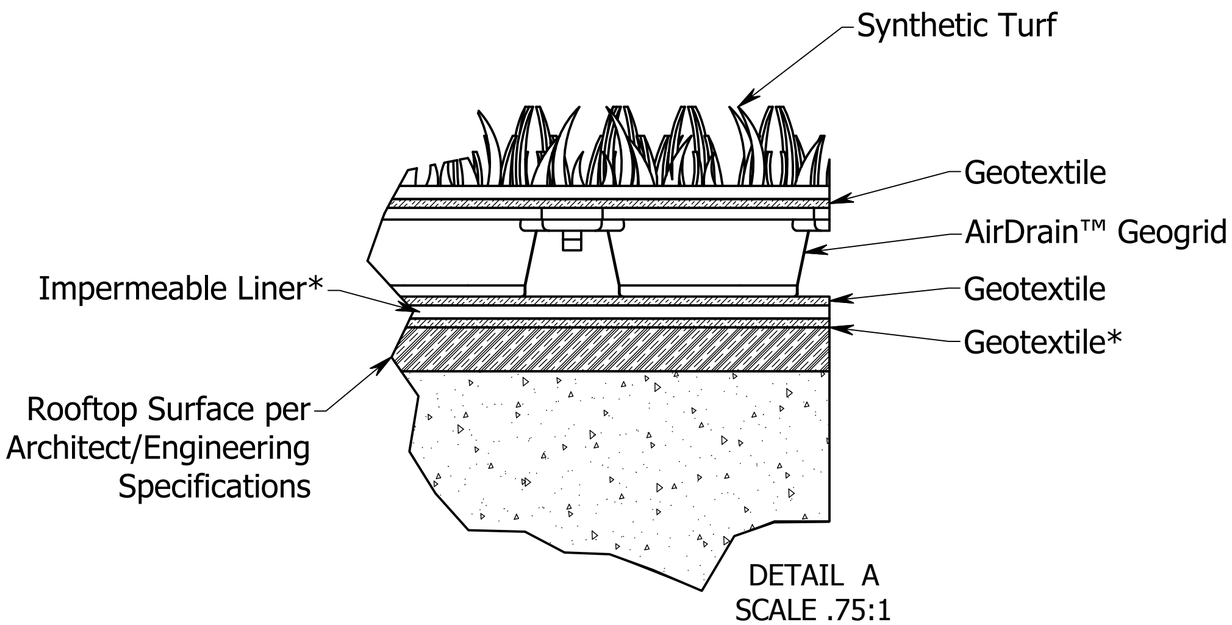
**GMAX Results for:** Turf - 2 1/2” Slit Film, in filled with 50% Green Rubber Infill and 50% Silica Sand.

The drainage/shock pad and turf underlying substrate consists of a concrete deck/rooftop, coated with a waterproof membrane and 2 separate layers of 5 ounce 100% recycled polyester geo-textile filter fabric.

| Test # | Drop No. | Drainmatt Tested | Ft. / Sec. | H.I.C | Peak/Gmax | Avg./Loc. | Drainmatt Average |
|---|---|---|---|---|---|---|---|
| 6 | 16 | AIRFIELD Drop 1 | 11.7 | 222 | 89 | | |
| | 17 | | 11.7 | 289 | 105 | | |
| | 18 | | 11.7 | 292 | 106 | 105.5 | |
| 7 | 19 | AIRFIELD Drop 2 | 11.7 | 215 | 87 | | |
| | 20 | | 11.7 | 275 | 101 | | |
| | 21 | | 11.7 | 294 | 105 | 103 | |
| 8 | 22 | AIRFIELD Drop 3 | 11.7 | 249 | 97 | | |
| | 23 | | 11.7 | 308 | 109 | | Average of all Three 107.166 |
| | 24 | | 11.7 | 333 | 117 | 113 | |

The Standard Test Method for Shock-Absorbing Properties of Playing Surface Systems and Materials (ASTM F1936-98 American Football Field) testing locations and procedure were preformed. The tests were performed using a Triax 2000 A-1 Missile, tripod mounted Gmax registration unit (www.triax2000.com). This report presents background information on the test procedures, existing conditions, test results and observations




DETAIL A
SCALE .75:1

*Impermiable Liner and or other waterproofing must be specified by a qualified engineer.

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).

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| | | |
|---|---|---|
| DRAWN | Gary | 9/22/2012 |
| CHECKED | | |
| QA | | |
| MFG | | |
| APPROVED | | |



