

ABT[®], permavoid

WATER IS OUR MOST PRECIOUS RESOURCE:

WHICH SIDE

ARE YOU ON?



ABT Permavoid is a multi-functional stormwater management & water conservation system that mimics the natural water cycle and can save up to 30% on overall site drainage costs.

RETENTION / DETENTION

Modular units with 95% void ratio interlock with patented lateral connectors to create a monolithic stormwater management system eliminating the need for end of line ponds and tanks.

PERMEABLE INFILTRATION

The ultra-shallow profile promotes stormwater infiltration over the largest area possible, including under traditional pavements like asphalt and concrete removing the added costs of permeable paving.

STRUCTURAL SUBBASE

The ultra-high strength (104 psi yield) safely and reliably transfers traffic loads to subgrade soils replacing large volumes of hauled subbase stone.

WATER CONVEYANCE

Stormwater is efficiently transported to discharge locations or landscaped areas for natural reuse eliminating drainage and irrigation pipes.

CAPILLARY IRRIGATION

Patented wicking cones employ capillary action to bring stormwater directly to the root zone of landscaped areas while keeping it away from evaporative heat and sunlight for up to 60% savings vs traditional sprinkler irrigation.

Since its introduction ABT Permavoid has revolutionized the way about which stormwater is thought. Its unique capabilities allow even the most challenging developed sites to behave like their natural pre-development counterparts. Whether returned to the community water cycle through infiltration or utilized locally through capillary irrigation, ABT Permavoid promotes the most natural, environmentally friendly methods of managing water. It is the clear choice on sites both large and small when designing sustainable, resilient landscapes that enhance neighborhood aesthetics, mitigate flood risks and during periods of drought, conserve our most precious resource.



SUBBASE REPLACEMENT



Minimize excavation costs while reducing runoff and meeting stormwater BMP objectives.

Ultra shallow envelope avoids surface bedrock, contaminated subgrades and high water tables.



Maximize stormwater attenuation through increased surface area for infiltration

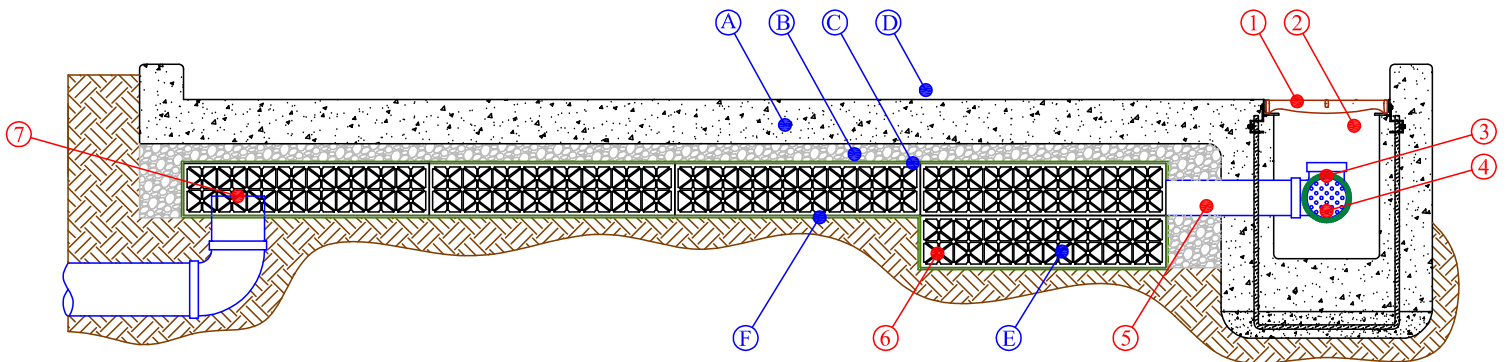
Eliminate large diameter, deep pipes by routing stormwater into Peramvoid at it's source.

Reduce flood risks by storing water to reduce runoff and control discharge rates.



Maximize the performance of permeable surfaces by storing and conveying water within Peramvoid.

Minimize subgrade improvement by dissipating heavy traffic loads through the Peramvoid interlocking structural raft.



Treatment Train

- ① Ductile Iron Grate Inlet
- ② TrenchFormer Catch Basin
- ③ FirstFlush Filter Fabric
- ④ FirstFlush Pipe w/ Orifice Bypass
- ⑤ Peramvoid Inlet Connection
- ⑥ Peramvoid Water Attenuation / Storage Units
- ⑦ Off-Site Controlled Discharge Pipe

Notes & Features

- A Concrete Pavement (5 in. for H-20)
- B Compacted Subbase (2 in. for H-20)
- C Geotextile (Mirafi 1100N)
- D Emergency Surface Water Storage
- E Scour Prevention Chamber
- F Geotextile or Geomembrane

Peramvoid is exceptionally capable of withstanding heavy traffic loads. As a result it is often used to replace traditional stone subbase in order to add safety and functionality. When poor subgrade soils are present Peramvoid can be utilized to help spread traffic loads without complicating the problem by adding dead loads. With ideal subgrades Peramvoid is used under traditional impervious pavement to allow them to behave like permeable surfaces while maximizing infiltration area. With nearly any subgrade Peramvoid can be used to convert traditional subbase into an extensive stormwater management tool capable of both conveyance and storage.



PIPE REPLACEMENT



Minimize excavation costs while reducing runoff and meeting stormwater BMP objectives.

Avoid subgrade conflicts such as bedrock, contaminated ground, buried utilities and high water tables.



