

STORMWATER MANAGEMENT FACILITY OPERATIONS & MAINTENANCE MANUAL

for

InSite Development Partners, LLC

**Proposed 4-Story Self Storage Facility
Block 119.00, Lot 1.01
US Route 22 & Wilson Avenue
Borough of North Plainfield
Somerset County, New Jersey**

Prepared by:



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APPENDIX

- Site Maps (with BMP's Identified)
 - Site Plan
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 - Drainage Plan
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 - Landscape Plan
 - Soil Erosion & Sediment Control Plan
- Maintenance Work Order & Checklist
- Maintenance Log
- Inspection Log
- Pervious Pavement System Guide Construction Specification

PART I: PROJECT DETAILS

A. Introduction and Description of Facilities:

The project area is comprised of Block 119.00, Lot 1.01 in the Borough of North Plainfield, Somerset County, New Jersey. The property is located at the corner of US Route 22 and Wilson Avenue. The project consists of constructing a 4-story Self-Storage Facility with a footprint of 29,779 SF and a gross floor area of 119,116 SF, with 12 parking stalls and drive-in overhead doors located around the building. Additional site improvements include grading, landscaping, lighting, and stormwater management facilities. The proposed stormwater management facilities include a pervious pavement system with underground storage that consists of 15" perforated PVC pipe and two (2) underground R-Tank basins.

The stormwater management facilities will contribute toward the safe conveyance, treatment and discharge of runoff generated by the proposed development. Every stormwater management system requires that basic periodic maintenance be performed in order to maintain the proper functioning and operation of the system. This report will outline these procedures, further discuss responsibilities and highlight those responsible for performing said maintenance. Maintenance logs can be found within the Appendix of this report.

This manual consists of three parts. The first part includes the introduction, project description and a list of project contacts. The second part provides the operation and maintenance instructions for the facilities and equipment. The third part (Appendix) provides information regarding the inspection and maintenance activities. **This manual shall run with the property and be recorded as part of the deed.**

B. Project Contacts:

The owner is responsible to maintain a detail log of all preventative and corrective maintenance for the constructed stormwater facilities incorporated into the design, including record of all inspections and copies of all maintenance-related work orders. The owner is also responsible for maintenance to evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and deed as needed. The owner should be responsible

for maintenance and shall retain a copy of this report should a public entity request this report or documentation of said maintenance in the future.

Applicant:

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Torrance, California 90502

Design Engineer:

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Dynamic Engineering Consultants, P.C.
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Party Responsible for Maintaining Stormwater Management Facility:

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Torrance, California 90502

As previously mentioned, this manual, including any future revisions, must be recorded upon the deed of record of the property.

C. Proposed Best Management Practices:

Pervious Pavement System

Stormwater runoff that is collected by the pervious pavement system is routed to a storage bed and underdrain where the stormwater runoff will be detained. The pervious pavement system has been utilized to incorporate low impact development strategies within the design as set forth by N.J.A.C 7:8, the New Jersey Soil Erosion and Sediment Control Standards and Borough of North Plainfield Land Use Ordinance. The pervious pavement system is ultimately tributary to the existing drainage facilities located within US Route 22. An illustration of the proposed devices has been provided in the appendix of this report.

R-Tank Storage bed(s)

The proposed R-Tank Storage Bed(s) has been designed to address the applicable aspects of N.J.A.C. 7:8 Stormwater Management, the New Jersey Soil Erosion and Sediment Control Standards and the Borough of North Plainfield Land Use Ordinance. Stormwater runoff from the roof areas and pervious pavement system will be directed to the basin via the proposed stormwater conveyance network. Runoff events will be released at a controlled rate through the proposed outlet structure to satisfy the N.J.A.C. 7:8 Stormwater Management runoff rate reduction requirements. Runoff that is released will be discharged at a controlled rate through an outlet control structure and is tributary to the existing drainage facilities located within US Route 22. An illustration of the proposed storage bed has been provided in the appendix of this report.

PART II: INSPECTION AND MAINTENANCE:

A. Routine Inspection and Maintenance of the Stormwater Management Facilities:

All stormwater management facilities have been designed to control stormwater and reduce flooding and degradation of water quality. Without proper routine inspection and maintenance, the facilities may lose some or all of their capability to function to their full capacity. Lack of adequate maintenance at these facilities could lead to system failures.

A consulting Professional Engineer should perform regularly scheduled maintenance inspections of the stormwater facilities at least four (4) times each year. The primary purpose of these inspections is to ascertain the operational condition and safety of the facilities, particularly the condition of the inlet/outlet structures, trash racks and other safety-related aspects. Inspections will also provide information on the effectiveness of regularly scheduled Preventative Maintenance Procedures, and will help to identify where changes in the extent and scheduling of the procedures are warranted. Finally, the facility inspections should also be used to determine the need for and timing of Corrective Maintenance procedures.

Routine maintenance is further broken down into two (2) categories: Preventative and Corrective. Listed below are the Preventative and Corrective Maintenance Procedures to be performed on a routine basis:

1. Preventive Maintenance Procedures:

The purpose of Preventative Maintenance is to maximize the effectiveness of the stormwater management aspects of the facilities so that they remain operational and safe as often as practicable, and to minimize the need for emergency or corrective maintenance. These procedures are as follows:

a) Removal and Disposal of Trash/Debris and Sediment:

All storm water management components expected to receive and/or trap debris and sediment must be inspected for clogging and excessive debris and sediment accumulation at least four times annually as well as after every storm exceeding one inch of rainfall. Such components may include the stormwater conveyance network (piping & inlet) flared end sections, rip rap, trash racks and outlet control structure.

These stormwater management components shall be visually inspected for the accumulation of excessive sediment as well as damage in the form of cracking, erosion and rutting. Sediment build up within the stormwater conveyance network shall be removed with the use of flushing. Sediment laden water is to be captured with the use of a pipe plug, or approved equal, prior to the stormwater conveyance network and simultaneously pumped out with the use of pump with sediment bag. Sediment should be disposed of in accordance with all applicable local, state and federal regulations.