Airfield Systems

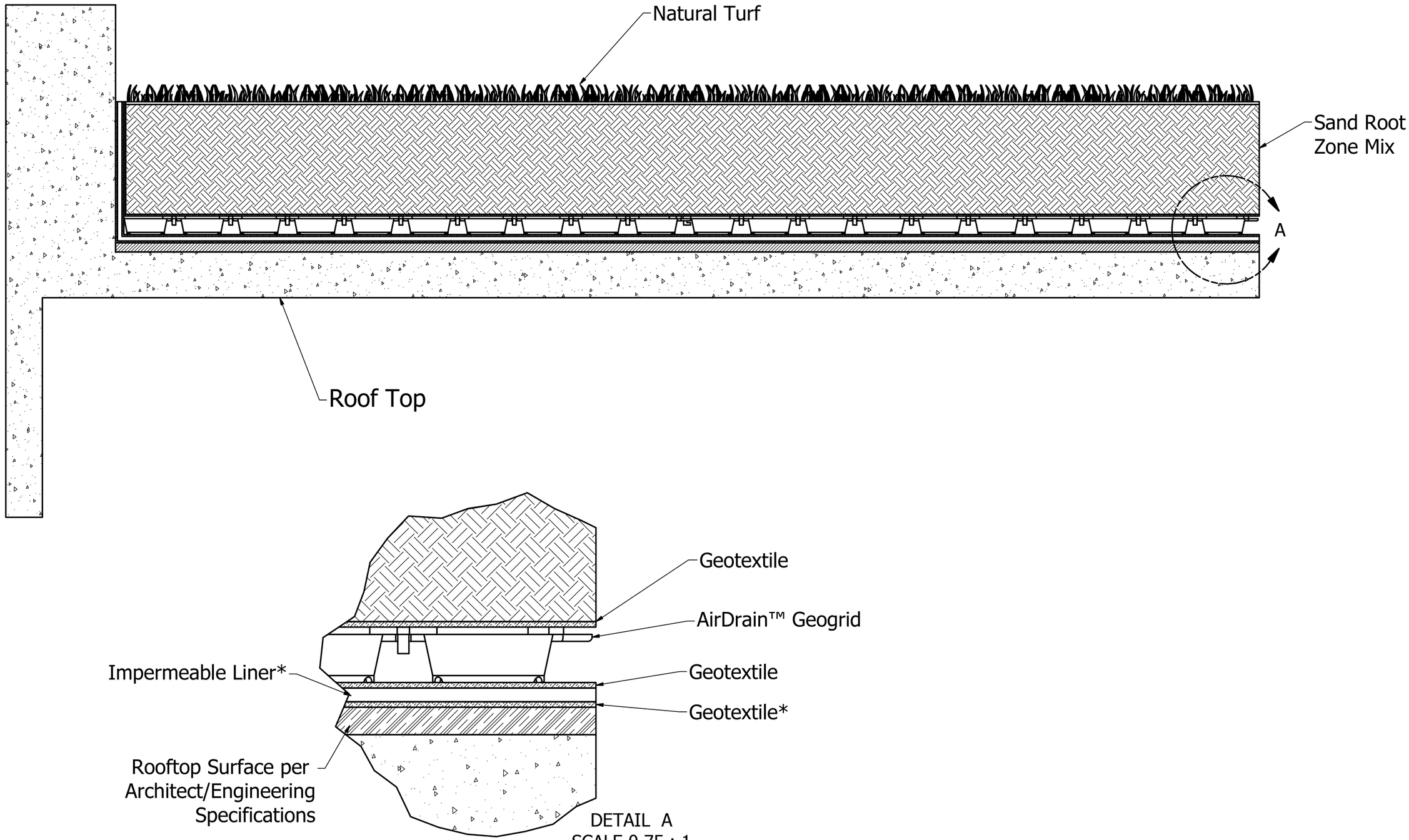
TITLE

AirDrain™ Sythetic Turf
Rooftop Drainage

| SIZE | DWG NO | REV |
|---|---|---|
| C | Rooftop_Assembly_SYN_ RT_001 | 2 |

SCALE

SHEET 1 OF 1




DETAIL A
SCALE 0.75 : 1

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| QA | | |
| MFG | | |
| APPROVED | | |



Airfield Systems

TITLE

Airdrain Natural Turf Rooftop Drainage

| SIZE | DWG NO | REV |
|---|---|---|
| C | Rooftop Assembly RT_004 | 6 |

SCALE

SHEET 1 OF 1

# AirField Systems Illustrated Manual for Green Roof System
# Sub-Surface Drainage

1. The roofing membrane underlying the proposed green roof area is to be verified as in compliance with all project specifications before work commencement on the AirField Sub-Surface Drainage System. Any discrepancies noted upon preliminary roofing inspection are to be satisfactorily repaired according to related specification sections and repairs verified before proceeding with work.

2. Once the roofing membrane system has been inspected and accepted, begin installation of the AirDrain™ GeoCell material over the approved roofing membrane system. The AirDrain™ GeoCell panels are to be installed with the larger diameter clover openings facing upwards. Place the first GeoCell panel to the roof area's upper left hand corner. It is of primary importance to orient the GeoCell materials with the integral indicator tab to the panels bottom left hand corner (refer to Figures 17). Proper sequencing and orientation of panels will result in a rapid installation.

The GeoCell panels are to be installed across the roofing membrane system in a rowed pattern. Staggering of rows will allow for multiple row completion by a multi-manned crew. Secure the first panel (1-1) and commence with panels 1-2, 1-3 and so on with one directional pull to secure (see Figures 16, 18 and 19). Once the first row has progressed across the field, start with the second row. By maintaining proper GeoCell panel orientation, the top edge panel connectors will drop into the previously installed panel receptors after the one directional pull secures the panel (see Figures 18). The GeoCell panels can be shaped to individual field areas as needed with an appropriate cutting device.

