

Tufftrack[™] Grass & Gravel Paver

Technical
Specifications
Guide



Model Number
TT-24

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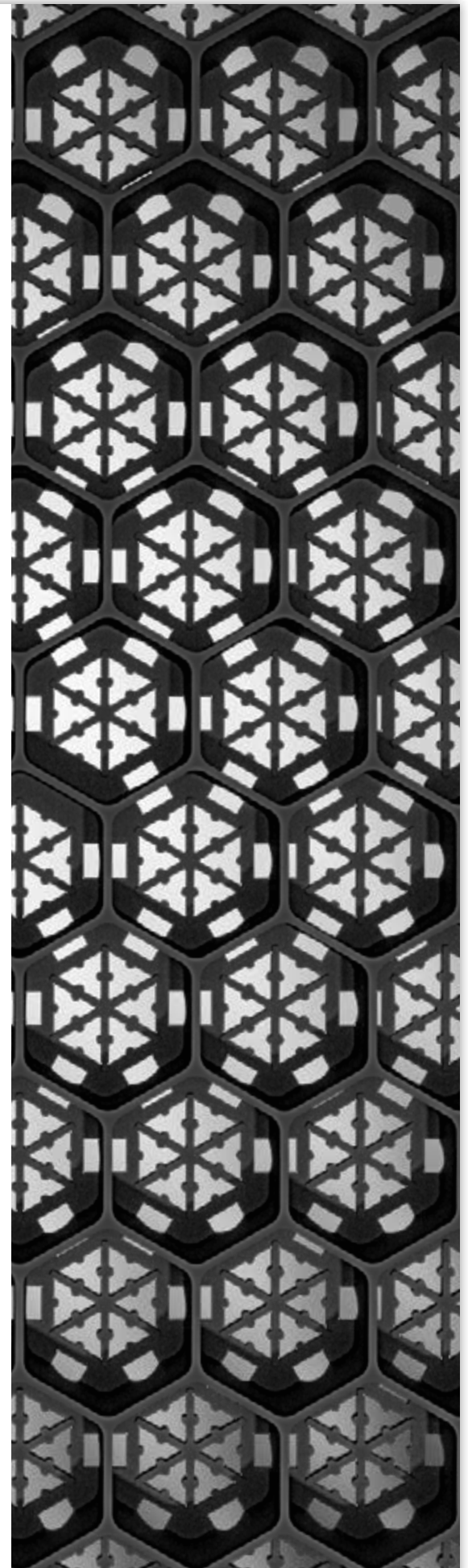
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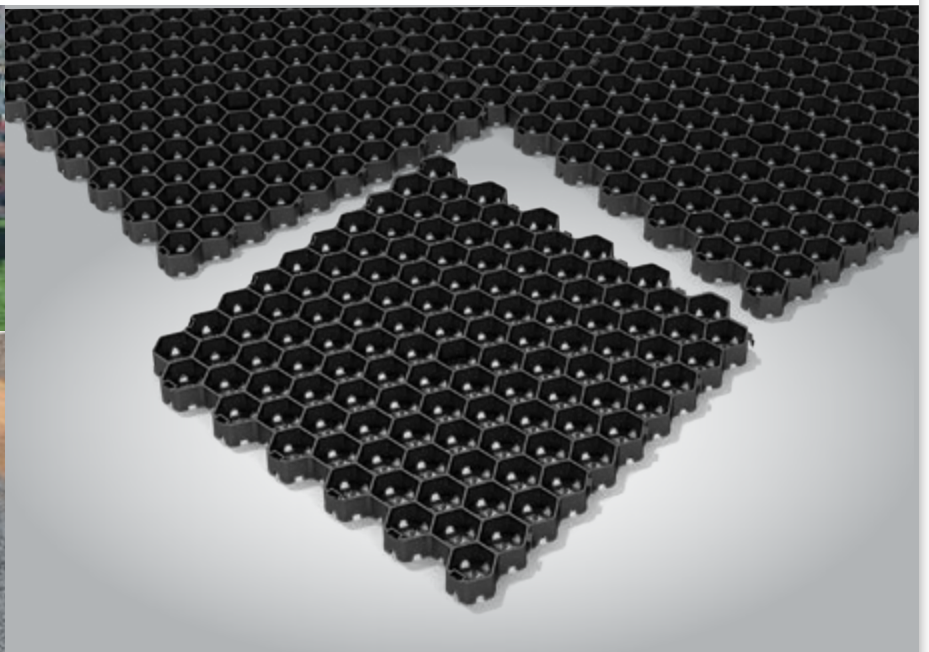


Tufftrack™ Grass & Gravel Pavers

A turf reinforcement, load transferring paving system designed to be placed directly on a lightly compacted planting base which is installed over an engineer specified compacted road base.

It can also be used for light load applications without road base by simply compacting the planting base per engineer specification. This system is designed to transfer vehicle weight directly to the supportive base course and prevent soil compaction. The web of interconnected honeycomb cells provides resistance from vehicular load as well as lateral containment that prevents the soil compaction that would inhibit healthy root growth. This system also provides a porous condition that allows rapid absorption and movement of storm water. When properly installed according to the instructions in this guide, Tufftrack Grass & Gravel Pavers provide a structural, green surface capable of supporting H-20 loads in a saturated condition. Tufftrack Grass & Gravel Pavers have a high compressive strength. Tufftrack Grass & Gravel Pavers can be infilled with soil or sand per specification. The Tufftrack Grass & Gravel Paver system has been used and accepted across the country for a wide variety of projects including emergency vehicle access purposes.

Additional information, details, and specifications can be found at
<http://www.ndspro.com/permeable-pavers/grass-pavers/tufftrack-grass-pavers>
For further technical support or assistance, contact: techservice@ndspro.com

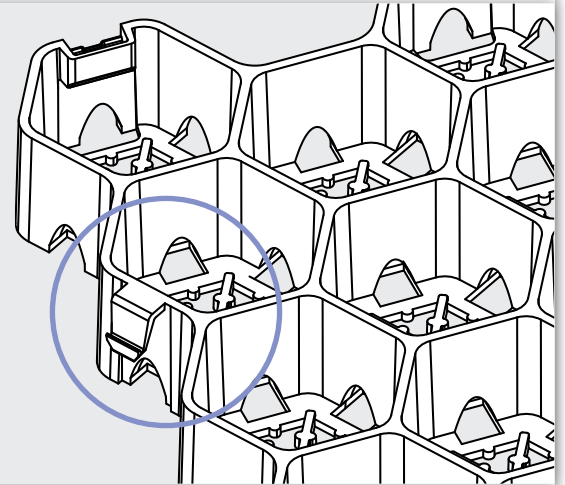


Design Theory

Tufftrack™ Grass & Gravel Paver has unique Tongue and Groove clips that minimize the paver mat separation and make for quick installation

The Tufftrack™ Grass & Gravel Paver's secure locking clips prevent paver displacement or mat failure that could result from traffic load movement or changing ground conditions

The Tufftrack™ system has a high compressive strength bare product, meaning that Tufftrack does not rely on the fill material for load carrying



Recommended Use

Light Loads:

- Golf Cart Paths
- Jogging Tracks
- Bike Paths
- ATV Paths
- Equestrian Parks
- Trail Reinforcements
- Runoff Areas

Medium Loads:

- Roadway Shoulders
- Residential Driveways
- Parking Lots
- Overflow Parking Area
- Truck & Cart Wash-Down Areas
- RV and Boat Access

Heavy Loads/Fire Lane:

- Fire Lanes
- Emergency Vehicle Access Roads
- Service Vehicle Utility Roads
- Truck Maintenance and Equipment Yards
- Construction Entrance Soil Stabilization
- Helicopter Pads

Non-load Applications:

- Erosion Control on Slopes (staking recommended)
- Erosion Control in Swales (staking recommended)

Not Recommended for the Following:

- Traffic on slopes exceeding a 10% grade
- To support tread driven vehicles



Product Description

The Tufftrack™ Grass & Gravel Paver from NDS is the latest and most advanced product of its type on the market. NDS has used its years of experience in the landscaping industry to create a product with all of the most desirable features.

