Brooklawn Park Constructed Wetland Retrofit

April 2022 Revised May 2022



Prepared for:
City of New Bedford
Parks Recreation & Beaches
Department
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Brooklawn Park Constructed Wetland Retrofit New Bedford, MA

Operation and Maintenance Plan

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APPENDICES

A. Drivable Grass Maintenance Guide (Sediment Forebay)

1.0 OWNER AND RESPONSIBILITY FOR MAINTENANCE

The City of New Bedford is responsible for the financing and continuous operation, maintenance and required emergency repair for the stormwater management system and associated drainage network.

Contact: Name: Email: Ph:			
Signed:			
Date:			

City of New Bedford

181 Hillman Street, Building 3 New Bedford Ma 02740

Parks Recreation & Beaches Department

Owner:

2.0 INTRODUCTION

This Guide provides a general description of the function and maintenance requirements for the Green Stormwater Infrastructure (GSI) located in Brooklawn Park (Park) in New Bedford, Massachusetts. The maintenance provider is required to familiarize themselves with this Guide and inspect and maintain the following practices, as outlined in the Guide throughout the year. Proper maintenance is vital to it's long-term success.

The proposed stormwater management includes a GSI approach to collect, capture, stores and filter stormwater prior to discharge to the duck pond in the Park. The pond overflows into the New Bedford stormwater system. Therefore, the maintenance provider is required inspect and maintain the following GSI practice (**Figure 1**) throughout the year, as indicated on the construction drawings and as outlined in this Guide.

STORES AND FILTERS

Constructed Stormwater Wetland

 Constructed wetlands are excavated basins with irregular perimeters and undulating bottom contours into which wetland vegetation is purposely planted to enhance pollutant removal from stormwater runoff. The constructed stormwater wetlands are designed to maximize the removal of pollutants from stormwater runoff via several mechanisms including; microbial breakdown of pollutants, plant uptake, retention, settling, and adsorption.



Figure 1: Constructed Wetland Location

3.0 FUNCTION AND MAINTENANCE

How Does Green Infrastructure Work?

GSI is nature-based approach to stormwater treatment and management. These stormwater practices are designed to mimic nature and use the natural filtration properties of soil and plants to remove pollutants from stormwater prior to discharging to the drainage system. GSI relies on the following five basic design elements, or steps, to function properly.

- 1. Collect (inlets) the stormwater.
- 2. Capture (sediment forebay) the sediment and debris.
- 3. Move (spillways) the water through the system.
- 4. Store and Filter (wetland cells) the water.
- 5. Overflow (overflow spillway) to by-pass larger storms.

These five steps will be referenced throughout this Guide. If one of these steps does not function properly, the entire system can be compromised and the GSI practice itself could be contributing to maintenance problems. This can lead to a landscape nuisances, more frequent maintenance, and costly repairs/improvement.

What is required for Maintenance?

As GSI are nature-based systems that often rely on plant care, the maintenance typically falls under landscape and general park maintenance services. The regularly scheduled maintenance, as outlined in this Guide, is critical to ensure proper function, maintain flow rates and storage capacity and preserve the pollutant removal capabilities as well as the protect the overall visual appearance. Regularly scheduled maintenance can prevent deficiencies in the effectiveness of the systems, due to sediment build-up, damage, or deterioration.

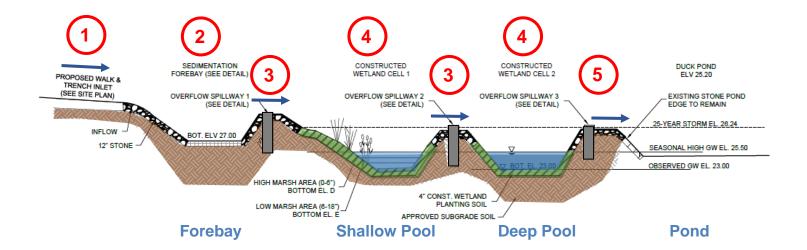
General maintenance includes the following:

- 1. Removing sediment from the pretreatment practices used to capture sediment (sediment forebay).
- Maintaining the proper drainage function and pollutant removal capacity of the systems.
- 3. Maintaining healthy native trees, plants, and vegetative cover as well as the removal of unwanted weeds.

It is recommended that all practices be maintained regularly as part of the routine landscape maintenance or at a minimum four times per year and after major rain events.