3. Install geo-textile filter fabric layer over the AirDrain™ GeoCell material. Firmly attach one end of the geo-textile filter fabric roll to the GeoCell panel edge with approved adhesive. Roll the geo-textile filter fabric across the entire width of the roof area until it reaches the GeoCell panel on the opposite side of the roof. Firmly attach the geo-textile filter fabric to the GeoCell panel edge on this side of the roof. Apply 2 to 4 inches of approved adhesive with a paint roller on top surface of fabric edge.

Firmly attach the next geo-textile filter fabric roll to the GeoCell panel edge. Overlap the first piece of filter fabric by approximately 6 inches to cover the 2 to 4 inches of approved adhesive and roll out the next filter fabric section across the roof. When the opposite side of the roof is reached, firmly attach the filter fabric to the GeoCell panel outside edge. Repeat this process until all the AirDrain™

GeoCell is completely covered with geo-textile filter fabric. Once the geo-textile filter fabric installation is complete there should be no visible gaps, puckering, folds, wrinkles or excessive loose material overhangs. Installed geo-textile filter fabric is to be smoothly laid across all the AirDrain™ GeoCell material.

4. Once the geo-textile fabric has been installed atop the AirDrain™ GeoCell material, the Sub-Surface Drainage System is complete and ready for inspection and acceptance by the Green Roof System Contractor. Satisfactorily repair all deficiencies noted and obtain approval and acceptance before proceeding with green roof system installation. Minimize any required vehicular traffic on completed sub-surface drainage system. Where vehicular traffic is required, limit equipment to flotation tire type and minimize vehicle speed and turning on drainage system to the greatest extent possible. Any sub-surface drainage system damaged by green roof system installation is to be satisfactorily repaired and accepted before the green roof system is installed. Refer to AirDrain™ Rooftop Drainage for Synthetic Turf or Natural Turf drawings for typical completed green roof system cross section.

**DISCLAIMER: The following drawings and/or general installation instructions 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.**