Removal of trash and debris will prevent possible damage to trash racks and outlet structure openings and eliminate potential mosquito breeding habitats. Debris and trash must be properly hauled off the site and transferred to an approved disposal site.

b) Elimination of Potential Mosquito Breeding Habitats:

The most effective mosquito control program is one that eliminates potential breeding habitats. Almost any stagnant pool of water can be attractive to

mosquitoes, and may become the source of a large mosquito population. A maintenance program dedicated to eliminating potential breeding areas is preferable to chemical means of controlling mosquitoes. The most important maintenance functions, is removal of all obstructions to natural flow patterns before stagnant water conditions can develop.

c) Parking Lot Maintenance:

This management measure involves employing pavement cleaning practices, such as parking lot sweeping on a regular basis, to minimize pollutant export to the stormwater conveyance system. These cleaning practices are designed to remove sediment, debris, and other pollutants from access drive and parking lot surfaces that are a potential source of pollution impacting urban waterways. Mechanical machines that use vacuum assisted dry sweeping to remove particulate matter shall be utilized as these have the ability to remove finer sediment particles. Parking lots and access drives shall be swept/vacuumed at least once a month. The disposal of the swept material must be properly hauled off the site and transferred to an approved disposal site.

d) Pervious Pavement System Maintenance:

The primary goal of pervious pavement maintenance is to prevent the pavement surface and/or the underlying storage bed from being clogged with fine sediments. To keep the system clean throughout the year and prolong its lifespan, the pavement surface should be vacuum swept at least four times a year. All inlet structures within or draining to the storage beds should also be inspected on a biannual basis and after major storm events and cleaned of debris as necessary. An underdrain piping system has been proposed to convey overflow runoff from the stormwater runoff storage area pervious pavement system's surface course. Should the pervious pavement system's storage area not drain within 72 hours, the various system components and groundwater levels must be evaluated and appropriate measures taken to

comply with the maximum drain time requirements and maintain the proper functioning of the system.

Planted areas adjacent to pervious pavement should be well maintained to prevent soil washout onto the pavement. If any washout does occur it should be cleaned off the pavement immediately to prevent further clogging of the pores. Furthermore, if any bare spots or eroded areas are observed within the planted areas, they should be replanted and/or stabilized at once. Superficial dirt does not necessarily clog the paver voids. However, dirt that is ground in repeatedly by tires can lead to clogging. Therefore, trucks or other heavy vehicles should be prevented from tracking or spilling dirt onto the pavement. Furthermore, all construction or hazardous materials carriers should be prohibited from entering a pervious pavement lot.

Vacuuming

It is recommended to vacuum pervious pavement with a vacuum sweeper at least four times a year. This should be followed by a high pressure hosing. All dislodged sediment and other particulate matter must be removed and properly disposed. Acceptable types of vacuum sweepers include the Elgin Whirlwind and the Allianz Model 650. Though much less effective than “pure” vacuum sweepers, regenerative air sweepers, such as the Tymco Model 210, Schwarze 348, Victory, and others, are sometimes used. These units contain a blower system that generates a high velocity air column, which forces the air against the pavement at an angle, creating a 'peeling' or 'knifing' effect. The high volume air blast loosens the debris from the pavement surface, then transports it across the width of the sweeping head and lifts it into the containment hopper via a suction tube. Thus, sediment and debris are loosened from the pavement and sucked into the unit. (Note: simple broom sweepers are not recommended for pervious pavement maintenance.) If the pavement surface has become significantly clogged such that routine vacuum sweeping does not restore permeability, then a more intensive level of treatment may be required. Recent studies have revealed the usefulness of washing pervious pavement with clean, low pressure water,

followed by immediate vacuuming. Combinations of washing and vacuuming techniques have proved effective in cleaning both organic clogging as well as sandy clogging.

Maintenance crews are encouraged to determine the most effective strategy of cleaning their pervious pavement installations.

For smaller installations, such as sidewalks, plazas, or small parking lots, “walk behind” vacuum units may prove most effective. Though these units can be loud and somewhat messy to the operator due to the lack of dust suppression, they are also relatively easy to operate and inexpensive. Examples of acceptable “walk behind” units include the Billy Goat models, the 5700 industrial-strength Scrubber by Tennant, and the sidewalk class vacuum sweepers made by Nilfisk, Advance and Hako. If “walk behind” units are used, it is recommended that the scrub pressure be kept relatively low. The dirtiest areas may need to be power washed after scrubbing to get out the dirt that has been deeply ground in.

Winter Maintenance

Winter maintenance for a pervious pavement parking lot may be necessary, but is usually less intensive than that required for a standard asphalt lot. By its very nature, a pervious pavement system with subsurface aggregate bed has superior snow melting characteristics than standard pavement. Therefore, ice and light snow accumulation are generally not as problematic. However, snow will accumulate during heavier storms. Abrasives such as sand or cinders should not be applied on or adjacent to the pervious pavement. Snow plowing is necessary for significant snow accumulation, but should be done carefully (i.e. by setting the blade slightly higher than usual, about an inch). Standard road salt is acceptable for use as a deicer on pervious pavement, although a non-toxic, organic deicer applied either as a blended, magnesium chloride-based liquid product or as pretreated rock salt, is recommended. Acceptable liquid deicers include Magic-O, Ice B' Gone, Ice Ban, and Geomelt, etc. Magic Salt is an example of an acceptable pretreated salt product. Other acceptable deicer alternatives to standard sodium chloride

include calcium chloride, magnesium chloride, potassium chloride, urea, and calcium magnesium acetate. Follow supplier recommendations when applying deicers to pavement.

2. Corrective Maintenance Procedures:

a) Structural Repairs:

Structural damage to outlet and inlet structures, trash racks, access hatches, roadways and headwalls as a result of vandalism, flood events, settlement or other causes must be repaired promptly. The urgency of the repairs will depend upon the nature of the damage and its effects on the safety and operation of the facility. The analysis of structural damage and the design and performance of structural repairs should only be undertaken by the consulting Professional Engineer.

b) Snow and Ice Removal:

Accumulations of snow and ice can threaten the functioning of the inlets and outlets. Provision of the equipment, material and personnel to monitor and remove snow and ice from critical areas will assure the function of the facility during the winter months.

c) Pervious Pavement System Repair:

Potholes in the pervious pavement are extremely unlikely, though settling might occur if a soft spot in the subgrade is not removed during construction. Damaged pavers should be replaced. Under no circumstance is the pavement surface to ever be seal coated. Any required repair of drainage structures should be done promptly to ensure continued proper functioning of the system.