- Early Spring: during spring cleanup
- Summer: during lawn mowing and other routine park maintenance
- Early Fall: when leaves begin to fall.
- Late Fall/Early Winter: after all the leaves have fallen during leaf removal.
- After major storm events: 2" of rain or greater.

The following sections describes the general function and maintenance of the wetland.



FUNCTION:

- 1. COLLECT Sidewalk Inlet Grate
 - Stormwater runoff is collected along the road gutter and sidewalk surface via overland flow through the sidewalk inlet grate.
- CAPTURE Sediment Forebay
 Sediment, trash, and debris is captured and accumulates overtime in the pervious pavement sediment forebay.
- 3. MOVE Spillways

Stormwater overflows from sediment forebay to cell 1 via a curb and stone spillway, then from cell 1 to cell 2 via a second curb and stone spillway.

- 4. STORE AND FILTER Wetland Cells 1 and 2
 - Once stormwater overtops the forebay spillway, it flows through the two planted wetland cells, which stores and filters stormwater through both shallow (depth up to 18") and a deep pool (depth up to 36").
- 5. OVERFLOW Emergency Spillway

When the capacity of both cells exceeds the design capacity (water quality volume) the cells overflow to the pond via an emergency curb and stone spillway. The water in the pond drains to the city drainage network through an existing outlet control structure on the eastern edge of the pond.

SURROUNDING AREA – Brooklawn Park

Problems such as unstabilized soils, erosion, and over sanding during the winter can contribute to long-term maintenance problems. See Sections 4.0, 5.0, 6.0 and 7.0.

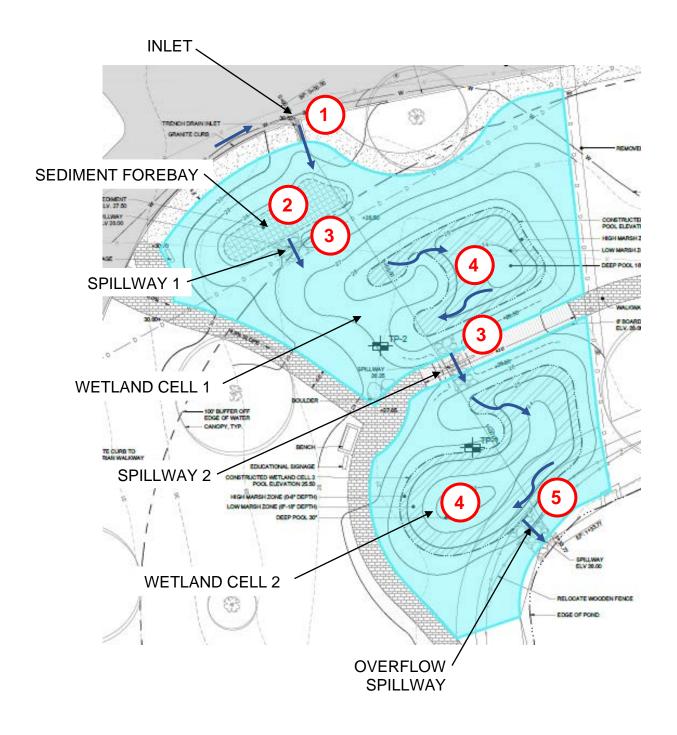
CONSTRUCTED WETLAND - MAINTENANCE CHECKLIST

Time:

Date:

Inspected by:				
Maintenance Item	ntenance Item Description			
or greater)	nes per years during regular park maintenance and after major storm e	events (2" of rain		
When: March, June, Septer				
Inlet	Remove all leaf litter and clogging. Check for evidence of frequent overflow or bypass of the inlet.			
Actions to be taken:				
2. CAPTURE (See also And Includes: Sediment Forebase Frequency: Inspect bi-annuevents (2" of rain or greater) When: March and November	ay ually and after major storm events the first year; then annually and afte)	er major storm		
Debris Cleanout	Remove all trash and debris from the inlet swale/forebay.			
Forebay Side Slopes	Signs of erosion gullies, animal burrowing, overtopping, or slumping are observed. Repair, as necessary.			
Sediment/Organic Debris Removal	Remove sediment accumulation and properly dispose when accumulation is greater than or equal to 3 inches or you cannot see stones. Maintain pervious paver bottom.			
Actions to be taken:				
3. MOVE				
Includes: Overflow Spillwa		•		
Sediment/Organic Debris Removal	Remove leaf litter, trash and debris from the surface.			
Erosion	Check for signs of bypassing, erosion or gullies in the spillway or along the sidewalls. Repair, as necessary.			