The Tufftrack Grass & Gravel Paver has a combined series of 120 nested hexagonal cells per paver cell with 12 connecting clips. This unique combination provides superior stability and durability.

Product Specifications

Material. 100% recycled Polyolefin plastic (50% pre-consumer 50% post-consumer). Polyolefin is rugged, flexible and ideally suited for outside exposure and longevity. NDS uses UV inhibitors in the polymer structure to prevent breakdown in the strength of the paver.

Manufacturing. Manufactured in the USA: Lindsay, CA.

Recyclability. 100% recyclable.
Please recycle whenever possible.

Paver Size. Each 24" x 24" x 1½" panel contains 120, 2½" nested hexagonal cells. Each cell has 6 arched cutouts at its base.

Weight Per Unit. 4.0 pounds per 24" x 24" section.

Paver Details. The top surface of the hexagonal cell walls is smooth and devoid of notches or grooves. The bottom surface of the paver mat has an integrated web that accommodates gravel as a fill material.

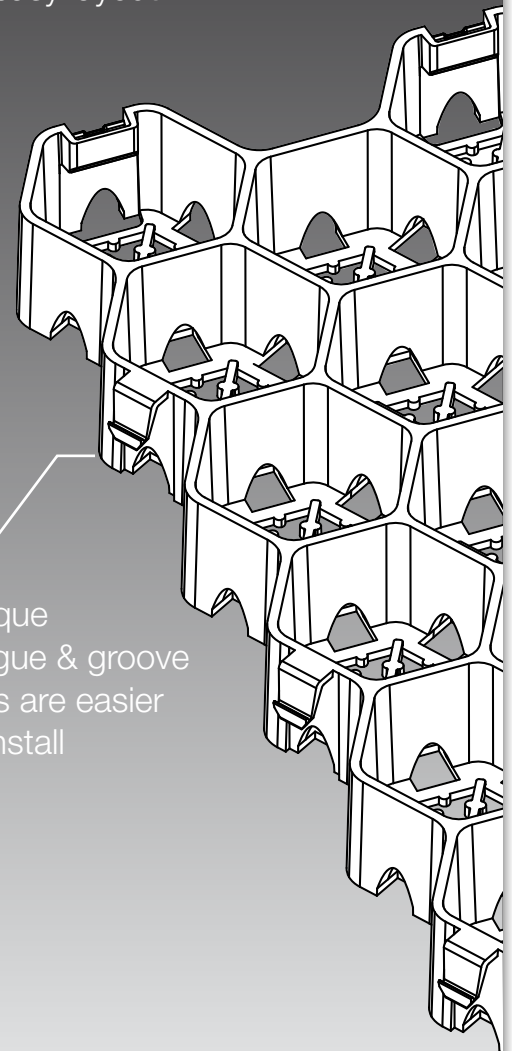
Assembly Mechanism. Each Paver section includes 10 sturdy Tongue and Groove locks per panel, which provide secure connection between panels.

Chemical Resistance. Tufftrack™ Pavers have superior chemical resistance and are totally inert.

Compressive Strength. 81,744 psf.

Unique Product Features. Tufftrack™ Pavers have features found in no other grass or gravel paver product in the industry. Tufftrack features a unique domed opening at the base of each hexagonal cell wall. This promotes a greater flow of water, oxygen and nutrients. Additionally, the slot opening allows root penetration to the soil below the paver and allows roots to grow between cells, promoting healthier grass. In areas where drainage is critical, Tufftrack increases water runoff capabilities. The Tongue and Groove latching system is another unique feature which provides exceptional stability, longevity, and ease of assembly.

Product ships
in 24 in. squares
for easy layout



Unique
tongue & groove
clips are easier
to install

Testing Methods

Tufftrack™ Grass & Gravel Pavers undergo a battery of tests with each production run, as is the process with all products manufactured by NDS.

All the manufacturing tests are conducted within the manufacturing cycle to assure a quality-finished product.

Fire Resistance

When tested in accordance with ASTM D 1929-96 and DIN 54836-1984, Polyolefin has an ignition temperature of 350-360°C or 662-680°F. HDPE does not support flame.

Compression Tests

Smith-Emery Laboratories performed the compression testing for Tufftrack™ Grass & Gravel Pavers. Samples of Tufftrack were placed in a Baldwin 440 Kips compression machine with a 12" x 12" steel plate. Load was applied at the rate of crosshead speed between 100 and 1,000 lbs per second until failure of the product. This testing resulted in a Maximum stress failure of 568 psi and a maximum load of 81,744 lbs. psf, making it stronger than our competitors.

Permeability

Tufftrack™ Grass & Gravel Pavers provide a lower runoff coefficient, a prolonged time of concentration, a much higher rate of percolation and a cleaner runoff of storm water than concrete or asphalt.

When used over a rock and sand base with sandy loam soil (CN30), Tufftrack will promote a situation unlikely to generate surface runoff in an average rainstorm (less than 6" in 24 hours).

When Tufftrack is installed over clay soils (CN78), water absorptions will vary depending on the depth of the base course due to the storage capacity of the soil.

As per Technical Release #55, US Department of Agriculture, Soil and Conservation Service, the evaluation of storm water management objective is done by the following method: Calculate the pre-construction runoff volumes and time of concentration factors, calculate area runoff volumes, calculate runoff reduction and compare to Table 1 which lists runoff percentages from various soils based on 'meadow' type cover and a 24 hour rainfall.

Runoff % – 24 Hour Rainfall Sand to Clay Soils

Inches	CN30	CN58	CN71	CN78
1.0	0.0	0.0	0.01	0.04
1.2	0.0	0.0	0.03	0.10
1.4	0.0	0.0	0.05	0.14
1.6	0.0	0.0	0.08	0.18
1.8	0.0	0.01	0.11	0.21
2.0	0.0	0.02	0.13	0.24
2.5	0.0	0.05	0.20	0.32
3.0	0.0	0.09	0.25	0.38
4.0	0.0	0.17	0.35	0.47
5.0	0.0	0.23	0.42	0.54
6.0	0.01	0.29	0.48	0.60
7.0	0.03	0.34	0.53	0.64
8.0	0.05	0.39	0.57	0.67
9.0	0.08	0.43	0.61	0.70
10.0	0.10	0.46	0.64	0.73
11.0	0.12	0.49	0.66	0.75
12.0	0.15	0.52	0.68	0.76

Tufftrack™ Grass & Gravel Pavers can be used in a number of categories that contribute points to LEED certification according to LEED v3.

Category: Sustainable Sites

Credit 5.1 Site Development- Protect or Restore Habitat (1 credit):

Conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity.

- To attain this credit, all site disturbances during construction must be limited to within a certain distance from the building perimeter. Use of Tufftrack™ Grass & Gravel Paver extends the allowed area of site disturbance from 10 ft. to 25 ft., thus providing more area to work during construction.
- Tufftrack™ Grass & Gravel Paver seeded with native plants in place of asphalt or other non-pervious surfaces will contribute to the overall percentage of habitat restored.
- For projects that qualify for 5.2 (below), use of Tufftrack™ Grass & Gravel Paver on a vegetated roof with native or adapted plants can contribute to overall percentage of habitat restored or protected.

Credit 5.2 Site Development- Maximize Open Space (1 credit):

Provide a high ratio of open space to development footprint to promote biodiversity.

- Application of Tufftrack™ Grass & Gravel Paver provides vegetated open space that will contribute to the open space requirements.
- Use of Tufftrack™ Grass & Gravel Paver on a vegetated roof can contribute to credit compliance.

Credit 6.1 Stormwater Design- Quantity Control (1 credit): Limit disruption of natural water hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from stormwater runoff, and eliminating contaminants.