Maximize stormwater attenuation through increased surface area for infiltration

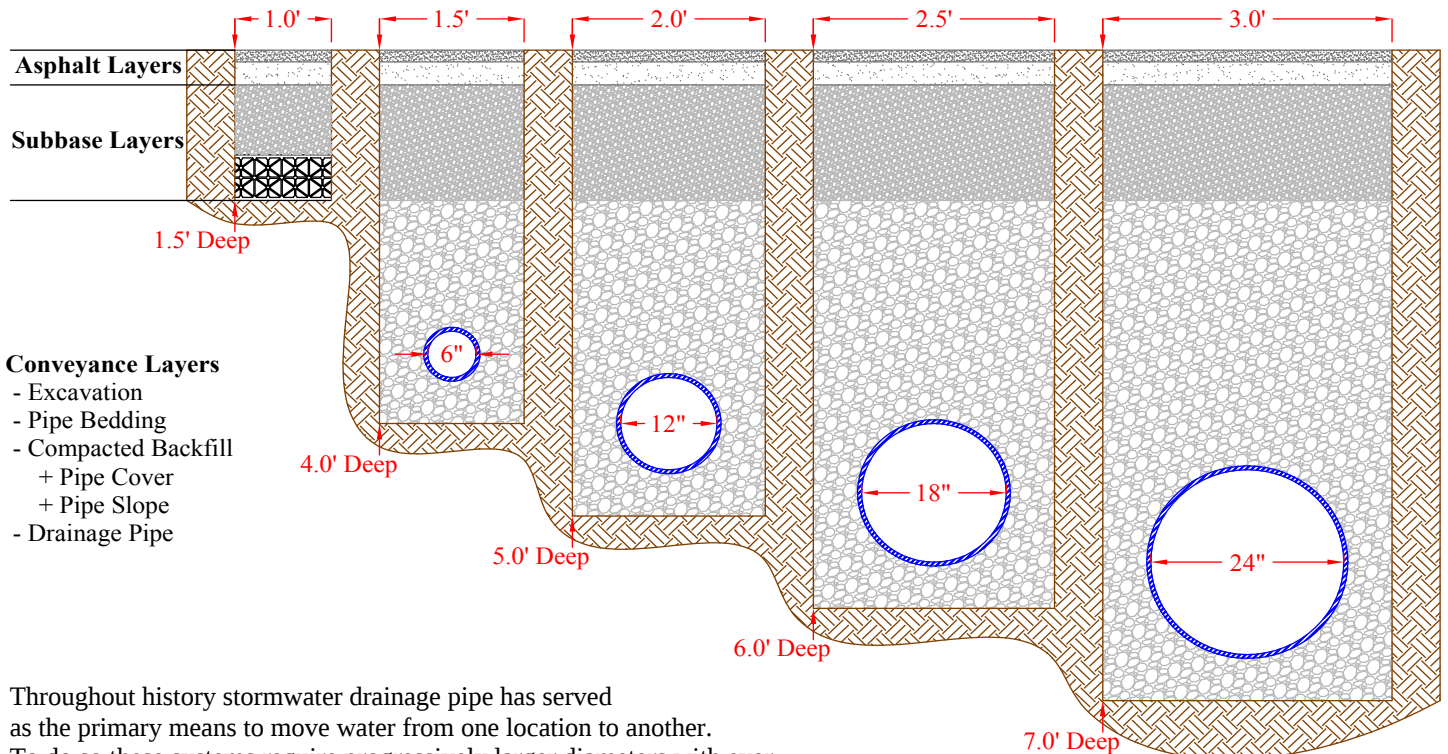
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Reduce flood risks by storing water to reduce runoff and control discharge rates.



Maximize the performance of permeable surfaces by storing and conveying water within Permavoid.

Minimize subgrade improvement by dissipating heavy traffic loads through the Permavoid interlocking structural raft.



Throughout history stormwater drainage pipe has served as the primary means to move water from one location to another. To do so these systems require progressively larger diameters with ever increasing depths that create large volumes of excavation to haul away and extensive material / labor to backfill with compaction. Now with ABT, Permavoid these costs can be eliminated. ABT, Permavoid's ultra high strength and unique highly voided internal structure allows these traditionally deep conveyance layers to fit within the subbase layer.



DETENTION REPLACEMENT



Minimize excavation costs while reducing runoff and meeting stormwater LID and BMP objectives.

Create offsetting costs by accomplishing multiple drainage functions simultaneously.

Design stormwater detention that remains accessible for easy and natural reuse on site.



Reduce construction time and cost by simplifying detention within a continuous, uniform layer of ABT, Permavoid.

Prevent subgrade conflicts such as bedrock, contaminated ground, buried utilities and high water tables.

Mitigate roadway damage by eliminating massive volumes of hauled materials.