Maintenance Item	nce Item Description					
Actions to be taken:						
4. STORE AND FILTER	₹					
	nd 2 with shallow and deep pools					
Frequency: Inspect four time greater)	nes per year during regular maintenance and after major storm events	(2" of rain or				
When: March, June, Septer	mber, November					
Debris removal	Remove trash and debris from the wetland cells. Remove any fallen branches that prevent free flow water movement between cells.					
Erosion	Check for areas of erosion/ gullies, particularly along the side slopes. Repair/reseed/replant as necessary to maintain slope stabilization.					
Vegetation Maintenance	See Landscape Maintenance					
5. OVERFLOW						
Includes: Overflow Spillway Frequency: Inspect biannua When: March, November	/ (at edge of pond) ally and after major storm events (2" of rain or greater)					
Water Level	Water level should be below the spillway.					
Sediment/Organic Debris Removal	Remove leaf litter, trash and debris from the surface.					
Actions to be taken:						
Other Routine Grounds Includes: Surrounding land Frequency: Inspect four time		vents				
When: March, June, Septer						
Pavement Sweeping	Sweep parking lot minimum once a year after spring thaw.					
Debris Removal	Remove, leaf litter, trash and debris from the surrounding areas.					
Contributing drainage area	Look for sediment sources from erosion in the surrounding area.					
Drainage Network	Maintain the surrounding drainage network to prevent additional runoff being directed to the wetland.					
Pavement Sweeping						
Actions to be taken:						



4.0 LANDSCAPE MAINTENANCE

By design, plants in the GSI practices are meant to help filter the stormwater and flourish throughout the growing season. The plants do not require fertilizers, watering and/or mowing. Remove and replace vegetation as necessary, and maintain the landscape based upon the information provided in this Section.

LANDSCAPE MAINTENANCE SCHEDULE

Plants				
Task	Frequency	Requirement	Time of Year	
Watering	First three months after planting or drought	During establishment or drought conditions, plants should be watered a minimum of once every seven to ten days.	June-Sept.	
Plant Cutting & Pruning	Annually	 Leave dry standing stalks during the dormant months and remove in the spring. Cut back grasses, sedges, and rushes in the spring. Prune trees to remove deadwood and low hanging branches. 	Early Spring	
Mowing	Bi-annually	 Mow 4 times per year to 3" height Remove grass clippings	MayOctober	
Plant Thinning	Every 3- 5 years	Pruned and thin vegetation to maintain capacity and proper water flow.	• NA	
Plant Replacement	As necessary	If bare soil is visible within the forebay or wetland cells, plant/seed asap.	• NA	
Fertilizing	NOT REQUIRED	• NONE	• NA	
Mulch	NOT REQUIRED	• NONE	• NA	

To reduce the level of effort, regular weeding should occur quarterly from April thru October.

Weeds					
Task	Frequency	Requirement	Time of Year		
Weeding	Quarterly	 Weeding should be limited to invasive and exotic species, which can overwhelm the desired plant community. Non-chemical methods including hand pulling and hoeing are recommended. Chemical herbicides should be avoided. 	Early SpringLate SpringLate SummerLate Fall		

LANDSCAPE AREAS

The constructed wetland and surrounding landscaped area is designed to treat stormwater runoff and create a healthier pond buffer zone. Below is the areas requiring regular mowing and no mowing (Figure 3).

Lawn/Landscaping Maintenance

Lawn and landscaping maintenance should be conducted with minimal use of fertilizers and pesticides to protect the nearby wetland and water resources. In particular, phosphate-based fertilizers are not to be used. Prior to applying fertilizers to the lawn and landscape, a soil analysis should be completed

Leaves and grass clipping are a nutrient pollutant and high in phosphorus. Avoid blowing leaves and lawn clippings into the forebay and wetland cells.



Figure 2 (Revised May 2022)

MOWED AREAS

Landscape maintenance of mowed areas includes the following:

SEED

Loam and reseed bare spots with the specified seed mix as shown on the Planting Plan.

MOWING

Mowing can be done once a week with a mulching mower or every other week during summer months. DO NOT bag grass clippings and dispose on site. Maintain a cutting height of 2 ½" to 3 ½". Leave the grass taller during hot, summer months, and cut shorter during cooler periods of the growing season. Trim edges when necessary.

FERTILIZING

No fertilizing shall be used on the lawn area.