- Tufftrack™ Grass & Gravel Paver can be utilized as part of a stormwater management plan as it reduces impervious cover, increases on-site infiltration, and reduces pollution from stormwater runoff.
- Tufftrack™ Grass & Gravel Paver can be used to maintain a vegetated roof, which will minimize impervious surface area onsite.

Credit 6.2 Stormwater Design - Quality Control (1 credit):

To limit disruption and pollution of natural water flows by managing stormwater runoff.

- Tufftrack™ Grass & Gravel Paver can be utilized as part of a stormwater management plan as it reduces impervious cover, increases on-site infiltration, and reduces pollution from stormwater runoff.

Credit 7.1 Heat Island Effect — Nonroof (1 credit): To reduce heat islands to minimize impacts on microclimates and human and wildlife habitats.

- As open grid pavement systems, the use of Tufftrack™ Grass & Gravel Paver reduces heat absorption and contributes to the overall hardscaped area calculation for this credit.

Credit 7.2 Heat Island Effect — Roof (1 credit):

To reduce heat islands to minimize impacts on microclimates and human and wildlife habitats.

- Tufftrack™ Grass & Gravel Paver utilized on a vegetated roof can reduce heat absorption.

Category: Materials and Resources

Credit 4.1 Recycled Content: 10% (post-consumer + ½ pre-consumer) (1 credit):

Increase demand for the building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials.

- Tufftrack™ Grass & Gravel Paver is made from 100% recycled HPPE (approximate blend is 50% post-consumer, 50% pre-consumer material). Utilization of this product will increase the proportion of materials used on site that are recycled, and can contribute towards attainment of this credit.

Credit 4.2 Recycled Content: 20% (post-consumer + ½ pre-consumer) (1 credit):

Increase demand for the building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials.

- As cited in credit 4.1 (above), utilizing Tufftrack™ Grass & Gravel Paver can contribute to the attainment of this credit, if used in a larger proportion on site relative to the proportion of materials that are not recycled.

Pre-Installation

1. The installation of Tufftrack™ Grass & Gravel Pavers should occur after the completion of any nearby sprinkler systems or hardscape elements.
2. It is recommended to order approximately 5% additional product to the total required to offset for curves and other unforeseen variances.
3. Check with local fire authority for any inspection requirements for areas that may provide emergency vehicle access.
4. Reclaimed and back-filled areas may require compaction and testing before the base course is installed.
5. Percolation rates of underlying soil should be at least .25 inches of water per hour.
6. Water table should be at minimum 3 feet below base course.
7. Surrounding hardscape should be slightly higher than paver surface to allow for grass growth at the top of the paver structure.
8. Define the boundary of the proposed grid using string line.

Base Course

The first decision in project planning must address the correct base construction that will support the maximum traffic load weight anticipated on the site. **The successful installation of Tufftrack™ Grass & Gravel Pavers is directly correlated to the quality of the base foundation upon which it is installed.** To calculate the depth and composition of material for the base course consider: Load bearing capacity of subsoil, plasticity or impact of moisture, frost-heave potential, and volume of traffic.

There are four basic options:

9. Light Load – base shall be min. 4" of engineered road base or to engineer's specification and local code.
10. Medium Load – base shall be a min. 6" of engineered road base or to engineer's specification and local code.
11. Heavy Load – base shall be min. 8" of engineered road base or to engineer's specification and local code, and fire authority's requirements.
12. Light Load – the option to utilize a compacted planting base should be done to engineer's specification and local code.

Base course options (cont.):



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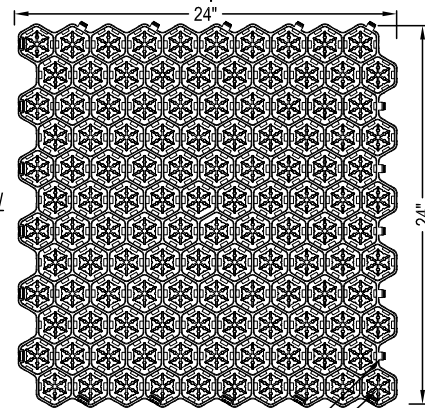
TUFFTRACK PRODUCT DESCRIPTION

PANEL SIZE: 24" X 24" X 1 1/2"
CELLS PER PANEL: (120) 2-1/2" HEXAGONAL CELLS

NESTED HONEYCOMB CELL: 81,744PSF
LAYOUT COMPRESSIVE STRENGTH: 568 PSI
EXCEEDS H2O LOADING

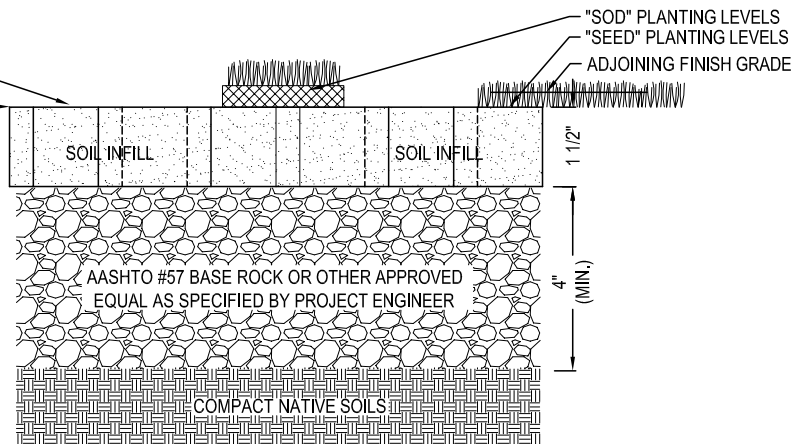
SOIL SEPARATOR MAY BE REQUIRED ABOVE STONE BASE MATERIAL IF USING AGGREGATE WITH A HIGH VOID RATIO.

PLAN VIEW



SNAP LATCHING SYSTEM
TUFFTRACK GRASS ROAD PAVER

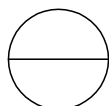
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PAVER GRIDWORK FINISH GRADE



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TUFFTRACK GRASS ROAD PAVERS

LIGHT LOAD



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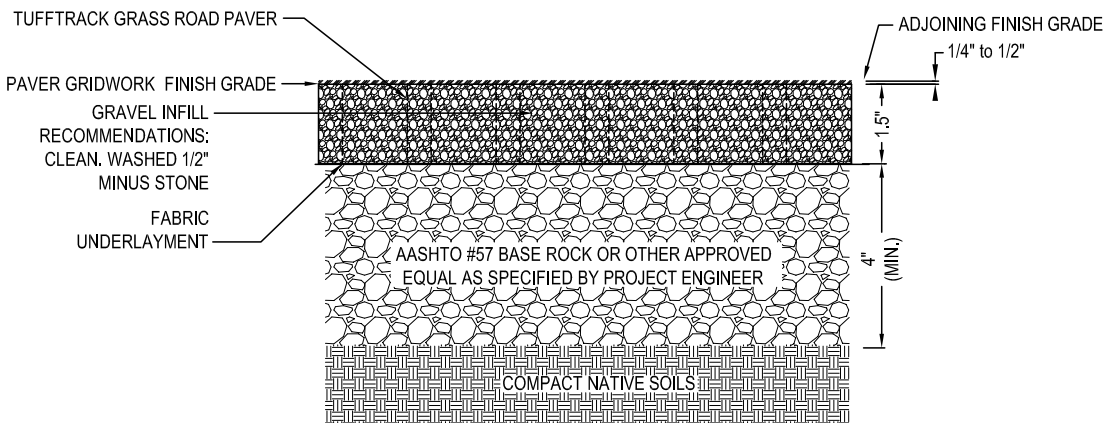
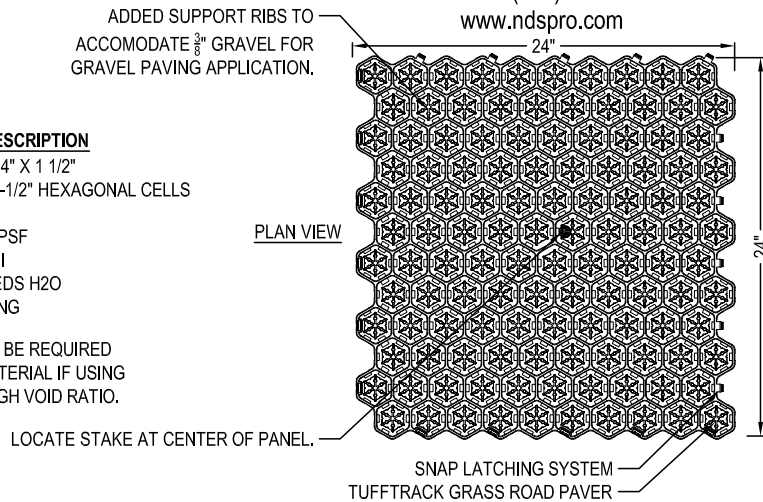
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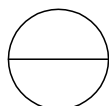
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GRAVEL APPLICATION - LIGHT LOAD