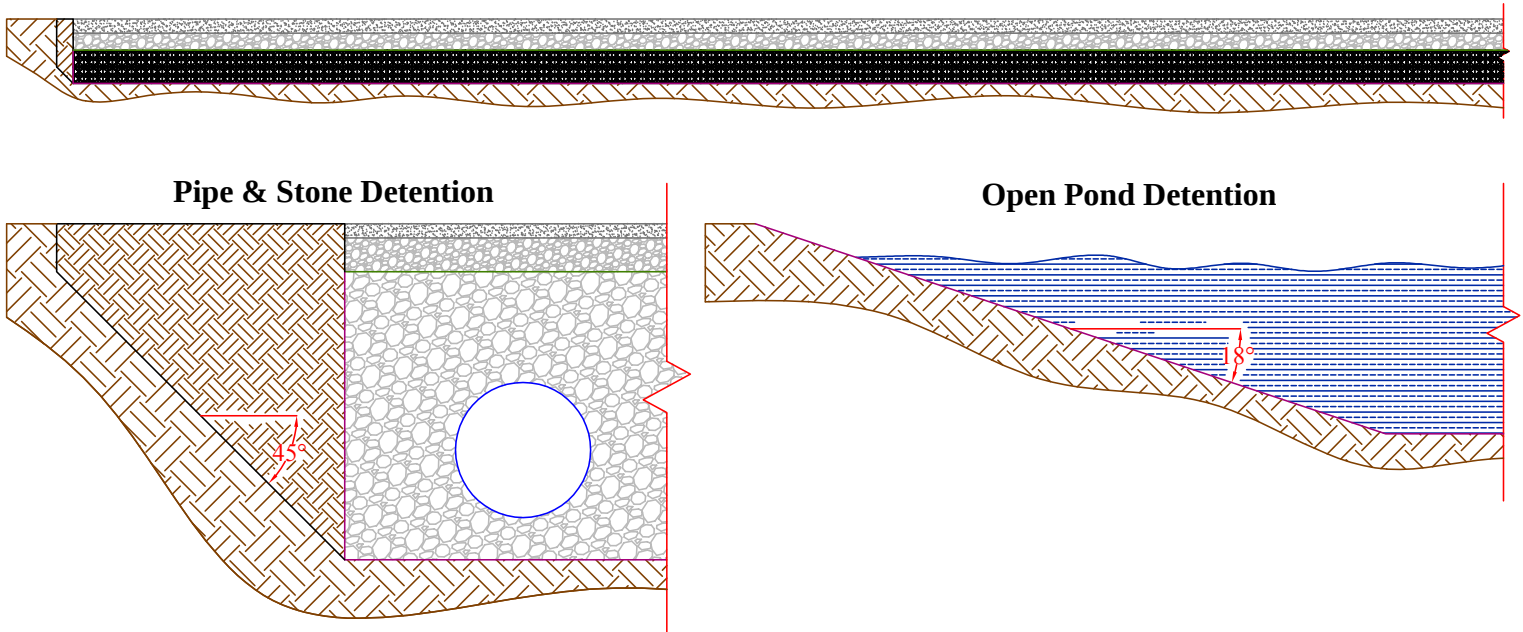


Avoid the hazards and liability of deep exposed surface water from open ponds through subbase detention with ABT, Permavoid.

Eliminate unsightly trash and debris build-up that reduces property values.

Maximize land use by preventing the wasted area dedicated to open ponds.

Permavoid Subbase Detention



Detention is a critical step for effective stormwater management systems. While traditional methods have been effective thus far, they have always come with trade-offs. With open ponds there are serious concerns of safety, aesthetics, maintenance and land use. With pipe / stone systems; construction time, materials handling and potential conflicts become driving factors. With ABT, Permavoid these pitfalls of historical approaches can be averted while promoting the most responsible and natural pre-development behavior of our stormwater.

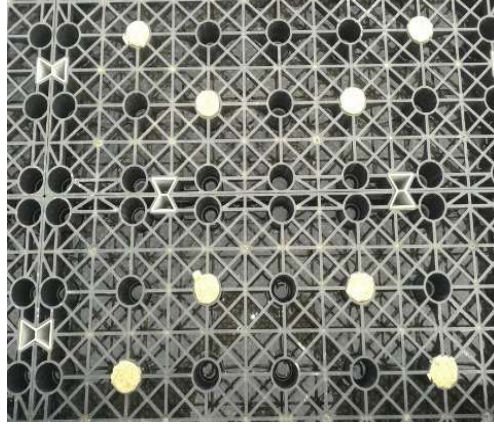


PASSIVE IRRIGATION



Achieve the classic look and feel of natural turf without costly irrigation.

Provides the ideal base for precision graded lawns, landscaping and playing surfaces.



Maximizes LID performance by reducing storm- water discharge through evapo-transpiration.

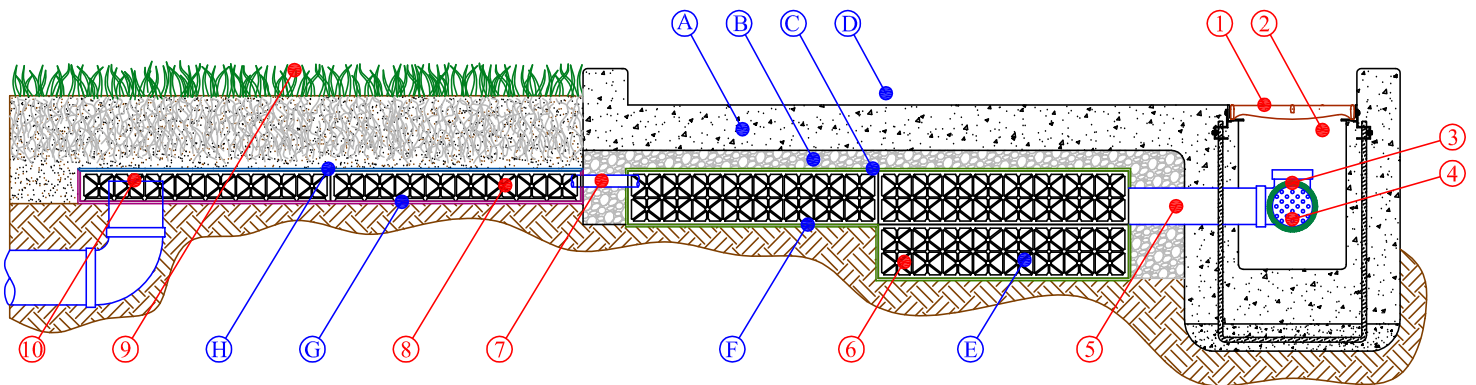
Mimics pre-development stormwater behavior by maximizing green space functionality.

Reduces heat-island effect through natural and biological evaporation processes.



Eliminates costly irrigation systems by wicking stored water to turf and landscaped areas.

Reduces runoff by converting stormwater from a waste product to a valuable resource.