WEEDING

Weeding should be limited to invasive and exotic species. Non-chemical methods (hand pulling and hoeing) are required; chemical herbicides are not allowed.

Carefully remove and dispose off site all invasive species as to prevent colonization elsewhere, this includes disposal on land beyond the project area.

DEBRIS & TRASH

Remove and properly dispose litter from all lawn areas prior to mowing.

LOW MOW AREAS

Landscape maintenance of no mow areas includes the following:

SEED

Loam and reseed bare spots with the specified low mow seed mix as shown on the Planting Plan.

MOWING/WEED WHACKING

Mow the edge along the walkways a minimum of four times per year. The edge should be mowed or weed whacked no more than 4 times per growing season, 2 times is preferred. Do NOT cut area lower than 4". Depending on height of grasses and the time of year, grass cuttings/stalks may need to be raked and removed from site.

WATERING

Allowing the low mow areas to "brown" is desired. Water only during drought conditions or during reseeding establishment period.

FERTILIZING

No fertilizing shall be used.

WEEDING

Weeding should be limited to invasive and exotic species. Non-chemical methods (hand pulling and hoeing) are required; chemical herbicides should be avoided.

MONITORING

During the establishment period, walk the low mow areas monthly without the intent to mow, but to look for invasive species, bare spots and identify potential pest or disease problems. Carefully remove and dispose all invasive species as to prevent colonization elsewhere, this includes disposal on land beyond the project area.

DEBRIS & TRASH

Remove and properly dispose litter from all low mow areas prior to mowing.

NO MOW AREAS

Landscape maintenance of no mow areas includes the following:

SEED

Loam, reseed and plant bare spots with the specified species and seed mix as shown on the Planting Plan.

MOWING/WEED WHACKING

Do not mow or weed whack this area

WATERING

Water only during drought conditions or during reseeding / plant establishment period.

FERTILIZING

No fertilizing shall be used.

WEEDING

Weeding should be limited to invasive and exotic species. Non-chemical methods (hand pulling and hoeing) are required; chemical herbicides should be avoided.

MONITORING

During the establishment period, walk the no mow areas monthly to look for invasive species, bare spots and identify potential pest or disease problems. Carefully remove and dispose all invasive species as to prevent colonization elsewhere, this includes disposal on land beyond the project area.

DEBRIS & TRASH

Remove and properly dispose litter from all low mow areas prior to mowing.





Redroot Pigweed- (Amaranthus retroflexus)





Dandelion (Taraxacum officinale)





Fireweed (Erechtites hieracifolia)

Spotted Spurge (Euphorbia maculata)













Operation and Maintenance Plan Brooklawn Park Constructed Wetland Retrofit

5.0 ROUTINE MAINTENANCE

Other routine maintenance should include the following:

- Remove of trash and litter from paved and perimeter areas.
- Pavement Sweeping:
 - o Minimum of once per year after the spring thaw.
- Check for erosions problems and sediment source(s) along the GSI practice sidewalls if excessive, frequent sediment accumulation occurs in practice area.
- Check for erosions problems and sediment source(s) in the contributing drainage area if excessive, frequent sediment accumulation occurs at inlet flume of sediment forebay.
- Contributing drainage network
 - Inspect annually for proper operation to ensure excess stormwater is not being directed to the GSI retrofit.

6.0 SNOW REMOVAL

Snow removal from the practice is not necessary. Plowed or shoveled snow piles should not block the inlet to prevent proper drainage during the winter months.

Excessive salting or other de-icing practices should be avoided.

Use of large amounts of sand should also be avoided to avoid obstructing/clogging the conveyance system.

7.0 LONG -TERM POLLUTION PREVENTION PLAN

Long-term pollution prevention measures implemented throughout the t site will further reduce pollutants in stormwater discharges after construction.

Pet Waste Management

Park visitors are encouraged to pick up after their pets with signage along lawn areas. Should pet waste station be provided at Brooklawn Park.

Solid Waste Management

Proper trash receptacles should be provided on site and emptied on a regular basis.

Spill Prevention & Control Measures

To minimize the risk of spills or other accidental exposure of materials and substances to stormwater runoff, the following material management is to be used when working on site.

- Any materials stored within the contributing drainage area must be stored in a neat, orderly manner in their appropriate containers.
- Products will be kept in their original containers with the original manufacturer's label.
- Substances will not be mixed with one another unless recommended by the manufacturer.
- Manufacturers' recommendations for proper use and disposal will be followed.
- The contractor's supervisor will be issued this Guide to ensure proper use and disposal
 of materials.