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Base course options (cont.):



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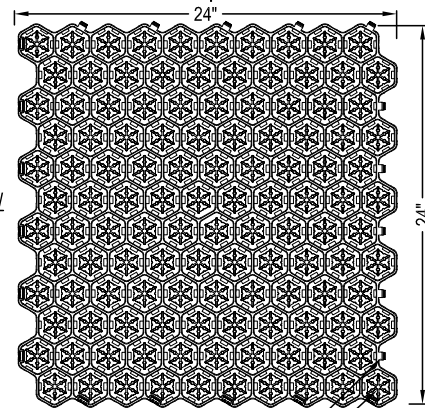
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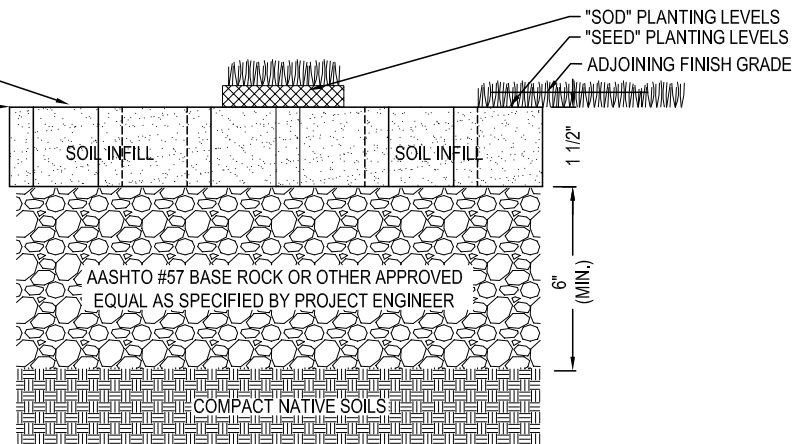
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SNAP LATCHING SYSTEM
TUFFTRACK GRASS ROAD PAVER

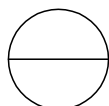
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MEDIUM LOAD



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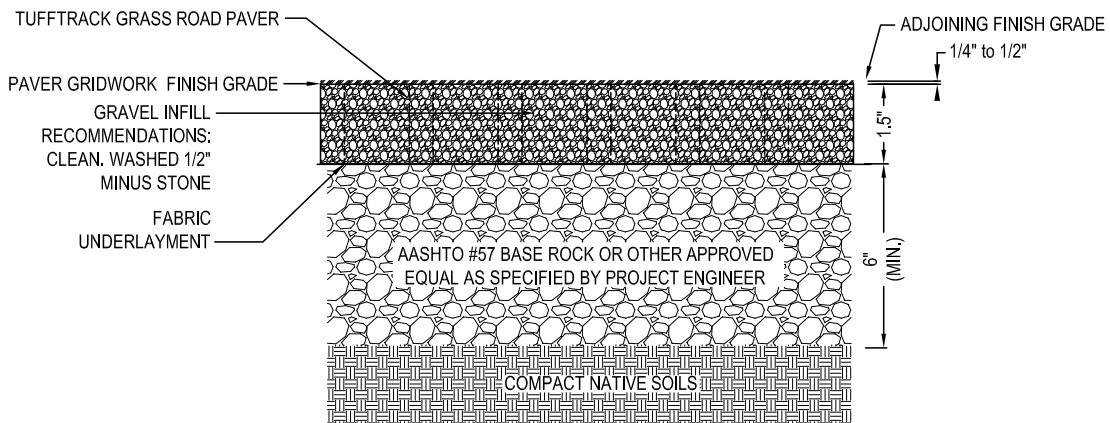
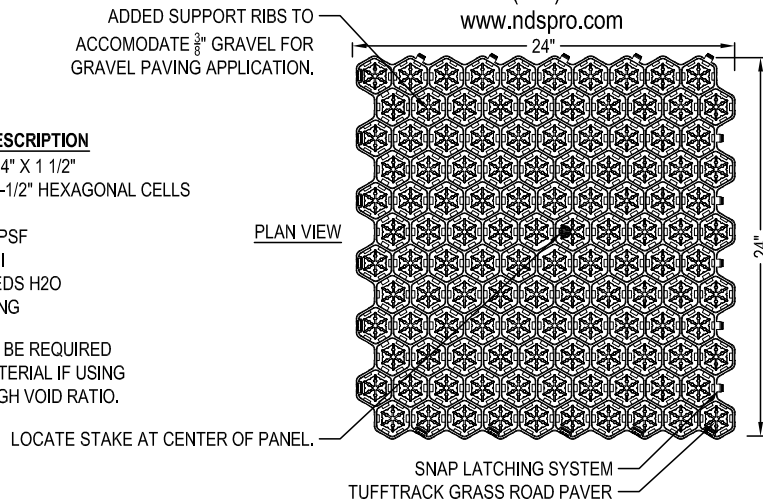
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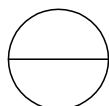
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TUFFTRACK GRAVEL ROAD PAVERS

GRAVEL APPLICATION - MEDIUM LOAD



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Base course options (cont.):



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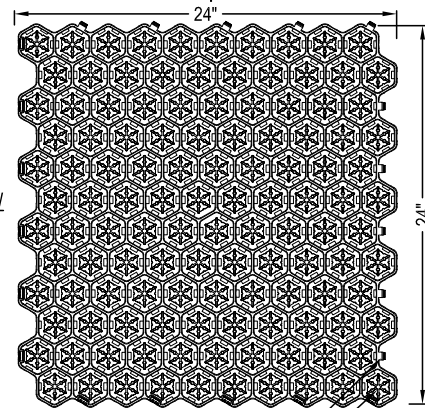
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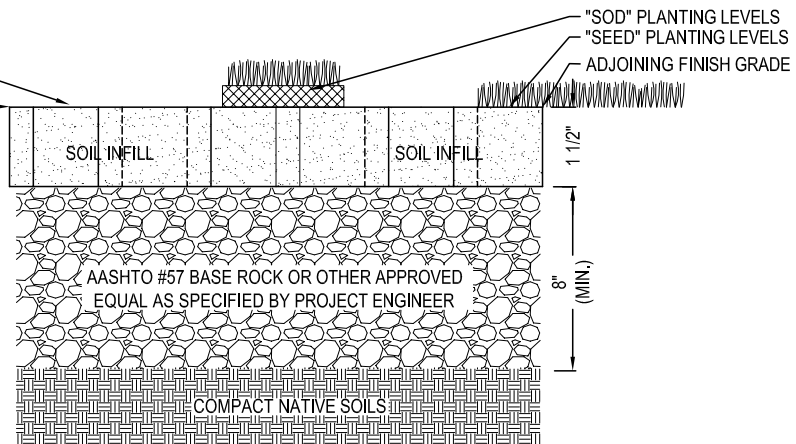
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SNAP LATCHING SYSTEM
TUFFTRACK GRASS ROAD PAVER