With minimal maintenance, pervious pavement systems can function effectively for well over 20 years. However, in the event that maintenance of

the pervious pavement system is neglected and it becomes clogged over time, the owner shall vacuum the lot until the original permeability is restored. (If the original permeability of the lot cannot be restored, the pavement should be removed and replaced with a new pavers.) Recent research has shown that one of the most effective ways of pervious pavement is applying a pressurized dose of a non-toxic detergent cleaning solution, allowing adequate soak time, and then vacuuming with a high performance unit (Elgin Whirlwind and the Allianz Model 650). Once again, it is important to note that high pressure washing may drive contaminants further into the pervious surface and even into the underlying aggregate. It is therefore recommended that, prior to vacuum sweeping, a low performance pressure washer is used to get the solution to break the surface tension and reach into the pores.

3. Recording and Logging of all Maintenance Activities:

The recording of all maintenance work and inspections provide valuable data on the facility's condition. Review of this information will also help to establish more efficient and beneficial maintenance procedures and practices. All recorded information should be directed to the owners of the basins for review and subsequent follow-up on recommendations. Data obtained from informal inspections should be retained; however, this data does not have to be submitted to NJDEP. A copy of all records and logs of maintenance activities shall be submitted to the Borough Engineer annually for review.

4. Summary of Maintenance Procedures:

Preventative Maintenance

- a) Removal and Disposal of Trash/Debris and Sediment
- b) Elimination of Potential Mosquito Breeding Habitats
- c) Parking Lot Maintenance
- d) Pervious Pavement System Maintenance

Corrective Maintenance

- a) Structural Repairs
- b) Snow and Ice Removal
- c) Pervious Pavement System Repair

B. Maintenance Equipment and Materials

1. Grass Maintenance Equipment

- a) Riding Mowers
- b) Hand Mowers
- c) Gas Powered Trimmers
- d) Gas Powered Edgers
- e) Seed Spreaders
- f) Fertilizer Spreaders
- g) De-Thatching Equipment
- h) Pesticide and Herbicide Application Equipment
- i) Grass Clipping and Leaf Collection Equipment

2. Transportation Equipment

- a) Trucks for Transportation of Materials
- b) Trucks for Transportation of Equipment
- c) Vehicles for Transportation of Personnel

3. Debris, Trash and Sediment Removal Equipment

- a) Backhoe
- b) Portable Pump for dewatering with sediment bag

4. Miscellaneous Equipment

- a) Shovels
- b) Rakers
- c) Picks
- d) Wheel Barrows
- e) Gloves
- f) Brooms

5. Standard Mechanics Tools

6. Tools for Maintenance of Equipment

7. Materials

- a) Topsoil
- b) Fill
- c) Seed
- d) Soil Amenities (Fertilizer, Lime, etc.)
- e) Chemicals (Pesticides, Herbicides, etc.)
- f) Mulch
- g) Spare Parts for Equipment

9. Parking Maintenance Equipment

- a) Sweeping/Vacuuming Equipment
- b) Snow Plowing Equipment
- c) Snow Shovels

C. Checklists and Logs

The Appendix of this report contains sample checklists and logs regarding various aspects of the pavement maintenance and inspection. A brief description of the use of each form is listed below:

1. “Maintenance Work Order and Checklist” – a comprehensive form outlining both required and completed maintenance work.
2. “Maintenance Log” – a summary table for recording of all maintenance work at the site.
3. “Inspection Log” – a summary table for recording the results of all inspection of the stormwater conveyance network.

D. Estimated Maintenance Costs and Tasks

The following is a summary of the required maintenance tasks and associated costs in written and tabular form:

- Inspections to be performed by a consulting engineer on an annual basis. - **\$1,500.00.**
- Inspections to be performed by the property owner and/or a maintenance designee on a monthly basis and/or after a storm event exceeding 1 inch of rainfall– **Minimal cost associated – Owners responsibility - \$500.00.**
- Stormwater conveyance system outlet control structure access for debris removal to be performed on an annual basis and/or as inspection routine dictates - **\$2,000.00.**
- Surface debris removal including garbage and organic matter to be performed in conjunction with lawn and grounds maintenance, includes leave removal in the Fall and removal of excessive amounts of snow, if necessary, in the Winter. These tasks are encouraged as necessary to maintain safe operating conditions (twice a month from Spring through Winter recommended or on as needed basis) - **\$1,000.00.**

Maintenance Schedule Summary

Task Identification	Task Frequency	Task Estimated Cost
Inspection by licensed professional consulting engineer	Once (1) per year	\$1,500.00
Inspection by property owner and/or maintenance designee	Once (1) per month (or after a storm event exceeding 1 inch of rainfall)	\$500.00
Debris removal from stormwater conveyance system (inlets, pipes, manholes, flared end sections, and outlet control structure)	Once (1) per year	\$2,000.00
Surface debris removal (garbage & organic matter) including leaves in the Fall and snow in the Winter	Twice (2) per month (or on needed basis)	\$1,000.00