Treatment Train

- ①-Ductile Iron Grate Inlet
- ②-TrenchFormer Catch Basin
- ③-FirstFlush Filter Fabric
- ④-FirstFlush Pipe w/ Orifice Bypass
- ⑤-Permavoid Inlet Connection
- ⑥-Permavoid-150 Water Attenuation / Storage
- ⑦-Controlled Discharge Pipe
- ⑧-Permavoid-85 Passive Irrigation / Storage
- ⑨-Passive Irrigated Grass - Evapo-Transpiration
- ⑩-Off-site Controlled Discharge Pipe

Notes & Features

- A-Concrete Pavement (5 in. for H-20)
- B-Compacted Subbase (2 in. for H-20)
- C-Geotextile (Mirafi 1100N)
- D-Emergency Surface Water Storage
- E-Scour Prevention Chamber
- F-Infiltration Geotextile
- G-Irrigation Geomembrane
- H-Wicking Geotextile

Healthy green lawns and landscaping beds add to the property values and aesthetics of any neighborhood or commercial area. With Permavoid's unequaled strength, water can be held very near the surface and in turn allow for passive irrigation. This assures plants remain at their best even during periods of drought. With heavy rainfall stormwater is retained for later use. During dry months the spigot or well water can be used to partially fill the tank. In both cases Permavoid keeps this precious resource away from evaporative sunlight and heat insuring the water is used precisely where it is intended.



BIOSWALE OPTIMIZATION



Maximize shallow storage and conveyance assuring the best bioswale efficiency.

Add aesthetically pleasing green space promoting increased property value.



Maximize LID performance by reducing stormwater discharge through evapo-transpiration.

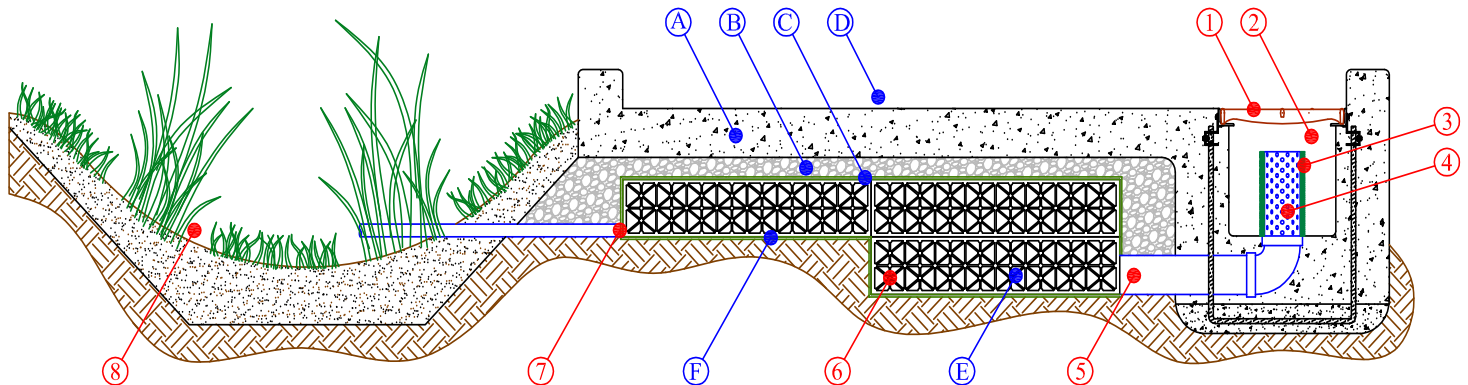
Mimic pre-development stormwater behavior by maximizing green space functionality.



Minimize liability by controlling exposed surface water elevations.

Maximize bio-remediation by storing excess runoff until further capacity is available.

Reduce the heat-island effect through natural and biological evaporation processes.



Treatment Train

- ① Ductile Iron Grate Inlet
- ② TrenchFormer Catch Basin
- ③ FirstFlush Filter Fabric
- ④ FirstFlush Pipe w/ Orifice Bypass
- ⑤ Permavoid Inlet Connection
- ⑥ Permavoid Water Attenuation / Storage Units
- ⑦ Controlled Discharge Pipe
- ⑧ Vegetative Bioswale

Notes & Features

- Ⓐ Concrete Pavement (5 in. for H-20)
- Ⓑ Compacted Subbase (2 in. for H-20)
- Ⓒ Geotextile (Mirafi 1100N)
- Ⓓ Emergency Surface Water Storage
- Ⓔ Scour Prevention Chamber
- Ⓕ Geotextile or Geomembrane

Bioswales provide a great opportunity to naturally treat and manage stormwater while adding bio-diversity and aesthetic appeal to any urban or rural landscape. Permavoid complements and enhances this by optimizing their footprint and maximizing their functionality. Excess water is stored in an ultra shallow profile allowing extended contact time for bio-remediation, evapo-transpiration and/or infiltration. Permavoid combined with bioswales create resilient landscapes that harness stormwater as an indispensable resource and utilize it to the fullest extent.



TREE PROTECTION



Protect mature trees to enhance urban aesthetics, quality of life and property values.



Minimize subgrade compaction by dissipating heavy urban loads throughout the structural ArborRaft.