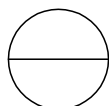
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TUFFTRACK GRASS ROAD PAVERS

FIRE/HEAVY LOAD



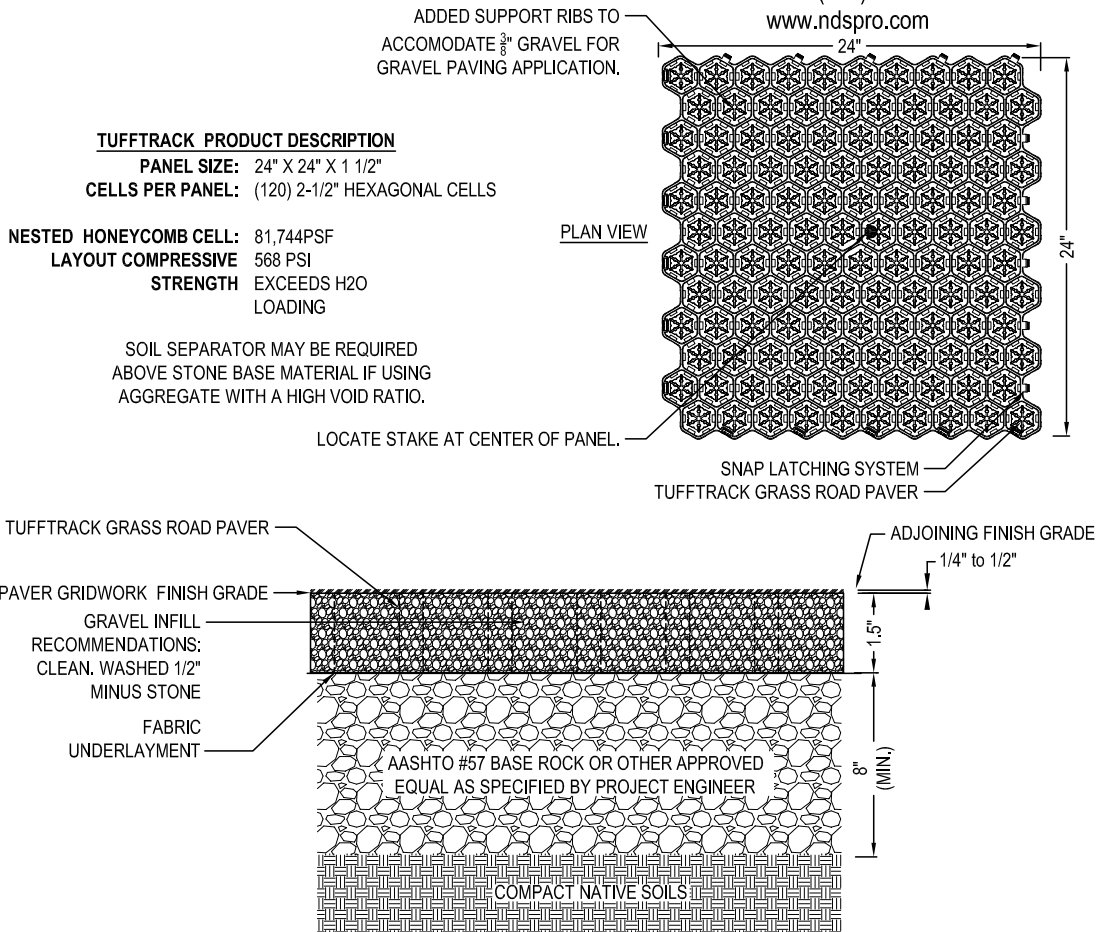
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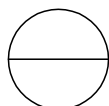
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GRAVEL APPLICATION - FIRE/HEAVY LOAD



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Base course options (cont.):



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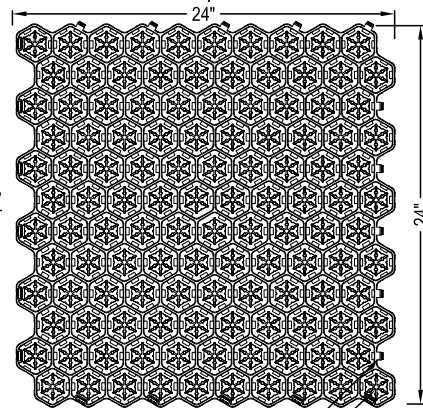
TUFFTRACK PRODUCT DESCRIPTION

PANEL SIZE: 24" X 24" X 1 1/2"
CELLS PER PANEL: (120) 2-1/2" HEXAGONAL CELLS

NESTED HONEYCOMB CELL: 98,770 PSF
LAYOUT COMPRESSIVE STRENGTH: 685 PSI EXCEEDS H2O LOADING

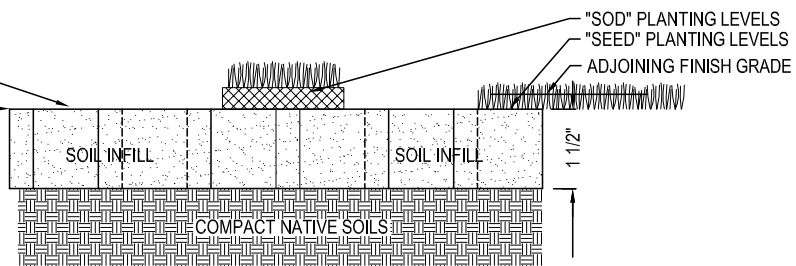
SOIL SEPARATOR MAY BE REQUIRED ABOVE STONE BASE MATERIAL IF USING AGGREGATE WITH A HIGH VOID RATIO.

PLAN VIEW



SNAP LATCHING SYSTEM
TUFFTRACK GRASS ROAD PAVER

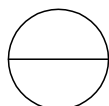
TUFFTRACK GRASS ROAD PAVER
PAVER GRIDWORK FINISH GRADE



SECTION

NOTES:

1. EXISTING SOILS SHOULD BE EVALUATED TO ENSURE PROPER STRUCTURAL AND PERMEABILITY PROPERTIES.
2. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
3. DO NOT SCALE DRAWING.
4. THIS DRAWING IS INTENDED FOR USE BY ARCHITECTS, ENGINEERS, CONTRACTORS, CONSULTANTS AND DESIGN PROFESSIONALS FOR PLANNING PURPOSES ONLY.
5. ALL INFORMATION CONTAINED HEREIN WAS CURRENT AT THE TIME OF DEVELOPMENT BUT MUST BE REVIEWED AND APPROVED BY THE PRODUCT MANUFACTURER TO BE CONSIDERED ACCURATE.