APPENDIX

**SITE MAPS
(WITH BMP'S IDENTIFIED)**

GENERAL NOTES

1. THE PLAN AND SECTION SHOWN ARE BASED ON THE FOLLOWING:
2. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.
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NO.	DESCRIPTION	DATE	BY	CHECKED
1	PREPARED	10/15/10	J.M.	J.M.
2	REVISED	10/15/10	J.M.	J.M.
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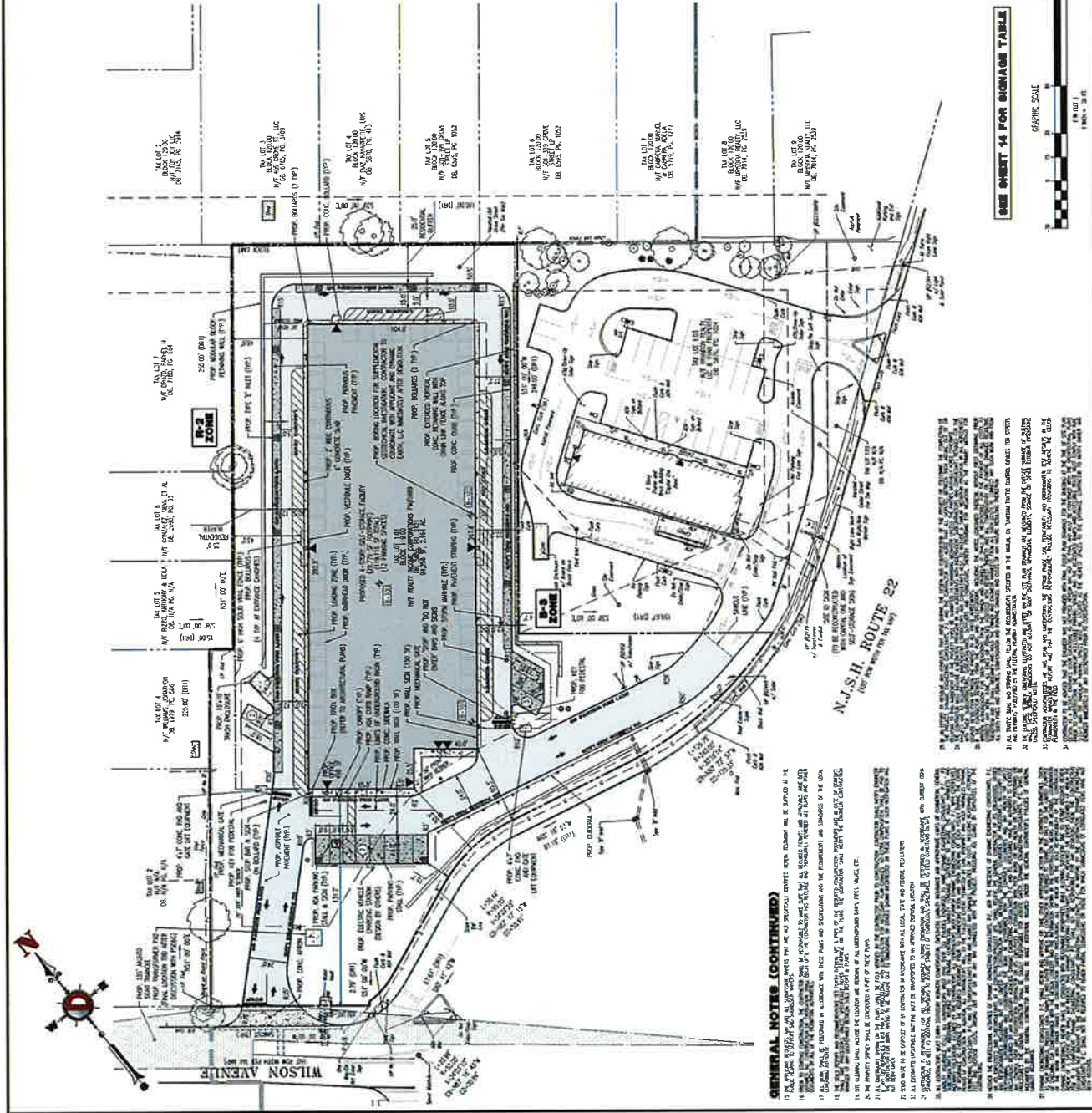
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GRAPHIC SCALE
 1" = 100'-0"

SHEET 44 FOR SUBMITTAL TABLE

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SITE PLAN
 PROJECT: INSITE DEVELOPMENT PARTNERS, LLC
 1000 W. 10TH AVENUE, SUITE 100
 DENVER, CO 80202
 SHEET NO. 44 OF 50
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GENERAL NOTES (CONTINUED)

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82. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.

83. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.

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96. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.

97. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.

98. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.

99. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.

100. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.

EXISTING UTILITY NOTES

1. ALL EXISTING UTILITIES SHOWN ON THIS PLAN ARE BASED ON RECORD DRAWINGS AND FIELD SURVEY. THE LOCATION AND DEPTH OF UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
2. ALL UTILITIES SHALL BE PROTECTED AND MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD. ANY DAMAGE TO UTILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES.
4. ALL UTILITIES SHALL BE DEEPENED TO A MINIMUM OF 1.00 FT. FROM THE EXISTING GRADE SURFACE.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION AND MAINTENANCE OF ALL EXISTING UTILITIES AND STRUCTURES.

UTILITY PLAN

1. ALL UTILITIES SHALL BE PROTECTED AND MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD. ANY DAMAGE TO UTILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
2. ALL UTILITIES SHALL BE DEEPENED TO A MINIMUM OF 1.00 FT. FROM THE EXISTING GRADE SURFACE.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION AND MAINTENANCE OF ALL EXISTING UTILITIES AND STRUCTURES.
4. ALL UTILITIES SHALL BE PROTECTED AND MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD. ANY DAMAGE TO UTILITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
5. ALL UTILITIES SHALL BE DEEPENED TO A MINIMUM OF 1.00 FT. FROM THE EXISTING GRADE SURFACE.