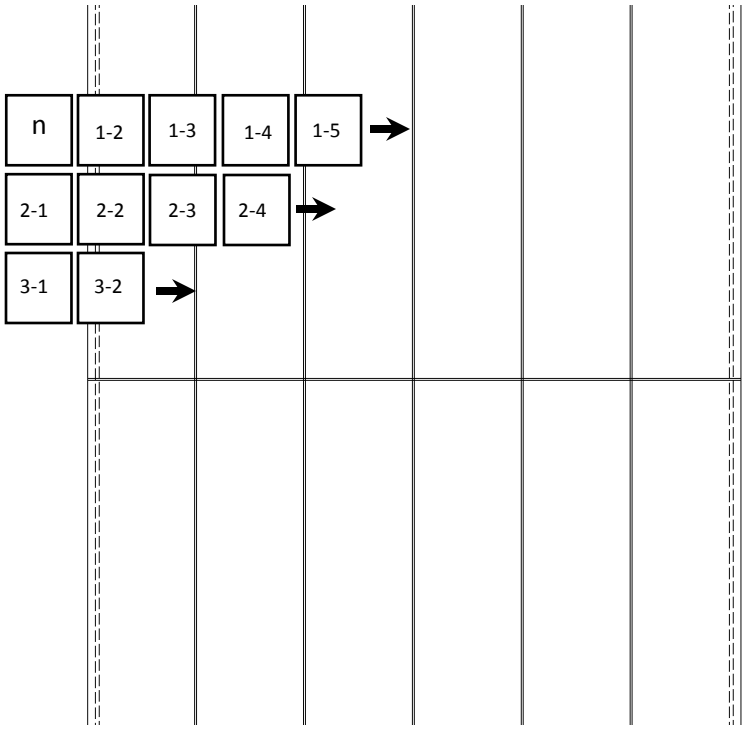


Figure 16

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www.airfieldsystems.com

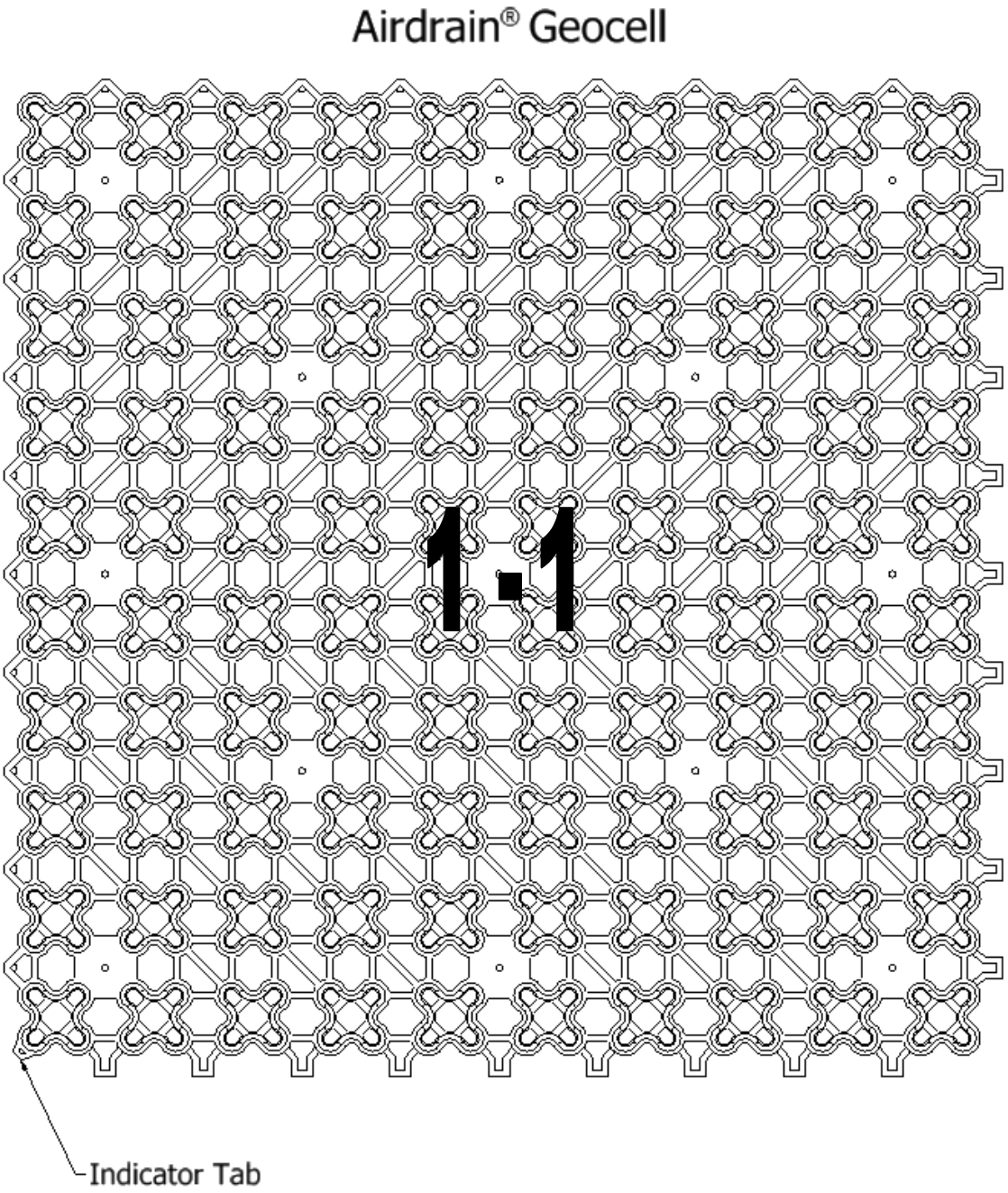


Figure 17

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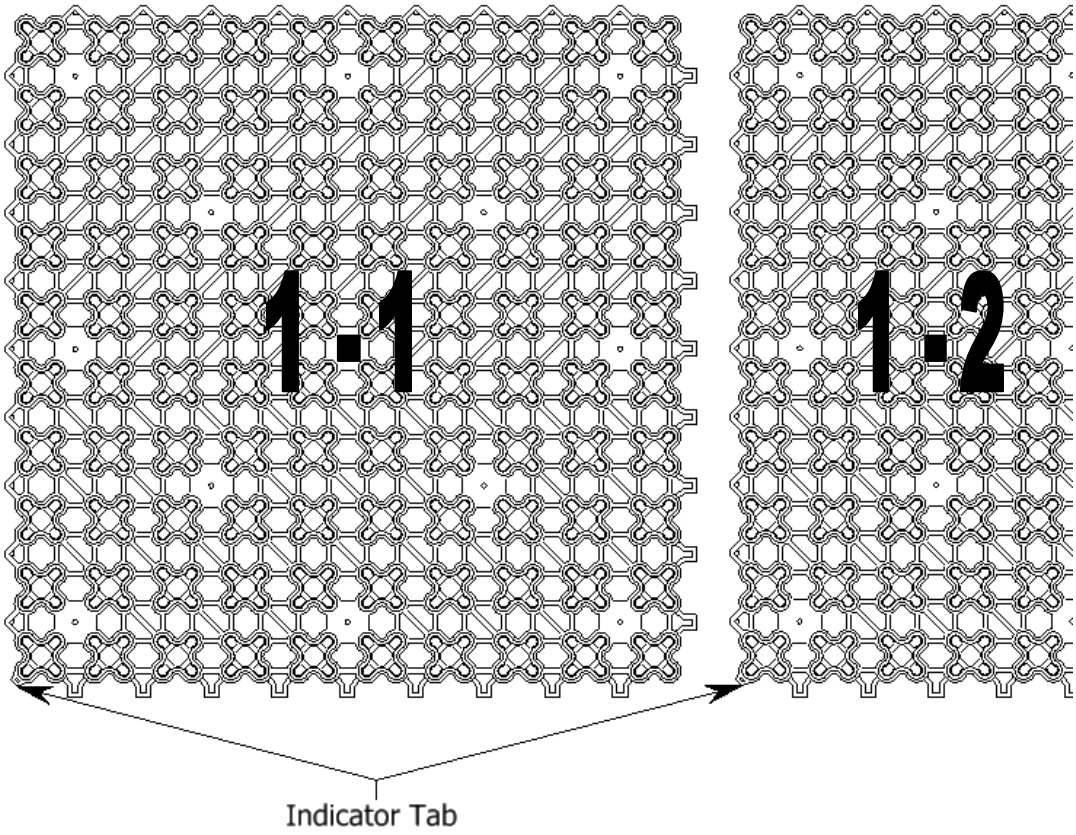