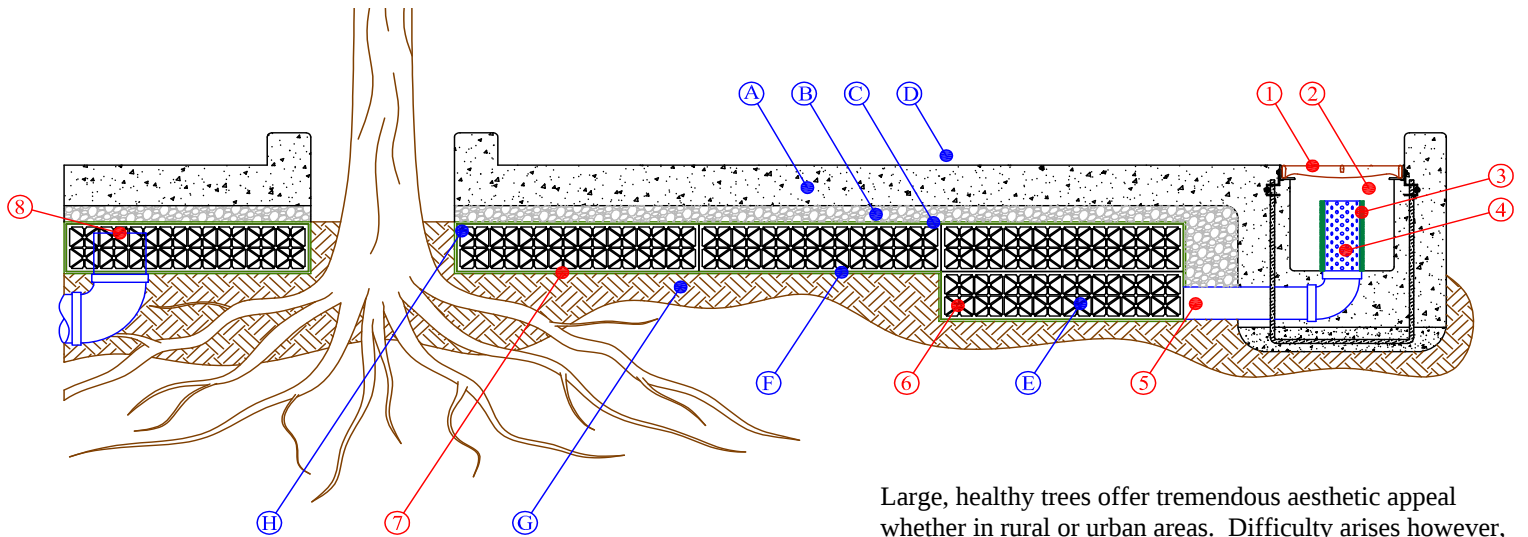


Maximize the performance of permeable surfaces by storing and conveying water within Permavoid.

Increase LID effectiveness through local stormwater storage, attenuation and infiltration.

Permavoid's natural air gap prevents upward migration of roots; protecting pedestrian walkways and promoting positive air circulation.

Create ideal environments, even beneath city streets, to promote healthy tree growth.



Treatment Train

- ① Ductile Iron Grate Inlet
- ② TrenchFormer Catch Basin
- ③ FirstFlush Filter Fabric
- ④ FirstFlush Pipe w/ Orifice Bypass
- ⑤ Permavoid Inlet Connection
- ⑥ Permavoid Water Attenuation / Storage Units
- ⑦ Root Zone Infiltration
- ⑧ Off-site Controlled Discharge Pipe

Notes & Features

- Ⓐ Concrete Pavement (5 in. for H-20)
- Ⓑ Compacted Subbase (2 in. for H-20)
- Ⓒ Geotextile (Mirafi 1100N)
- Ⓓ Emergency Surface Water Storage
- Ⓔ Scour Prevention Chamber
- Ⓕ Geotextile or Geomembrane
- Ⓖ Uncompacted Root Zone Sub-Grade
- Ⓗ Positive Root Zone Air Circulation

Large, healthy trees offer tremendous aesthetic appeal whether in rural or urban areas. Difficulty arises however, specifically in cities, where heavy traffic loads must be transferred to sub-grade soils. Permavoid offers the ideal balance of load transference and surface protection. First, the void space created offers a guided path for stormwater to infiltrate through the root zone providing vital irrigation directly where it is needed most. Second, during periods without rainfall an air gap is present preventing roots from migrating upward and damaging valuable infrastructure while maintaining air circulation directly to the root zone. These features mean stormwater behaves more naturally while trees are provided an ideal growing environment.



Maximize shallow storage and conveyance assuring the best bioswale efficiency.

Add aesthetically pleasing green space promoting increased property value.



Maximize LID performance by reducing stormwater discharge through evapo-transpiration.

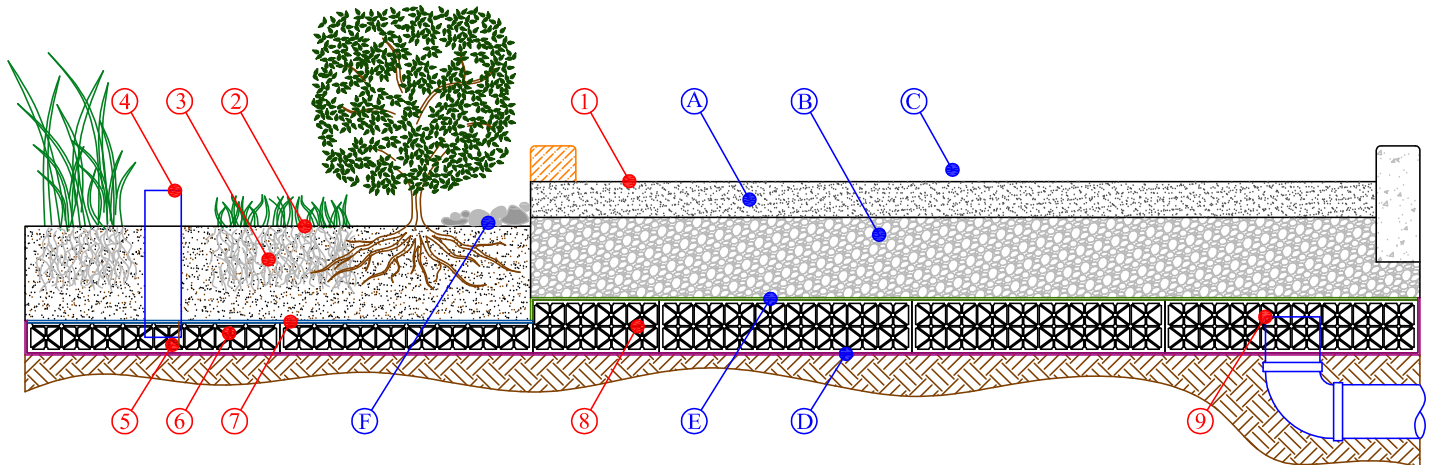
Mimic pre-development stormwater behavior by maximizing green space functionality.