GRADING/UTILITY GRAPHIC LEGEND

SYMBOL	DESCRIPTION
(Symbol)	EXISTING GRADE
(Symbol)	PROPOSED GRADE
(Symbol)	EXISTING UTILITY
(Symbol)	PROPOSED UTILITY
(Symbol)	EXISTING STRUCTURE
(Symbol)	PROPOSED STRUCTURE
(Symbol)	EXISTING DRIVEWAY
(Symbol)	PROPOSED DRIVEWAY
(Symbol)	EXISTING SIDEWALK
(Symbol)	PROPOSED SIDEWALK
(Symbol)	EXISTING PAVEMENT
(Symbol)	PROPOSED PAVEMENT
(Symbol)	EXISTING CURB
(Symbol)	PROPOSED CURB
(Symbol)	EXISTING LANDSCAPE
(Symbol)	PROPOSED LANDSCAPE
(Symbol)	EXISTING TREES
(Symbol)	PROPOSED TREES
(Symbol)	EXISTING FENCES
(Symbol)	PROPOSED FENCES
(Symbol)	EXISTING SIGNAGE
(Symbol)	PROPOSED SIGNAGE
(Symbol)	EXISTING LIGHTING
(Symbol)	PROPOSED LIGHTING
(Symbol)	EXISTING SECURITY
(Symbol)	PROPOSED SECURITY
(Symbol)	EXISTING ACCESS
(Symbol)	PROPOSED ACCESS
(Symbol)	EXISTING EGRESS
(Symbol)	PROPOSED EGRESS
(Symbol)	EXISTING ESCAPE
(Symbol)	PROPOSED ESCAPE
(Symbol)	EXISTING EXIT
(Symbol)	PROPOSED EXIT
(Symbol)	EXISTING ENTRANCE
(Symbol)	PROPOSED ENTRANCE
(Symbol)	EXISTING PORCH
(Symbol)	PROPOSED PORCH
(Symbol)	EXISTING PATIO
(Symbol)	PROPOSED PATIO
(Symbol)	EXISTING DECK
(Symbol)	PROPOSED DECK
(Symbol)	EXISTING BALCONY
(Symbol)	PROPOSED BALCONY
(Symbol)	EXISTING TERRACE
(Symbol)	PROPOSED TERRACE
(Symbol)	EXISTING STAIRS
(Symbol)	PROPOSED STAIRS
(Symbol)	EXISTING RAMP
(Symbol)	PROPOSED RAMP
(Symbol)	EXISTING ELEVATOR
(Symbol)	PROPOSED ELEVATOR
(Symbol)	EXISTING ESCALATOR
(Symbol)	PROPOSED ESCALATOR
(Symbol)	EXISTING MECHANICAL
(Symbol)	PROPOSED MECHANICAL
(Symbol)	EXISTING ELECTRICAL
(Symbol)	PROPOSED ELECTRICAL
(Symbol)	EXISTING TELEPHONE
(Symbol)	PROPOSED TELEPHONE
(Symbol)	EXISTING CABLE
(Symbol)	PROPOSED CABLE
(Symbol)	EXISTING SATELLITE
(Symbol)	PROPOSED SATELLITE
(Symbol)	EXISTING ANTENNA
(Symbol)	PROPOSED ANTENNA
(Symbol)	EXISTING SIGN
(Symbol)	PROPOSED SIGN
(Symbol)	EXISTING LIGHT
(Symbol)	PROPOSED LIGHT
(Symbol)	EXISTING CAMERA
(Symbol)	PROPOSED CAMERA
(Symbol)	EXISTING SENSOR
(Symbol)	PROPOSED SENSOR
(Symbol)	EXISTING ACTUATOR
(Symbol)	PROPOSED ACTUATOR
(Symbol)	EXISTING RELAY
(Symbol)	PROPOSED RELAY
(Symbol)	EXISTING TRANSFORMER
(Symbol)	PROPOSED TRANSFORMER
(Symbol)	EXISTING GENERATOR
(Symbol)	PROPOSED GENERATOR
(Symbol)	EXISTING STORAGE
(Symbol)	PROPOSED STORAGE
(Symbol)	EXISTING EQUIPMENT
(Symbol)	PROPOSED EQUIPMENT
(Symbol)	EXISTING STRUCTURE
(Symbol)	PROPOSED STRUCTURE
(Symbol)	EXISTING UTILITY
(Symbol)	PROPOSED UTILITY
(Symbol)	EXISTING GRADE
(Symbol)	PROPOSED GRADE
(Symbol)	EXISTING DRIVEWAY
(Symbol)	PROPOSED DRIVEWAY
(Symbol)	EXISTING SIDEWALK
(Symbol)	PROPOSED SIDEWALK
(Symbol)	EXISTING PAVEMENT
(Symbol)	PROPOSED PAVEMENT
(Symbol)	EXISTING CURB
(Symbol)	PROPOSED CURB
(Symbol)	EXISTING LANDSCAPE
(Symbol)	PROPOSED LANDSCAPE
(Symbol)	EXISTING TREES
(Symbol)	PROPOSED TREES
(Symbol)	EXISTING FENCES
(Symbol)	PROPOSED FENCES
(Symbol)	EXISTING SIGNAGE
(Symbol)	PROPOSED SIGNAGE
(Symbol)	EXISTING LIGHTING
(Symbol)	PROPOSED LIGHTING
(Symbol)	EXISTING SECURITY
(Symbol)	PROPOSED SECURITY
(Symbol)	EXISTING ACCESS
(Symbol)	PROPOSED ACCESS
(Symbol)	EXISTING EGRESS
(Symbol)	PROPOSED EGRESS
(Symbol)	EXISTING ESCAPE
(Symbol)	PROPOSED ESCAPE
(Symbol)	EXISTING EXIT
(Symbol)	PROPOSED EXIT
(Symbol)	EXISTING ENTRANCE
(Symbol)	PROPOSED ENTRANCE
(Symbol)	EXISTING PORCH
(Symbol)	PROPOSED PORCH
(Symbol)	EXISTING PATIO
(Symbol)	PROPOSED PATIO
(Symbol)	EXISTING DECK
(Symbol)	PROPOSED DECK
(Symbol)	EXISTING BALCONY
(Symbol)	PROPOSED BALCONY
(Symbol)	EXISTING TERRACE
(Symbol)	PROPOSED TERRACE
(Symbol)	EXISTING STAIRS
(Symbol)	PROPOSED STAIRS
(Symbol)	EXISTING RAMP
(Symbol)	PROPOSED RAMP
(Symbol)	EXISTING ELEVATOR
(Symbol)	PROPOSED ELEVATOR
(Symbol)	EXISTING ESCALATOR
(Symbol)	PROPOSED ESCALATOR
(Symbol)	EXISTING MECHANICAL
(Symbol)	PROPOSED MECHANICAL
(Symbol)	EXISTING ELECTRICAL
(Symbol)	PROPOSED ELECTRICAL
(Symbol)	EXISTING TELEPHONE
(Symbol)	PROPOSED TELEPHONE
(Symbol)	EXISTING CABLE
(Symbol)	PROPOSED CABLE
(Symbol)	EXISTING SATELLITE
(Symbol)	PROPOSED SATELLITE
(Symbol)	EXISTING ANTENNA
(Symbol)	PROPOSED ANTENNA
(Symbol)	EXISTING SIGN
(Symbol)	PROPOSED SIGN
(Symbol)	EXISTING LIGHT
(Symbol)	PROPOSED LIGHT
(Symbol)	EXISTING CAMERA
(Symbol)	PROPOSED CAMERA
(Symbol)	EXISTING SENSOR
(Symbol)	PROPOSED SENSOR
(Symbol)	EXISTING ACTUATOR
(Symbol)	PROPOSED ACTUATOR
(Symbol)	EXISTING RELAY
(Symbol)	PROPOSED RELAY
(Symbol)	EXISTING TRANSFORMER
(Symbol)	PROPOSED TRANSFORMER
(Symbol)	EXISTING GENERATOR
(Symbol)	PROPOSED GENERATOR
(Symbol)	EXISTING STORAGE
(Symbol)	PROPOSED STORAGE
(Symbol)	EXISTING EQUIPMENT
(Symbol)	PROPOSED EQUIPMENT