Figure 18

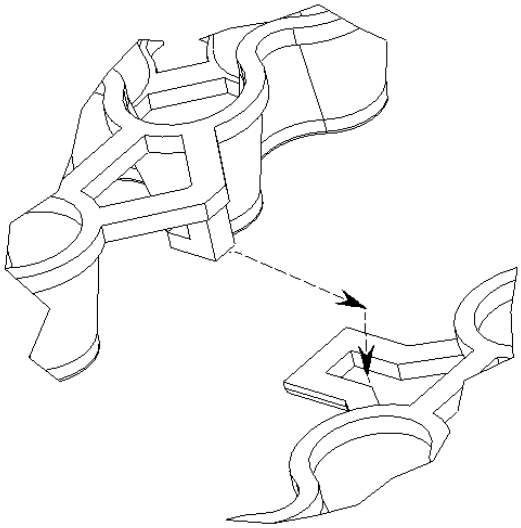

Figure 18A

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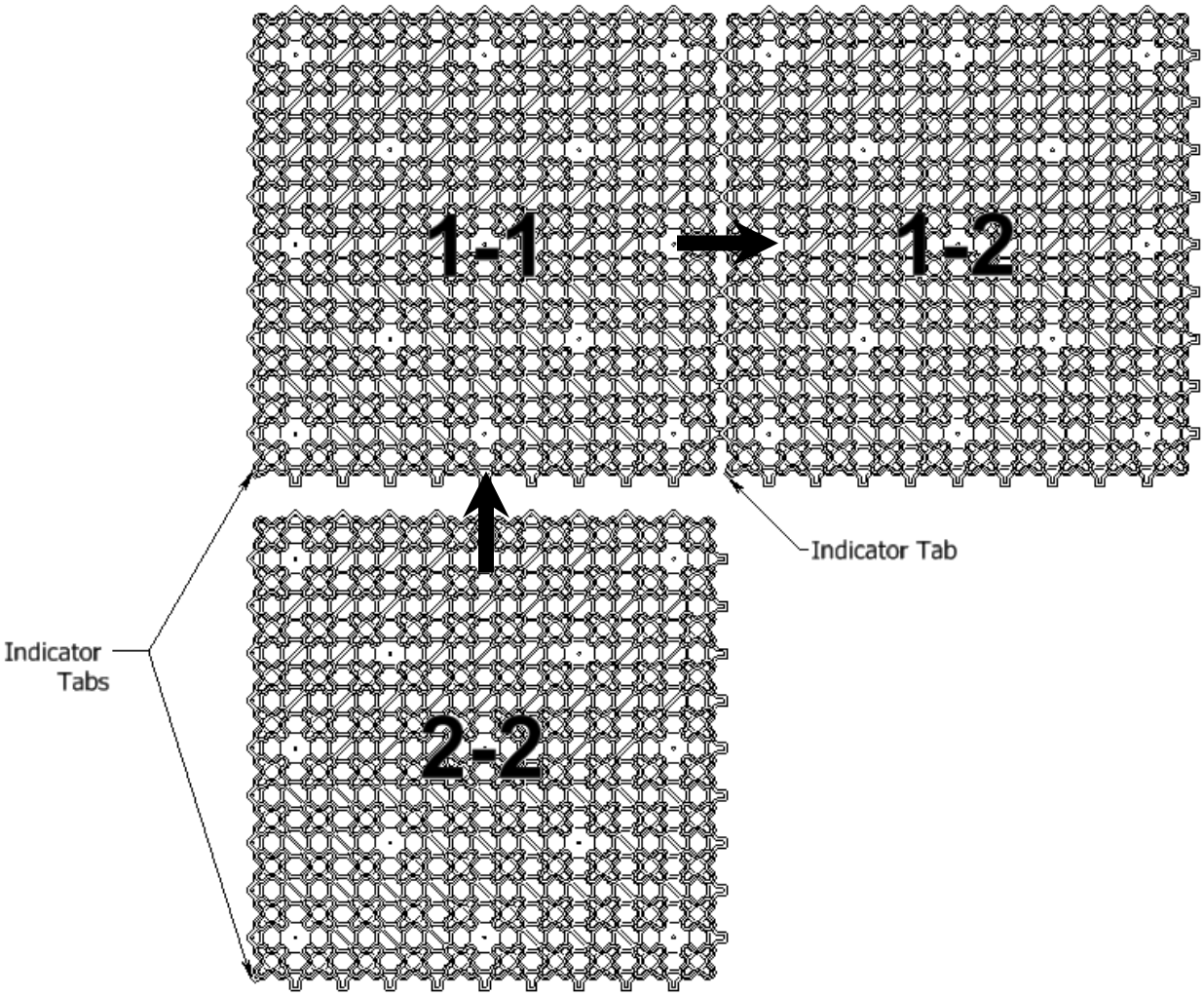