TUFFTRACK GRASS ROAD PAVERS

NO SUB BASE



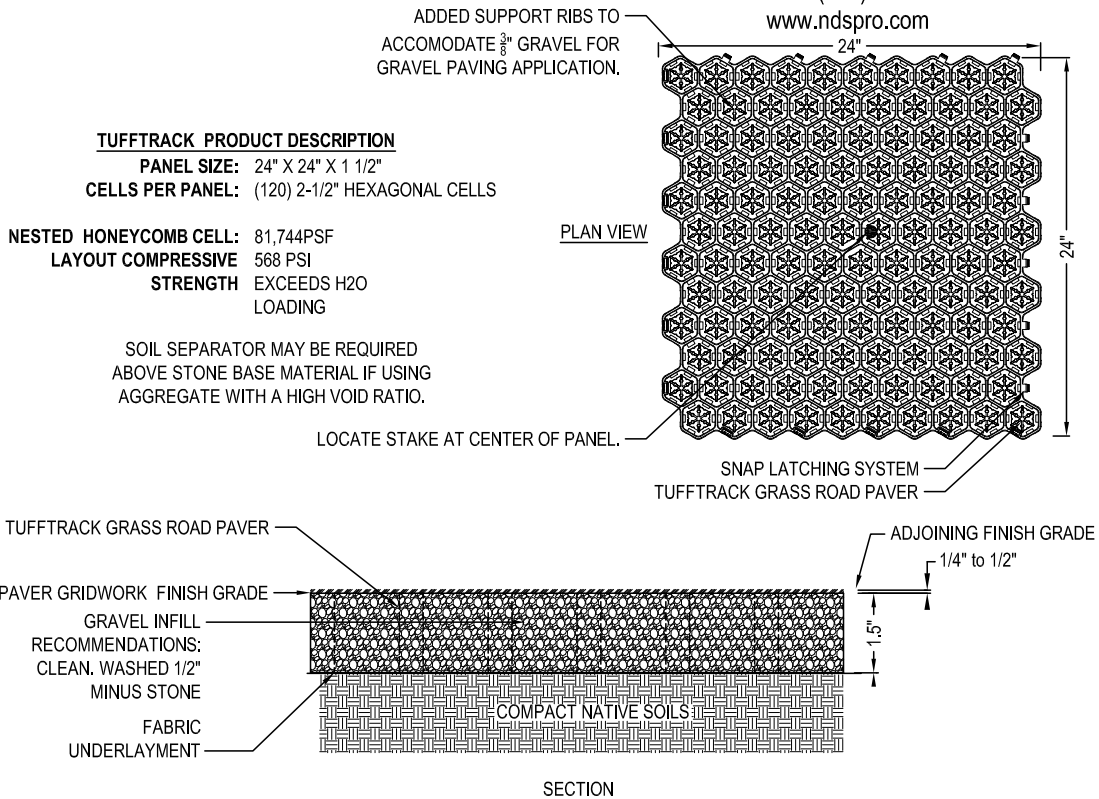
REVISION DATE 8-24-2015

Base course options (cont.):



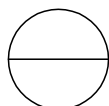
NDS[®]
We put water in its place

NDS, INC.
851 NORTH HARVARD AVE.
LINDSAY, CA 93247
TOLL FREE: 1-800-726-1994
PHONE: (559) 562-9888
FAX: (559) 562-4488
www.ndspro.com



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TUFFTRACK GRAVEL ROAD PAVERS

GRAVEL APPLICATION - NO SUB BASE



REVISION DATE 1-8-2016

Traffic and Parking Considerations

The height of the cell walls of Tufftrack™ Grass & Gravel Pavers protects the root systems of turf. Frequent vehicular traffic does not harm the root structure because of the cell wall protection; however, the blades will be cut if driven on daily. If someone parks on the same spot daily, the grass will not receive the light necessary to survive. Parking areas should be used less than daily or rotated.

Root Penetration

The entire base and paver structure is designed to allow water to percolate into the soil quickly, while retaining strength. While the soil in the paver structure is important and is a source for nutrients and moisture, it is not the primary source. The main purpose of the base is to obtain 95% compaction while still allowing permeability.

Staking Recommendations

Due to difficulty maintaining traction for motor vehicles on vegetated slopes, installing Tufftrack on slopes between 5-10% requires staking. Installation on slopes greater than 10% should only be used for erosion control applications.

Site Selection and Preparation

1. Remove all foreign top grade structures or objects, and excavate existing site soil to accommodate the base specified.
2. Install the base per architectural and/or engineering drawings and written specifications describing depth, load rating, construction materials, and required compaction.
3. Install with no more than a 6% grade for emergency access lanes or heavy vehicle access.
4. Install with no more than 10% grade when used for light vehicular traffic. Retention stakes must be installed in this application in a manner specified by a qualified architect or soils engineer.
5. Installations over 10% grades are for erosion control only. The installation of Tufftrack Grass & Gravel Pavers on any type of slope should be pinned or staked to the soil in a manner specified by a qualified architect or soils engineer.

Paver Assembly and Installation

1. The installation of Tufftrack™ Grass & Gravel Pavers is generally performed at the same time as other grass installation on the site and after the completion major area construction.
2. Ensure the paver is installed right-side-up with the open cells facing up. Warranties are voided for pavers installed face down.
3. Install the first section of pavers where there is an available straight border or where there is the longest available single run.
4. To connect Tongue & Groove clips simply align the clip with a protruding tongue on top of the receiving clip and apply pressure. The clips will lock together forming a secure bond between paver sections. Install additional rows of pavers as needed to cover large areas and securely connect the lateral snap locks to create an integral paver mat. Stagger the joint lines between adjacent panels for a stronger paver mat.
5. Be sure to leave the recommended 1" clearance between the paver mat and any pre-installed fixed objects or surface structures.
6. The paver can be trimmed to fit any fixed object using garden shears, a hand saw, PVC pipe cutter, utility cutter, or appropriate power saw. Be sure to follow all manufacture's operation and safety guidelines.
7. After assembling the paver network, re-examine all paver fittings around surface utilities and bordering structures to assure 1" clearance. Do this prior to soil fill or planting.

Planting

1. When using Tufftrack for grass applications, the paver mat should be filled with soil and planted within 30 days.
2. Sandy loam, loam soil or soil specified by soils engineer should be used to fill the empty grass paver cells. The selection of fill material should be made based upon the soil requirements of the turf selected for the project and local conditions.
3. Select a turf variety well suited to the anticipated traffic frequency and local growing conditions. Resistance to thatch build-up, drought and disease resistance should also be considered.
4. Seeded or sodded areas should be protected from non-emergency traffic for 4-6 weeks or until the grass is sufficiently established to handle traffic.
5. Both seeded and sodded grass should be filled to the top of the cell wall.
6. Grass paved areas must have irrigation systems sufficient to maintain healthy turf year round.
7. When planting trees nearby, it is advisable to install a root barrier around the root ball to prevent shallow roots from interfering with surface integrity or the road base.
8. When pavers are installed bisecting a large lawn or field to provide a service road, it is recommended to plant shrubs, or trees to mark the ends and edges of the paved strip to guide the vehicle along the paved strip.

Sod, Seed, Hydroseeding

1. Sod
 - a. The paver grid is filled with soil or sandy loam, leveled with rake to top of cell walls and watered moderately. If the fill settles below the top of the paver after watering, additional fill should be added until the cells are completely full. The soil is ready to have sod laid in a staggering pattern.
2. Seeding and HydroSeeding
 - a. The paver grid is filled with soil or sandy loam, leveled with rake to top of cell walls and watered moderately. If the fill settles below the top of the paver after watering, additional fill should be added until the cells are completely full. The surface is now ready for seed and fertilizer to be broadcast or hydroseeded over the paver grid work.

Maintenance Tips

- Turf care and mowing practices that minimize the need for de-thatching:
 - Planting turf that is resistant to thatch
 - Collecting grass clippings when mowing
 - Using slow release fertilizers
 - Adopting deep watering irrigation techniques
- Do not aerate
- Utilizing skid shoes or raising the snow plow a minimum 2" above paver surface
- Do not use equipment intended for operation for thatching or scalping over the paver



Specification Sheet – Grass

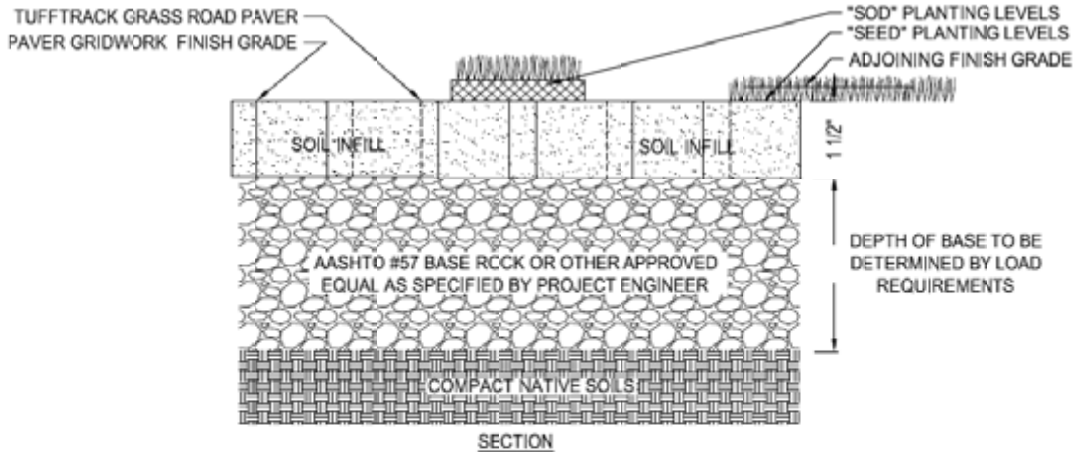


TT-24

TUFFTRACK GRASS PAVER

Specification Sheet

TAG _____



NOTES:

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TUFFTRACK GRASS PAVERS are a turf reinforcement load transferring paving system designed to provide a sustainable and alternative to traditional asphalt and concrete. When properly installed, Tufftrack can support H-20 loads.