UTILITY PLAN

DYNAMIC ENGINEERING
 1000 ROUTE 22 EAST, SUITE 100, HUNTSVILLE, AL 35894
 TEL: 256-883-1111 FAX: 256-883-1112
 WWW.DYNAMICENGINEERING.COM

UTILITY PLAN
 PROJECT: INSIDE DEVELOPMENT PARTNERS, LLC
 1000 ROUTE 22 EAST, SUITE 100, HUNTSVILLE, AL 35894
 DRAWN BY: J.M. MILLER
 CHECKED BY: J.M. MILLER
 DATE: 08/17/2011
 SHEET NO. 7 OF 20

THOMAS J. MILLER
 JOHN A. PALUS
 PROFESSIONAL ENGINEER
 LICENSE NO. 10000
 REGISTERED PROFESSIONAL ENGINEER
 LICENSE NO. 10000

THIS PLAN IS TO BE UTILIZED FOR LANDSCAPE PURPOSES ONLY

PLANTING NOTES

1. ALL PLANTINGS SHALL BE INSTALLED ACCORDING TO THE PLANTING SPECIFICATIONS AND LANDSCAPE SCHEDULE. UNLESS OTHERWISE SHOWN, ALL PLANTINGS SHALL BE INSTALLED IN THE MANNER SHOWN ON THIS PLAN. UNLESS OTHERWISE SHOWN, ALL PLANTINGS SHALL BE INSTALLED IN THE MANNER SHOWN ON THIS PLAN.

2. ALL PLANTINGS SHALL BE INSTALLED ACCORDING TO THE PLANTING SPECIFICATIONS AND LANDSCAPE SCHEDULE. UNLESS OTHERWISE SHOWN, ALL PLANTINGS SHALL BE INSTALLED IN THE MANNER SHOWN ON THIS PLAN. UNLESS OTHERWISE SHOWN, ALL PLANTINGS SHALL BE INSTALLED IN THE MANNER SHOWN ON THIS PLAN.

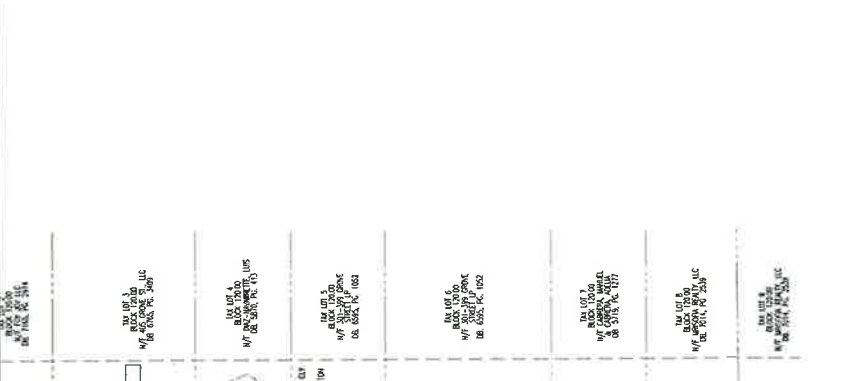
PLANTING SPECIFICATIONS

1. ALL PLANTINGS SHALL BE INSTALLED ACCORDING TO THE PLANTING SPECIFICATIONS AND LANDSCAPE SCHEDULE. UNLESS OTHERWISE SHOWN, ALL PLANTINGS SHALL BE INSTALLED IN THE MANNER SHOWN ON THIS PLAN. UNLESS OTHERWISE SHOWN, ALL PLANTINGS SHALL BE INSTALLED IN THE MANNER SHOWN ON THIS PLAN.

2. ALL PLANTINGS SHALL BE INSTALLED ACCORDING TO THE PLANTING SPECIFICATIONS AND LANDSCAPE SCHEDULE. UNLESS OTHERWISE SHOWN, ALL PLANTINGS SHALL BE INSTALLED IN THE MANNER SHOWN ON THIS PLAN. UNLESS OTHERWISE SHOWN, ALL PLANTINGS SHALL BE INSTALLED IN THE MANNER SHOWN ON THIS PLAN.

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NO.	PLANT	SIZE	QUANTITY
1	DOGWOOD	4-7"	10
2	HYDRANGEA	4-7"	10
3	SPRING BURNING BUSH	4-7"	10
4	REDBUD	4-7"	10
5	DOGWOOD	4-7"	10
6	HYDRANGEA	4-7"	10
7	SPRING BURNING BUSH	4-7"	10
8	REDBUD	4-7"	10
9	DOGWOOD	4-7"	10
10	HYDRANGEA	4-7"	10
11	SPRING BURNING BUSH	4-7"	10
12	REDBUD	4-7"	10



DYNAMIC ENGINEERING

LANDSCAPE PLAN

PROJECT: INSITE DEVELOPMENT PARTNERS, LLC

DATE: 07/27/22

SCALE: 1" = 4'-0"

PROJECT NO: 22-10000

8

THOMAS J. MILLER
REGISTERED PROFESSIONAL ENGINEER

JOHN A. PALUS
REGISTERED PROFESSIONAL ENGINEER

EX. TREES WITHIN LIMITS OF SIGHT TRIANGLES TO BE LIMBED TO 7' ABOVE GRADE TO MAINTAIN CLEAR SIGHT DISTANCES

NO.	PLANT	SIZE	QUANTITY
1	DOGWOOD	4-7"	10
2	HYDRANGEA	4-7"	10
3	SPRING BURNING BUSH	4-7"	10
4	REDBUD	4-7"	10
5	DOGWOOD	4-7"	10
6	HYDRANGEA	4-7"	10
7	SPRING BURNING BUSH	4-7"	10
8	REDBUD	4-7"	10
9	DOGWOOD	4-7"	10
10	HYDRANGEA	4-7"	10
11	SPRING BURNING BUSH	4-7"	10
12	REDBUD	4-7"	10

Borough Landscaping Requirements

1. ALL PLANTINGS SHALL BE INSTALLED ACCORDING TO THE PLANTING SPECIFICATIONS AND LANDSCAPE SCHEDULE. UNLESS OTHERWISE SHOWN, ALL PLANTINGS SHALL BE INSTALLED IN THE MANNER SHOWN ON THIS PLAN. UNLESS OTHERWISE SHOWN, ALL PLANTINGS SHALL BE INSTALLED IN THE MANNER SHOWN ON THIS PLAN.