Figure 19

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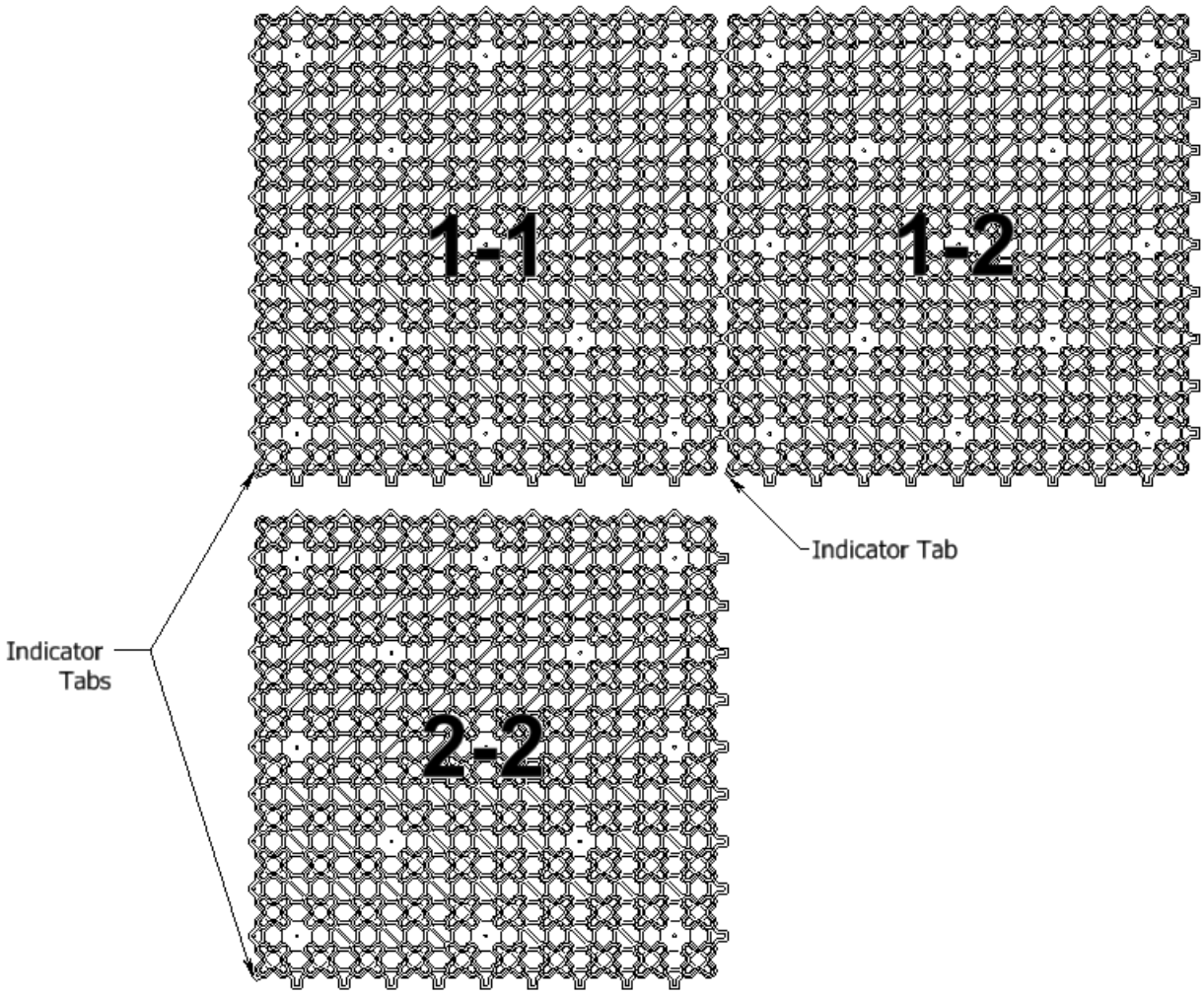
# Proper Sequencing and Orientation of AirDrain GeoCell Panels for Rapid Installation

Pallet Staging: AirDrain pallets cover approximately 795sqft. per pallet and should be staged accordingly within the installation area so that you minimize the amount of time to stage the AirDrain grid along the install lines across the project.

1. Orientate the AirDrain GeoCell materials with the integral indicator tab to the panel's bottom left corner (painted yellow). **Install the AirDrain units by placing units with the connectors and platforms up creating a flat surface for the profile above.**




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

3. Once the first row has progressed across the project, start with a second row. Have a person staging the panels in three's 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 sync ) 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 snap all three parts in place.