BASE DETERMINATION

- | | | |
|--|---------|---|
| <input type="checkbox"/> Light Loads | 4" base | Golf cart paths, equestrian parks, trail reinforcement, sports fields |
| <input type="checkbox"/> Medium Loads: | 6" base | Roadway shoulders, driveways, parking lots, RV and boat access |
| <input type="checkbox"/> Heavy Loads: | 8" base | Fire lanes, service vehicle roads, equipment yards, helicopter pads |
| <input type="checkbox"/> Non-load | No base | Erosion control on slopes and swales (staking recommended) |
- Not recommended for use on slopes exceeding a 10% grade. For more information see pages 9-17

SPECIFICATIONS

Material	100% recycled polyolefin plastic	See page 5
Size	24"x24"x1 1/2" with hexagonal cells	See page 5
Weight	4.0 lbs	See page 5
Compressive strength	81744 psf per Smith Emory Testing Lab # L15-2013 Job # 42289-1	See page 6
Features	Tongue & Groove Clips for 2x faster and easier installation Domed Drainage Outlets for increased lateral movement of water and nutrients Webbed cell design for both grass and gravel applications	
LEED	Sustainable Sites credits 5.1, 5.2, 6.1, 6.2, 7.1, 7.2 Materials and Resources credits 4.1 & 4.2	See page 8

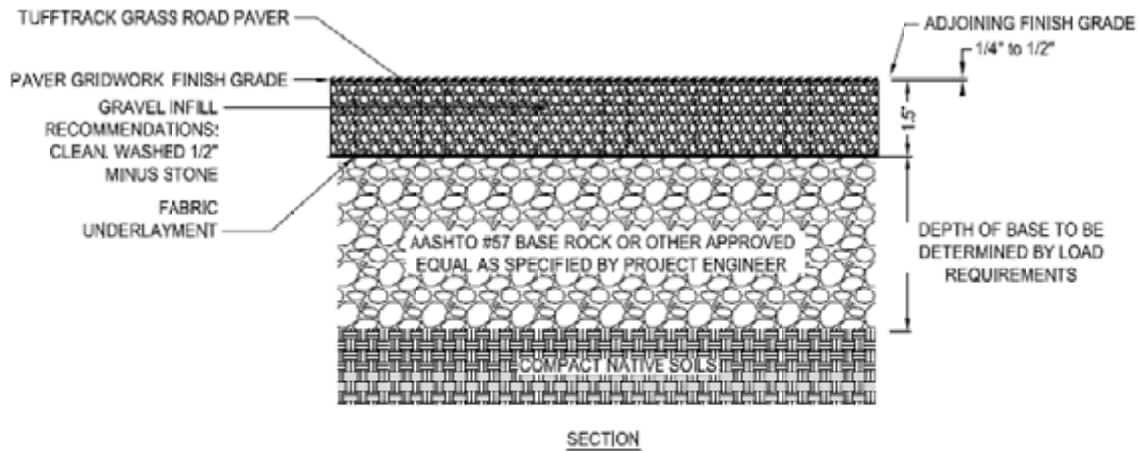
Specification Sheet – Gravel



TT-24
TUFFTRACK GRAVEL PAVER

Specification Sheet

TAG _____



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BASE DETERMINATION

- | | | |
|--|---------|---|
| <input type="checkbox"/> Light Loads | 4" base | Golf cart paths, equestrian parks, trail reinforcement, sports fields |
| <input type="checkbox"/> Medium Loads: | 6" base | Roadway shoulders, driveways, parking lots, RV and boat access |
| <input type="checkbox"/> Heavy Loads: | 8" base | Fire lanes, service vehicle roads, equipment yards, helicopter pads |
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LEED	Sustainable Sites credits 5.1, 5.2, 6.1, 6.2, 7.1, 7.2 Materials and Resources credits 4.1 & 4.2	See page 8

Product Guide Specification

NDS, Inc. / April 2015

851 North Harvard Avenue Lindsay, California 93247

Toll Free: 800-726-1994

Phone: 559-562-9888

Toll Free Fax: 800-726-1998

Fax: 559-562-4488

Website: www.ndspro.com

Email: nds@ndspro.com

Specifier Notes: This product guide specification is written in Construction Specifications Institute (CSI) 3-Part Format in accordance with *The CSI Construction Specifications Practice Guide*, including *MasterFormat*, *SectionFormat*, and *PageFormat*.

This section must be carefully reviewed and edited by the Architect to meet the requirements of the project and local building code. Coordinate this section with Division 1, other specification sections, and the Drawings. Delete all Specifier Notes after editing this section.

Section numbers and titles are based on MasterFormat 2014 Update.

Section 32 12 43

POROUS FLEXIBLE PAVING

Specifier Notes: This section covers NDS, Inc. "Tufftrack Grass & Gravel" pavers to construct porous flexible paving. Consult NDS, Inc. for assistance in editing this section for the specific application.

Use of "Tufftrack Grass & Gravel" pavers may contribute to LEED credits. Consult NDS, Inc. for more information.

Part 1 General

1.1 SECTION INCLUDES

A. Porous flexible paving using grass pavers.

1.2 RELATED REQUIREMENTS

Specifier Notes: Edit the following list of related sections as necessary. Limit the list to sections with specific information that the reader might expect to find in this section, but is specified elsewhere.

A. Section 31 20 00 – Earth Moving: Subgrade preparation.

B. Section 32 80 00 – Irrigation: Irrigation system.

C. Section 32 91 00 – Planting Preparation: Soil preparation.

Specifier Notes: Provide section number and title for method of planting grass specified in Part 3 of this section.

D. Section 32 92 ____ – ____: Grass.

E. Section 33 46 00 – Subdrainage: Subsurface drainage.

1.3 PRE-INSTALLATION MEETINGS

Specifier Notes: Edit pre-installation meetings as necessary. Delete if not required.

- A. Convene pre-installation meeting [1 week] [2 weeks] before start of Work of this Section.
- B. Require attendance of parties directly affecting Work of this Section, including Contractor, Architect, installer, and manufacturer's representative.
- C. Review the Following:
 - 1. Materials
 - 2. Protection of in-place conditions
 - 3. Preparation
 - 4. Installation
 - 5. Adjusting
 - 6. Protection

1.4 SUBMITTALS

Specifier Notes: Edit submittal requirements as necessary. Delete submittals not required.

- A. Comply with Division 1.
- B. Product Data: Submit manufacturer's product data, including preparation and installation instructions.
- C. Samples: Submit manufacturer's sample of one 24-inch by 24-inch grass paver.
- D. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.
- E. Sustainable Design Submittals: Submit manufacturer's sustainable design submittals for grass pavers.
 - 1. Recycled Content: Certify percentages of post-consumer and pre-consumer recycled content.
 - 2. Regional Materials: Certify distance between manufacturer and Project, in miles.
- F. Manufacturer's Project References: Submit manufacturer's list of successfully completed grass paver projects, including project name and location, name of architect, and type and quantity of grass pavers furnished.
- G. Installer's Project References: Submit installer's list of successfully completed grass paver projects, including project name and location, name of architect, and type and quantity of grass pavers installed.
- H. Warranty Documentation: Submit manufacturer's standard warranty.