Minimize liability by controlling exposed surface water elevations.

Maximize bio-remediation by storing excess runoff until further capacity is available.

Reduce the heat-island effect through natural and biological evaporation processes.



Treatment Train

- ① Surface Runoff
- ② Natural Infiltration
- ③ Bio-Remediation / Evapotranspiration
- ④ Vertical Bypass Pipe
- ⑤ Permavoid 85 Water Attenuation / Storage Units
- ⑥ Permavoid Wicking Cones for Passive Irrigation
- ⑦ Wicking Geotextile for Passive Irrigation
- ⑧ Permavoid 150 Water Attenuation / Storage Units
- ⑨ Controlled Discharge Outlet Pipe

Notes & Features

- Ⓐ Asphalt Pavement
- Ⓑ Compacted Subbase
- Ⓒ Emergency Surface Water Storage
- Ⓓ Geotextile or Geomembrane
- Ⓔ Geotextile (Mirafi 1100N)
- Ⓕ Runoff Scour Prevention

Bioswales provide a great opportunity to naturally treat and manage stormwater while adding bio-diversity and aesthetic appeal to any urban or rural landscape. Permavoid complements and enhances this by optimizing their footprint and maximizing their functionality. Excess water is stored in an ultra shallow profile allowing extended contact time for bio-remediation, evapo-transpiration and/or infiltration. Permavoid combined with bioswales create resilient landscapes that harness stormwater as an indispensable resource and utilize it to the fullest extent.



GEOFOAM SUPPLEMENT



Maintain minimal soil bearing pressures with lightweight, ultra high strength ABT, Permavoid.

Avoid shifting subgrades and instability by preventing ground water buoyancy forces.

Eliminate flotation counter- measures including anchoring slabs and thick overburden.

Prevent lateral pressures through natural horizontal conveyance and water level equalization.

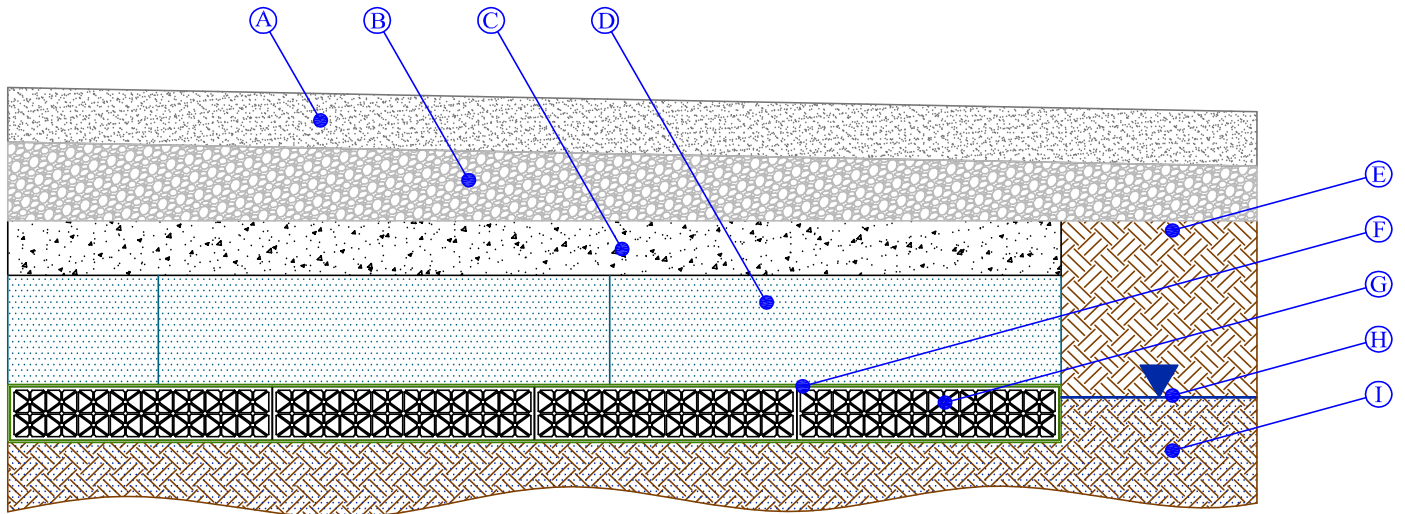
Ward off long term failure from fluctuating water tables and associated pressure changes.

Create a vast subgrade control structure that mimics and/or improves natural water movement.

Minimize subgrade improvement through the ABT, Permavoid interlocking structural base.

Provide a stable working surface to prevent hazardous or unsafe construction conditions.

Reduce construction delays by allowing ponding below the working surface.



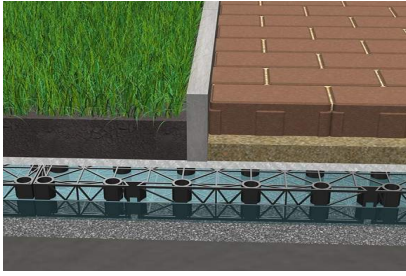
Notes & Features

- (A) Asphalt Pavement
- (B) Compacted Subbase
- (C) Concrete Cap-Subbase
- (D) ABT Foam - GeoFoam
- (E) Subgrade
- (F) Geotextile (Mirafi 1100N)
- (G) Permavoid 150 Lightweight Water Management
- (H) Seasonal High Water Table
- (I) Low Strength Saturated Subgrade

Since the 1970's geofoam has been used to reduce the overburden pressures on top of weak subgrade soils. The success of this lightweight fill has allowed construction in locations that would have otherwise been impossible. Now with ABT, Permavoid that success can be taken one step further in cases of high ground water. Rather than adding to the problem with heavy cover or anchored bases to prevent buoyancy forces, ABT Permavoid's ultra high strength, low weight and open cell structure allows water to freely flow into and out of the system without creating vertical uplift forces. Additionally the Permavoid base promotes the most natural lateral movement of ground water further preventing hydrostatic pressures while creating the perfect foundation to build upon.