Materials or substances listed below may be present on-site for maintenance and care should be taken to avoid spills:

Petroleum Based Products

The following product-specific measures will be followed on-site:

- <u>Petroleum Products</u> All on-site vehicles and equipment will be monitored for leaks and receive preventative maintenance to reduce the chance of leakage.
- <u>Grass Clipping, Leaf Litter and Plant Debris</u> are to be removed from the property and not disposed on site.

Personnel Training

All staff/ personnel responsible for maintaining the practices will be given a copy of this Guide and will receive training in the applicable practices and implementation described in herein

8.0 ESTIMATED OPERATION AND MAINTENANCE BUDGET

The estimated average annual operating and maintenance budget for the proposed system is shown below:

Constructed Wetland (1): Source:	\$ 1,000
Sediment Forebay (1): (3% of preliminary construction costs)	\$ 500
Catch Basins (2): Source: Massachusetts Highway Department (\$250/basin)	\$ 500
Other Routine Maintenance: Removal of trash and litter Pipe network/outlet inspections	\$ 500
Total:	\$ 2,500





DRIVABLE GRASS® PERMEABLE PAVING SYSTEM MAINTENANCE GUIDE

FOR GRASS INFILL APPLICATIONS

As for all grass paved areas, regular maintenance is required to minimize wear and tear and maximize successful results. The following maintenance and repair guidelines will enable your maintenance staff to achieve healthy and beautiful grass areas for years to come.

I. GENERAL MAINTENANCE

Drivable Grass® areas, with grass infill, require basically the same care as other grassed areas. The same attention must be paid to irrigating, mowing and fertilizing as to standard lawn/grass area. The more frequent traffic (pedestrian or vehicular), the more stress is placed on the turf; hence frequent and careful observation by maintenance staff is required to initiate immediate response to any potential problem areas.

II. TURF MAINTENACE

- A. **Irrigation:** Before installing **Drivable Grass®**, the best irrigation option needs to be chosen for the application. There are 2 main options:
 - 1. Sprinkler irrigation: this type needs to be placed below the road base, underneath the Drivable Grass mats. The Drivable Grass muffins can be easily cut or individually removed allowing for pop-up riser operation. This type in general uses more water, as a lot of the water evaporates. This type of system is more time consuming to replace when needed, as the Drivable Grass mats will need to be removed for access.
 - 2. Drip irrigation: the irrigation lines are installed after the **Drivable Grass®** mats are put in place. The lines fit in the groves of the **Drivable Grass®** mats. On average less water is used with this irrigation system. This type can also be used without wasteful spray damaging objects above ground. However, grass leaves do not get cleansed from water coming from above and needs temporary overspray to establish grass.

Regular irrigation is necessary in most geographical areas. Irrigation should be adjusted based on seasonal needs.

- **B.** Mowing: When the **Drivable Grass®** mats are properly infilled, the wheels of the lawn mower will ride on top of the surface while the grass is cut 1-3 inches above. Mov your Drivable Grass as you would your regular lawn, about once a week. A lawn mower with a grass catcher (bag) is recommended to reduce thatch.
- C. **Fertilization:** Treat all areas as needed, we recommend a minimum of two times per year to keep grass growing at a healthy pace. Do not use fertilizers with clay fillers, as they will clog. Instead use slow release fertilizers or liquid concentrates; consider compost tea.
 - 1. **Other chemicals:** Herbicides and insecticides should be applied only as needed in response to site specific needs / problem areas.



III. MAINTENANCE SOLUTIONS FOR POSSIBLE ISSUES WITH TURF

A. Thatch Removal:

- 1. Lawns can develop layers of thatch containing clippings, leaves, and other organic materials, which cause a loss of percolation. Once the layer of thatch is more than ½-inch thick, it needs to be addressed. This layer of thatch needs to be removed for the long-term health of the turf. Do a small test area to make sure you are not damaging the **Drivable Grass*** pavers when thatching.
- 2. There are two conventional methods for the removal of thatch:
 - Spring tines on rotary mower blades are best for buildup from clippings.
 - Sod cutter set to a shallow depth to skim tops just above the **Drivable Grass*** pavers. (best for air/waterborne soil deposits over the long term).
- 3. After thatching, fill any bear areas by infilling with bedding mix and broadcasting grass seed evenly over the **Drivable Grass**® mats. Lightly cover with a seed cover. The seed cover should be light and not contain small particles that mix into the infill. The seed cover will be sucked up by the lawnmower once the lawn is established. Keep the lawn moist as the seeds sprout and watered often so germinating seeds never dry out.