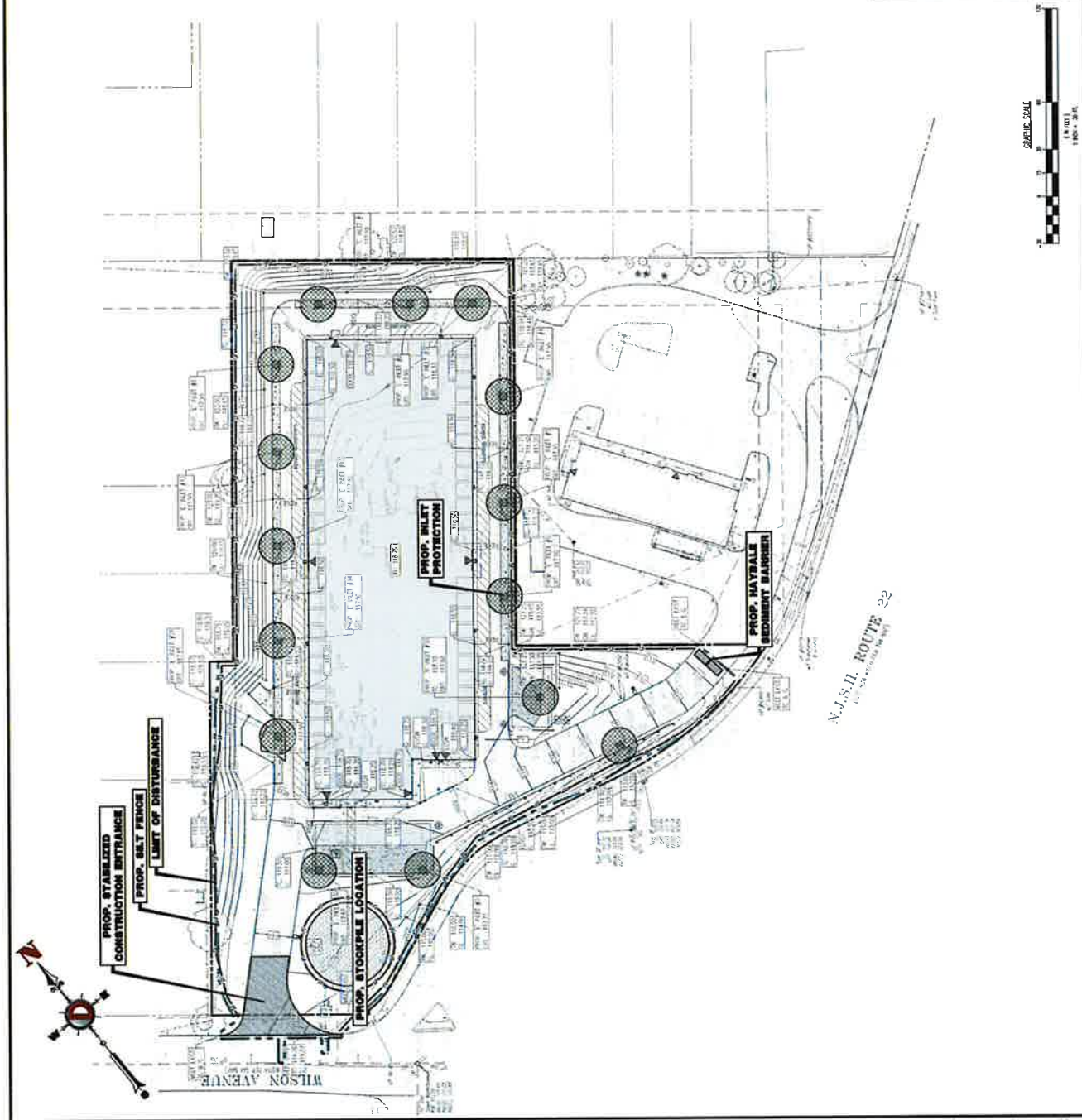
Tree Replacement Requirements

1. ALL PLANTINGS SHALL BE INSTALLED ACCORDING TO THE PLANTING SPECIFICATIONS AND LANDSCAPE SCHEDULE. UNLESS OTHERWISE SHOWN, ALL PLANTINGS SHALL BE INSTALLED IN THE MANNER SHOWN ON THIS PLAN. UNLESS OTHERWISE SHOWN, ALL PLANTINGS SHALL BE INSTALLED IN THE MANNER SHOWN ON THIS PLAN.

NE PROPERTY LOCATIONS

NO.	PROPERTY	ADDRESS
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5

THIS PLAN TO BE UTILIZED FOR SOIL EROSION & SEDIMENT CONTROL PURPOSES ONLY



AS DETERMINED BY THE STATE POLICY MAP, THE PROJECT AREA FALLS WITHIN THE METROPOLITAN PLANNING AREA (PA) AND IS CONSIDERED PREVIOUSLY DEVELOPED UNDER EXISTING COMPACTION REQUIREMENTS. THE DISTURBANCE SHALL BE LIMITED TO THE SOIL COMPACTION REQUIREMENTS.

THE SITE SHALL BE FENCED DURING CONSTRUCTION IN A MANNER TO PROTECT AGAINST PUBLIC ENTRY ON THE PROPERTY.



LIMIT OF DISTURBANCE = 89,796.5 SF. (2.19 AC.)

THIS PLAN SET OR ANY INSTRUMENT THEREON SHALL BE VOID WITHOUT THE SIGNATURE OF THE ENGINEER.