ABT[®], permavoid

Other Applications



Hybrid Solutions

Provides multi-surface interconnectedness assuring optimal drainage functionality and safety.
Converts traditional concrete and asphalt pavement into pervious surfaces for infiltration.
Easily transition between multiple surfaces without complicated terminations or connections.
Expedites site work by replacing complex excavations with simple grading.



Athletic Fields

Eliminates collector pipe excavation and materials while increasing stormwater source control.
Protects expensive synthetic infill turf fields by maximizing permeability and water storage.
Eliminates settlement concerns through high strength interconnected units and load distribution.
Provides the ideal base for precision graded athletic fields for all levels of play.



Green / Blue Roofs

Rainfall storage on the roof allows larger building footprints while meeting LID criteria.
High strength and light weight Permavoid minimizes dead loads allowing structures to carry larger volumes of water and maximize plant diversity.
Passive irrigation offers precious water directly to plant roots preventing wasteful evaporation.



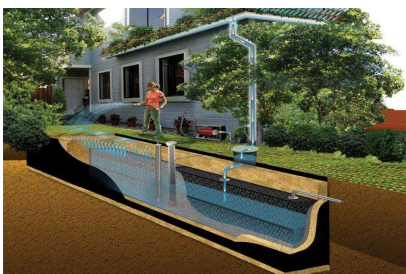
Permeable Pavers

Minimize excavation by replacing up to 18 inches of subbase drainage aggregate.
Reduce construction costs by supplementing permeable pavers with Permavoid under traditional surfacing allowing it to behave equally while maximizing infiltration capabilities.



Equestrian

Provides the ideal base for precision graded surfacing for all types of equestrian events.
Create the ideal moisture content within sand surfacing through the capillary action of Permavoid's passive irrigation.
Minimize downtime after heavy rainfall events through Permavoid's superior storage volume.



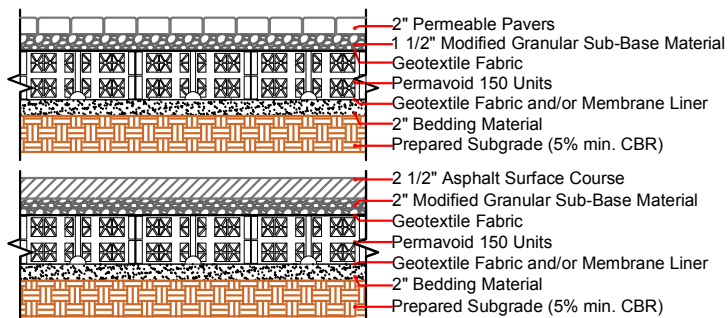
Water Harvesting

Reduce operating budgets by replacing costly irrigation with water captured on site.
Capture rainwater to flush toilets, wash cars, wash clothes or purify for drinking water.
Reduce demands on local ground water by saving rainwater within Permavoid.
Reduce runoff by diverting excess water to Permavoid for use during periods of drought.

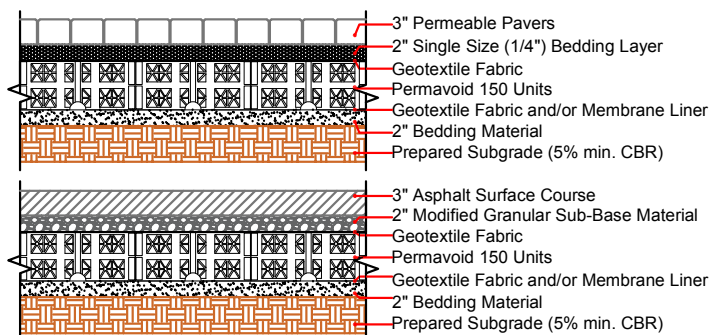
PV-150 Typical Cross Sections



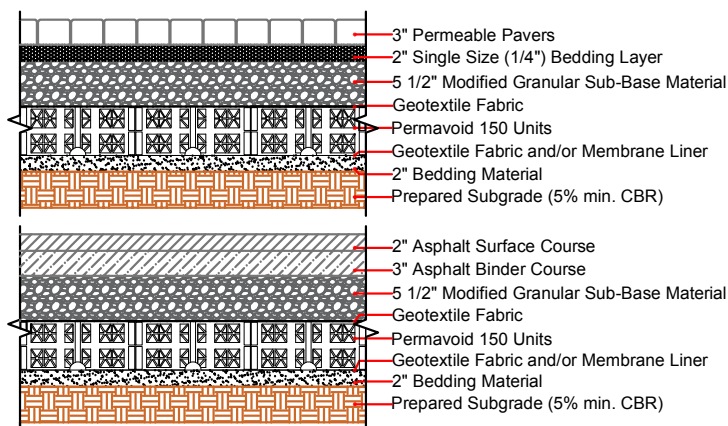
PEDESTRIAN
Typical of Sidewalks



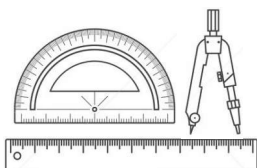
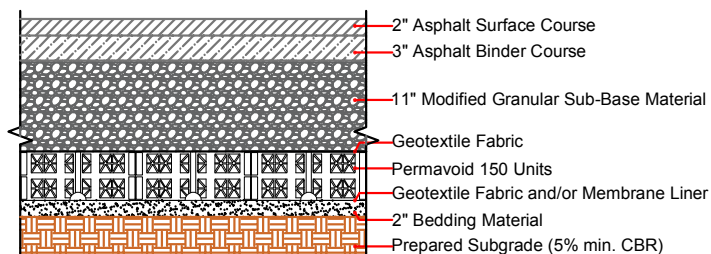
CARS ONLY
Typical of Parking Areas