4. AirDrain 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.

Visit [www.AirFieldSystems.com](http://www.AirFieldSystems.com) to watch a video of a 74,000 sq ft project for Chesapeake Energy illustrating a 3 man crew installation. (Near the middle of page)

| 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/ft$^3$ | 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 |

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

# PRODUCT DATA SHEET – 14N5006NC

***Flame Retardant, High Impact Polypropylene Copolymer, Black***

| PROPERTY | TYPICAL VALUE | TEST METHOD |
|---|---|---|
| MELT FLOW RATE (230°C/2.16kg), g/10min | 12 | ASTM D1238 |
| SPECIFIC GRAVITY | 0.99 | ASTM D792 |
| NOTCHED IZOD IMPACT, ft·lb/in | No Break | ASTM D256 |
| GARDNER DART IMPACT, in·lb | 160 | ASTM D5420 |
| TENSILE STRENGTH, psi | 2800 | ASTM D638 |
| FLEXURAL MODULUS (tangent), psi | 135,000 | ASTM D790 |
| HDT @ 66 psi, °F | 175 | ASTM D648 |
| SHORE D HARDNESS | 63 | ASTM D2240 |
| FLAMMABILITY, 0.062” minimum thickness | V-0* | UL94* |
| RTI RATING, °F, 0.062” minimum thickness | 230* | UL746* |
| LINEAR MOLD SHRINKAGE, in/in | 0.016-0.022 | Matrixx Method |

* UL recognized, File E158835



RJB 5/16/12 – PR1017, PR2805

# TEST REPORT

QAI LABORATORIES
CERTIFICATION TESTING INSPECTION

1325 North 108th E. Ave.
Tulsa, OK 74116
918.437.8333 ph. | 918.437.8487 fx.

**CLIENT:** Airfield Systems
8028 N. May Ave, Ste 201
Oklahoma City, OK 73120

Attn: Michael Bean

| **Test Report No:** | **TJ0963** | **Date:** | **November 21, 2012** |
|---|---|---|---|

**REFERENCE:** QAI Laboratories Proposal Number FB110812-1

**SUBJECT:** Evaluation of the sample per ASTM C 518-10 Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

**SAMPLE ID:** One sample identified by client as: Airdrain™ Sythetic Turf Rooftop Drainage, was received from client on 11/14/12 in good condition.

**TEST REQUESTED:** The material was tested and evaluated for Thermal Conductivity in accordance with the procedures outlined in ASTM C 518-10.

**TEST DATE:** 11/20/12

**RESULTS:** See test data on the following pages.

**CERTIFICATION:** The tests reported here were conducted under the continuous direct supervision of QAI Laboratories Inc., Tulsa, OK.

**SIGNED FOR AND ON BEHALF OF QAI LABORATORIES, INC.**

Linda Lewis
Materials Department Technician

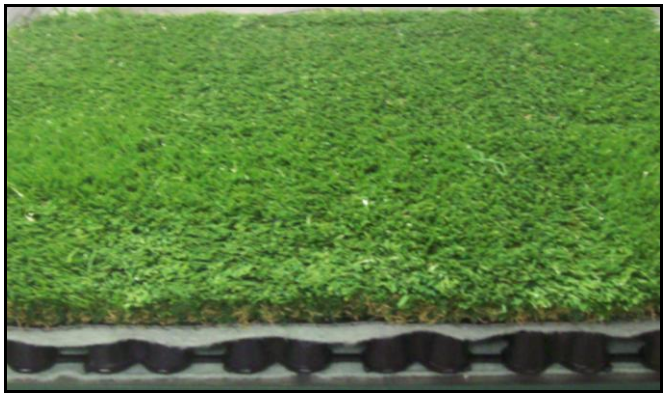
Randall P. Baker, PE
Tulsa Plumbing and Materials Manager

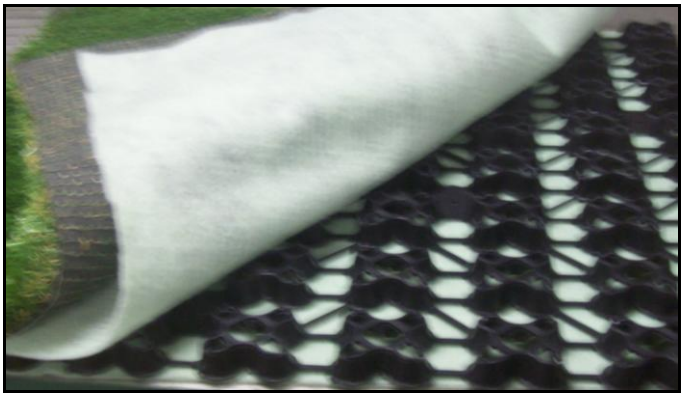
## Test Procedure and Results

Sample ID: Airdrain™ Sythetic Turf Rooftop Drainage

Thermal Conductivity/Thermal Resistance
ASTM C 518-10

| | |
|---|---|
| $T_H$ = Hot Plate Temp (°F) | 102.26 |
| $T_C$ = Cold Plate Temp (°F) | 51.33 |
| Q = Heat Flow (mV) | 4.903 |
| Δχ = Sample Thickness (in.) | 1.743 |
| ΔT = Hot Plate - Cold Plate (°F) | 50.93 |
| k = Thermal Conductivity, (BTU in) / (hr·ft2·°F) | **0.6326** |
| R = Thermal Resistance, (hr·ft2·°F) / BTU | **2.7553** |