B. Drainage:

- 1. Regular inspections and maintenance of drainage systems for adjacent landscaping, walkways, and driveways should be performed. Drain inlets should be cleared of debris to maintain proper function.
- 2. Large volumes of water should not be discharged onto **Drivable Grass**® installation areas unless specifically designed to handle the flow. Concentrated drainages from roofs and gutter downspouts should be directed to appropriate drainage collection devices.
- 3. Ponded and oversaturated areas should be addressed. Additional corrective drains may be needed to remedy areas.

C. Snow Removal:

- 1. Snowplow equipment operators should be educated about the underlying surface before beginning snow removal as part of maintenance agreement. Snowplow equipment should be fitted with Teflon runners, which will help keep the snowplow blade from damaging the **Drivable Grass**.
- 2. For sites that will require the use of heavy-duty snowplowing machinery, install concrete curbs and/or strips as a level guide for the snowplow blade prior to installation of Drivable Grass® paving mats.

 Drivable Grass® should be depressed ¼" below the top of the curb/strip to protect the product from the snowplow blade.



3. Do not use deicing agents, such as rock salt, that are known to damage concrete.

D. Spills:

- Small Spills Naturally occurring microorganisms in turf can break down oil and "clean" spills before
 they infiltrate. Turf can accept oil drippings without harm to grass plants. Small amounts of diluted
 detergent (dishwashing concentrates) applied to minor spills will also help to reduce oil size
 particles, which helps with recovery time.
 - 2. Large Spills Large oil or antifreeze spills will effectively sterilize affected soils for years and prevent the growth of most vegetation. If needed, impacted bedding layer, base course, **Drivable Grass*** pavers, and grass should be replaced.

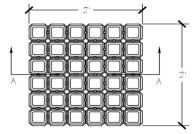
E. Replacement of **Drivable Grass**® mats:

In the event some (or all) Drivable Grass mats need to be replaced, follow these steps:

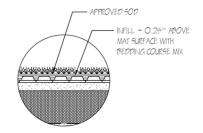
- Remove grass from the tops and between the joints of the damaged area until you can see the flanges of
 the pavers. Continue to remove grass until you can see the flange perimeter of the **Drivable Grass**°
 mat(s) you intend to replace. Line trimmers and/or hand tools are recommended for grass removal.
- 2. Pull **Drivable Grass*** mats upward to remove, separating the roots from the 2" bedding course below the pavers.
- 3. If old bedding is contaminated or pulls up with mats, add a new bedding course and use a handheld tamping tool to compact if needed.
- 4. Install the new **Drivable Grass** mat(s) and fill in joints with bedding course material. Whenever possible, replace full mats of **Drivable Grass**.
- 5. Broadcast grass seed evenly over the **Drivable Grass*** mats. Lightly cover with a seed cover. The seed cover should be light and not contain small particles that mix into the infill and can be sucked up by the lawnmower. Keep seeds moist as they sprout, often watering so germinating seeds never dry out.
- 6. Keep traffic off until grass is established.
- 7. Refer to general install details if needed.



PRODUCTS INC.

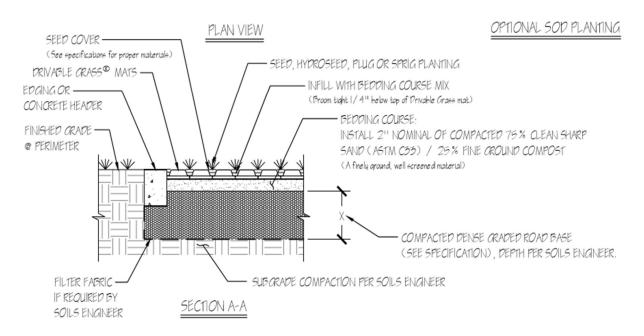






Exposed flanges of pavers





Soil Retention Products, Inc. • P: (800)346-7995 • www.soilretention.com

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IV. <u>ADDITIONAL INFORMATION</u>

- A. Please visit our website (<u>www.soilretention.com</u>) for additional information on **Drivable Grass***.
- B. Please contact our office with any questions or inquiries at info@soilretention.com or call at (800) 346-7995.