OCCASSIONAL H-20
Typical of Commercial Deliveries



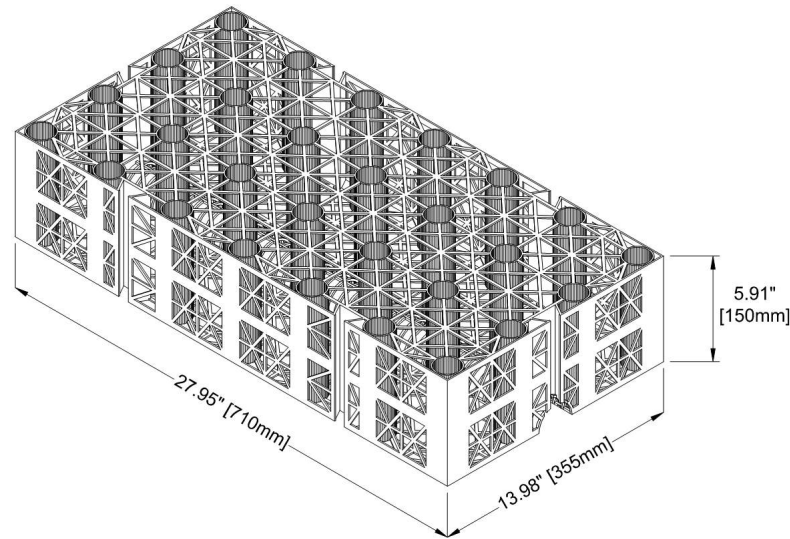
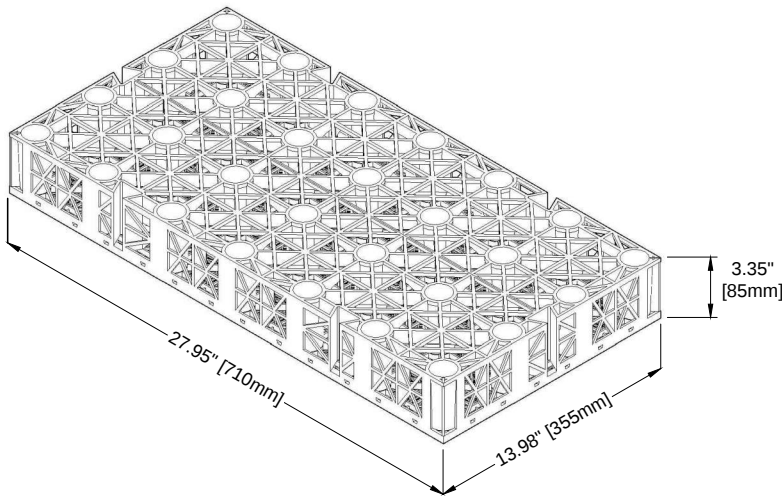
REGULAR H-20
Typical of Loading Docks



ENGINEERING
For Alternate Cross Sections

IMPORTANT PERMAVOID LOADING CHARACTERISTICS:	
Long Term Sustained Dead Load	24 psi (100 yr. Creep Limit)
Short Term Elastic Live Load	104 psi
Ultimate Unconfined Crush Strength	169 psi
Stress-Strain Relationship	0.125 in. PER 58 psi

For assistance please call 1-800-438-6057 or visit www.abtdrains.com



Part Number: PV85

Material: Polypropylene (CoPo)
 Weight: 4.96 lbs (2.25 kg)
 Void Space: 0.6961 ft³ (0.01971 m³)

Compressive Yield Strength

Vertical: 103.7 psi (715 kPa)
 Lateral: 22.6 psi (156 kPa)

Deflection Strength [1/8 in (3.175 mm)]

Vertical: 58.0 psi (400 kPa)
 Lateral: 6.9 psi (48 kPa)

Hydraulic Performance [GPM / ft² (LPS / m²)]

0.0% Slope 74.0 GPM / ft² (50.2 LPS / m²)
 1.0% Slope 119.3 GPM / ft² (81.6 LPS / m²)
 2.0% Slope 138.8 GPM / ft² (94.2 LPS / m²)
 3.0% Slope 157.2 GPM / ft² (106.7 LPS / m²)

Part Number: PV150

Material: Polypropylene (CoPo)
 Weight: 6.61 lbs (3.00 kg)
 Void Space: 1.2684 ft³ (0.03592 m³)

Compressive Yield Strength

Vertical: 103.7 psi (715 kPa)
 Lateral: 22.6 psi (156 kPa)

Deflection Strength [1/8 in (3.175 mm)]

Vertical: 58.0 psi (400 kPa)
 Lateral: 6.9 psi (48 kPa)

Hydraulic Performance [GPM / ft² (LPS / m²)]

0.0% Slope 74.0 GPM / ft² (50.2 LPS / m²)
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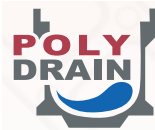
**RETENTION /
DETENTION**

**PERMEABLE
INFILTRATION**

**STRUCTURAL
SUBBASE**

**WATER
CONVEYANCE**

**CAPILLARY
IRRIGATION**



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The information contained within is believed to be accurate but not guaranteed to be so. The customer should evaluate the suitability and safety of these products for any application. ABT assumes no liability for the end results since the conditions of installation and use are beyond the control of ABT. Concrete specifications, placement, reinforcement and structural considerations are the responsibility of the customer. ABT reserves the right to change the price, availability, specifications, and content of any of its products, literature or other information in all media at any time without notification.

PolyDrain®, PolyDyn®, PolyChampion®, GreenDot®, RedDot®, PolyWall®, TrenchFormer® are registered trademarks of ABT, Inc., USA Patent Numbers 5,281,051; 5,348,421; 5,393,171; 5,399,047; 5,573,350; 5,702,204; 5,890,839; 6,443,656; 6,533,497; 6,926,245 : Canada 2,080,136; 2,131,866; 2,131,867; 2,139,405; 2,139,407 : Mexico 189,218; 189,436; 197,851 : Other US and foreign patents pending.

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