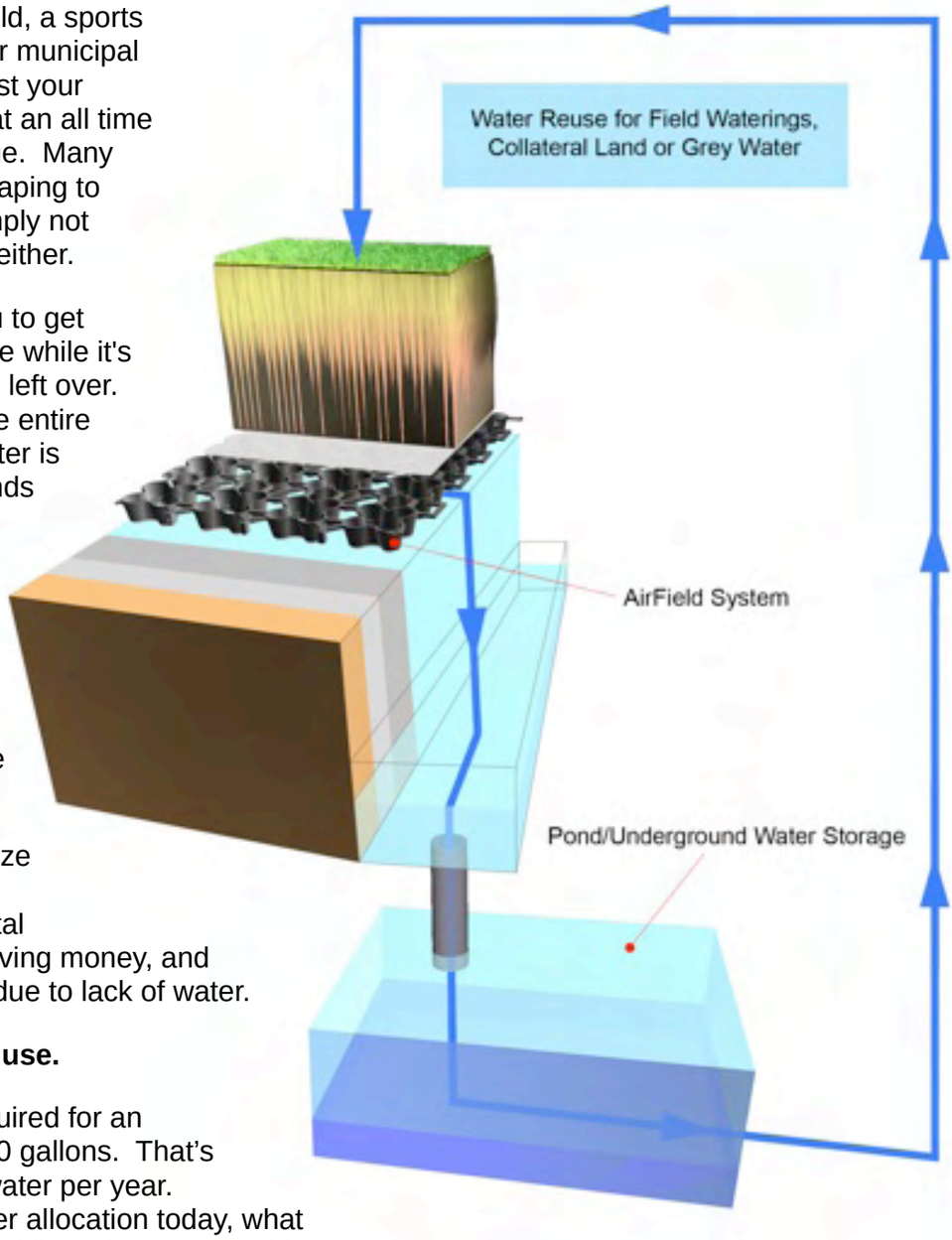




*******

**End of Report**

Whether it's a single sports field, a sports field complex, a golf course, or municipal landscaping, it's time to harvest your water. Water allocations are at an all time low, and that trend will continue. Many facilities are sacrificing landscaping to keep sports fields alive, or simply not receiving enough water to do either.




An AirField System allows you to get more out of the water you have while it's in use, and then reuse what is left over. WIth a one inch void below the entire surface of a field or green, water is quickly routed to retention ponds or underground harvesting tanks for treatment and later use. Taking rain water and paid-for sprinkler water further by collecting it and reusing it is a great way to recycle, but AirField also allows you to use your water more efficiently.

That means you save and utilize water every way you can, lowering the total environmental impact of your facility while saving money, and avoiding continued problems due to lack of water.

**Dramatically cut your water use.**

The daily volume of water required for an average golf course is 400,000 gallons. That's over 145,000,000 gallons of water per year. With drastic reductions in water allocation today, what will tomorrow bring? Green building with the AirField System creates up to 4 more days of plant available water compared to a gravel drainage profile, and allows you to reclaim water for later use.

With AirDrain as part of your sustainable site design you will enjoy:

- Healthier turf and stronger roots with a nearly perfect perched water table
- Less frequent irrigation
- Reduced damage and loss of play
- Reduced site disturbance during installation
- Dramatically lower carbon footprint and sustainable site impact

To learn more about sustainable sports field design, contact AirField Systems today.

Corporate Office:
8028 N. May Avenue, Suite 201
Oklahoma City, OK 73120

Phone: (405) 359-3775
Email: info@airfieldsystems.com
Web: www.airfieldsystems.com

Or Contact an authorized AirField distributor:

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