1.5 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Manufacturer regularly engaged, for a minimum of 10 years, in the manufacturing of grass pavers of similar type to that specified.
- B. Installer's Qualifications:
 - 1. Installer regularly engaged, for a minimum of 5 years, in installation of grass pavers of similar type to that specified.
 - 2. Employ persons trained for installation of grass pavers.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery Requirements: Deliver grass pavers to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage and Handling Requirements:
 - 1. Store and handle grass pavers in accordance with manufacturer's instructions.
 - 2. Keep grass pavers in manufacturer's original, unopened containers and packaging until installation.
 - 3. Store grass pavers in clean areas, protected from exposure to harmful weather conditions.
 - 4. Store grass pavers out of direct sunlight.
 - 5. Protect grass pavers during storage, handling, and installation to prevent damage

1.7 AMBIENT CONDITIONS

- A. During Cold Weather:
 - 1. Do not use frozen materials.
 - 2. Do not use materials mixed or coated with ice or frost.
 - 3. Do not build on frozen Work.
- B. During Wet Weather: Do not build on wet, saturated, or muddy subgrade.

Part 2 Products

2.1 MANUFACTURERS

- A. Manufacturer: NDS, Inc., 851 North Harvard Avenue, Lindsay, California 93247. Toll Free 800-726-1994. Phone 559-562-9888. Toll Free Fax 800-726-1998. Fax 559-562-4488. Website www.ndspro.com. Email nds@ndspro.com.

Specifier Notes: Specify if substitutions will be permitted.

- B. Substitutions: [Not permitted] [Comply with Division 1].

2.2 MATERIALS

- A. Grass Pavers: NDS "Tufftrack Grass & Gravel" pavers, model "TT-24".
 - 1. Injection-molded, nested-honeycomb, plastic-panel grass pavers for permeable, natural-grass paved environments.
 - 2. Load-bearing paving system.
 - 3. Use full rigid base course to prevent pavers from being pressed into subbase.
 - 4. Material: 100 percent recycled polyolefin plastic with carbon black for UV stabilization.
 - 5. Recyclable Content: 100 percent.
 - 6. Paver Size: 24 inches by 24 inches by 1-1/2 inches high.
 - 7. Wall Thickness: 0.12 inch.
 - 8. Cells:
 - a. Number per Paver: 120.
 - b. Shape: Hexagon.
 - c. Size: 2-1/2-inches.
 - d. Form: Nested honeycomb.
 - 9. Bottom of Each Cell:
 - a. 1-1/4-inch-diameter hole in center.
 - b. Six 0.475-inches by 0.212-inch perimeter slot openings through bottom of paver.
 - c. One opening at bottom of each cell wall to discourage root girdling within cell.
 - 10. Bottom Surface of Pavers: Flat, without vertical posts or obstructions.
 - 11. Top Surface of Pavers: Smooth, without notches or grooves.
 - 12. Latching System Between Pavers:
 - a. Tongue-and-groove latching system molded around perimeter lock pavers together.
 - b. Does not require additional parts or tools.
 - c. Tongues: 1 inch by 1 inch by 0.12 inch thick.
 - d. Grooves: 1 inch by 0.12 inch.
 - 13. Bottom Open Area: Greater than 41 percent, across entire bottom surface.
 - a. Total Bottom Open Area per Paver: Greater than 228 square inches.
 - 14. Paver Color: Black.

2.2 MATERIALS (CONT.)

15. Paver Compressive Strength, Empty Cells: 98,770 psf.
16. Nominal Coverage Area per Paver: 4 square feet.
17. Weight per Paver: 4.5 pounds.
18. Chemical Resistance: Superior chemical resistance; totally inert.

Specifier Notes: Edit the following for the local available base course material and anticipated traffic loads. Consult NDS, Inc. for more information.

B. Base Course: Sandy gravel material from local sources, commonly used for road base construction, passing the following sieve analysis:

Percent Passing	Sieve Size
100	3/4 inch
85	3/8 inch
60	#4
30	#40
< 3	#200

1. Sources of the material may include pit run or crusher run.
2. Crusher run material will typically require sand be added (33 percent by volume) to ensure long-term porosity.
3. Should local sources not be available, alternative mixture can be created by mixing 2/3 crushed stone (0.75-inch diameter) with 1/3 sand, as available.
4. Alternative materials, such as washed or clean stone (0.75-inch diameter typical) may be used with soil separator above stone base and below growing medium.
5. Confirm base course sieve analysis by testing material.

Specifier Notes: The selection of sandy loam or loam soil should be made based on the soil requirements of the grass variety selected for the project.

C. Soil:

1. Sandy loam or loam soil.
2. Sand: Not acceptable.

Specifier Notes: Select a grass variety well suited to the anticipated traffic frequency and local heat and growing conditions.

D. Grass: Specified in Section 32 92 _____.

Part 3 Execution

3.1 EXAMINATION

- A. Examine areas to receive porous flexible paving.
- B. Examine subgrade and base course installed conditions.
- C. Check for improperly compacted trenches, debris, and improper gradients.
- D. Notify Architect of conditions that would adversely affect installation or subsequent use.
- E. Do not begin preparation or installation until unacceptable conditions are corrected.

3.2 PREPARATION

- A. Protection of In-Place Conditions: Protect adjacent areas and landscaping from installation of porous flexible paving.
- B. Place base course material over prepared subbase to grades indicated on the Drawings, in lifts not to exceed 6 inches.
- C. Compact each lift separately to minimum 95 percent Modified Proctor.
- D. Leave minimum 1-1/2 inches for grass pavers and soil.
- E. Fill to final grade.

3.3 INSTALLATION

- A. Install grass pavers in accordance with manufacturer's instructions at locations indicated on the Drawings.
- B. Install grass pavers by placing units with cells facing up and connecting tongue and groove locks.
- C. Clearance: Leave 1-inch-minimum clearance between grass pavers and fixed objects or surface structures.
- D. Anchor grass pavers placed on curves and slopes to base course as required to secure pavers in place.
- E. Top of Cells: Leave top of cells 1/4 inch to 1/2 inch below surface of adjacent hard-surface pavements.
- F. Install soil in cells as grass pavers are laid in sections.
- G. Add soil to grass pavers from an area already filled with soil.
- H. Spread soil to fill grass pavers to top surface.

Specifier Notes: Specify one of following methods of planting grass: top dressing with sod, recessed sod planting, seeding, or hydroseeding. Include the section number for the section specifying the appropriate method of planting.

I. Planting:

Plant grass by [top dressing with sod] [recessed sod planting] [seeding] [hydroseeding] as specified in Section 32 92 ____.

- J. Fill grass pavers with soil and plant within 30 days of being installed.

3.4 ADJUSTING

- A. Remove and replace with new materials, segments of grass pavers where 3 or more adjacent cells are broken or damaged.

3.5 PROTECTION

- A. Protect Work of this Section:
 - 1. From traffic until grass is sufficiently established to handle traffic.
 - 2. From damage or deterioration during construction.

END OF SECTION



SUSTAINABLE STORMWATER SOLUTIONS

NDS has an over 40-year history manufacturing quality stormwater management products. In that time our understanding and appreciation for the effects of stormwater runoff on our environment has evolved, culminating in the development of S5 Sustainable Stormwater Solutions. This evolution towards a system-based approach to comprehensive stormwater management represents a paradigm shift reflective of ongoing research, changing attitudes and advancing regulations that aim to reduce runoff and maximize groundwater recharge. NDS is committed to providing effective solutions for the next 40 years and beyond.