DYNAMIC ENGINEERING
 1000 ROUTE 22, SUITE 100, WILSON, NJ 07097
 TEL: 908-687-1111 FAX: 908-687-1112
 WWW.DYNAMICENGINEERING.COM

SOIL EROSION & SEDIMENT CONTROL PLAN

PROJECT: INSITE DEVELOPMENT PARTNERS, LLC
 PROJECT NO.: 2011-03-010
 DATE: 03/27/2012
 DRAWN BY: JAC
 CHECKED BY: JAC
 SCALE: AS SHOWN

THOMAS J. MILLER
 PROFESSIONAL ENGINEER
 NO. 34927 (04/01/08) EX. 10/11

JOHN A. PALUS
 PROFESSIONAL ENGINEER
 NO. 34927 (04/01/08) EX. 10/11

DATE: 03/27/2012
 SHEET NO. 10 OF 24



N.J.S.I. ROUTE 22
 100-20 WILSON ROAD

MAINTENANCE WORK ORDER & CHECKLIST

**MAINTENANCE WORK ORDER AND CHECKLIST
FOR STORMWATER MANAGEMENT FACILITIES**

NAME OF FACILITY: _____
 LOCATION: _____ DATE: _____
 WEATHER: _____ WORK STARTED: _____
 MAINTENANCE PERFORMED BY: _____ WORK COMPLETED: _____

A. PREVENTATIVE MAINTENANCE			
WORK ITEMS	ITEMS REQUIRED	ITEMS DONE	COMMENTS AND SPECIAL INSTRUCTIONS
1. GRASS CUTTING			
A. BOTTOMS			
B. EMBANKMENTS AND SIDE SLOPES			
C. PERIMETER AREAS			
D. ACCESS AREAS AND ROADS			
E. OTHERS			
2. GRASS MAINTENANCE			
A. FERTILIZING			
B. RE-SEEDING			
C. DE-THATCHING			
D. PEST CONTROL			
E. OTHERS			
3. VEGETATIVE COVER			
A. FERTILIZING			
B. PRUNING			
C. PEST CONTROL			
D. POISONOUS PLANTS			
E. OTHERS			
4. TRASH AND DEBRIS REMOVAL			
A. BOTTOMS			
B. EMBANKMENTS AND SIDE SLOPES			
C. PERIMETER AREAS			
D. ACCESS AREAS AND ROADS			
E. INLETS			
F. OUTLETS AND TRASH RACKS			
G. OTHERS			
5. SEDIMENT REMOVAL			
A. INLETS			
B. OUTLETS AND TRASH RACKS			
C. LOW FLOW CHANNELS			
D. BOTTOMS			
E. OTHERS			
6. PEST CONTROL			
A. GEESE			
B. MOSQUITO BREEDING			
C. RODENTS / RODENT HOLES			
D. OTHERS			
7. STRUCTURAL REPAIRS			
A. VALVES			
B. SLUICE GATES			
C. PUMPS			
D. FENCE GATES			
E. LOCKS			
F. ACCESS HATCHES			
G. OTHER:			
8. POND MAINTENANCE			
A. AERATION EQUIPMENT			
B. DEBRIS AND TRASH REMOVAL			
C. WEED REMOVAL			
D. OTHER:			
9. OTHER PREVENTIVE MAINTENANCE			
A. PARKING LOT SWEEPING			
B. EMPTYING TRASH RECEPTACLES			
C. PUMPS AND VALVES			
D. ELECTRICAL PANEL AND WIRING			
E. DEWATERING			
F. GRAFFITI REMOVAL			
E. OTHER:			

B. CORRECTIVE MAINTENANCE			
WORK ITEMS	ITEMS REQUIRED	ITEMS DONE	COMMENTS AND SPECIAL INSTRUCTIONS
1. REMOVAL OF DEBRIS AND SEDIMENT			
2. STRUCTURAL REPAIRS			
3. EMBANKMENTS AND SIDE SLOPES			
4. DEWATERING			
5. BASIN MAINTENANCE			
6. CONTROL OF MOSQUITOES			
7. EROSION REPAIR			
8. FENCE REPAIR			
9. SNOW AND ICE REMOVAL			
10. SAND LAYER REPLACEMENT			
11. OTHER			

C. AESTHETIC MAINTENANCE			
WORK ITEMS	ITEMS REQUIRED	ITEMS DONE	COMMENTS AND SPECIAL INSTRUCTIONS
1. GRAFFITI REMOVAL			
2. GRASS TRIMMING			
3. WEEDING			
4. OTHERS			

GENERAL NOTES AND REMARKS:

WORK ORDER PREPARED BY: _____

WORK COMPLETED BY: _____

MAINTENANCE LOG

**MAINTENANCE LOG
FOR STORMWATER MANAGEMENT FACILITIES**

NAME OF FACILITY: _____ DATE: _____
 LOCATION: _____ WORK STARTED: _____
 WEATHER: _____ WORK COMPLETED: _____
 MAINTENANCE PERFORMED BY: _____

A. PREVENTATIVE MAINTENANCE					
WORK ITEMS	ITEMS REQUIRED	DATE REQUIRED	ITEMS DONE	DATE DONE	COMMENTS AND SPECIAL INSTRUCTIONS
1. GRASS CUTTING					
A. BOTTOMS					
B. EMBANKMENTS AND SIDE SLOPES					
C. PERIMETER AREAS					
D. ACCESS AREAS AND ROADS					
E. OTHERS					
2. GRASS MAINTENANCE					
A. FERTILIZING					
B. RE-SEEDING					
C. DE-THATCHING					
D. PEST CONTROL					
E. OTHERS					
3. VEGETATIVE COVER					
A. FERTILIZING					
B. PRUNING					
C. PEST CONTROL					
D. POISONOUS PLANTS					
E. OTHERS					
4. TRASH AND DEBRIS REMOVAL					
A. BOTTOMS					
B. EMBANKMENTS AND SIDE SLOPES					
C. PERIMETER AREAS					
D. ACCESS AREAS AND ROADS					
E. INLETS					
F. OUTLETS AND TRASH RACKS					
G. OTHERS					
5. SEDIMENT REMOVAL					
A. INLETS					
B. OUTLETS AND TRASH RACKS					
C. LOW FLOW CHANNELS					
D. BOTTOMS					
E. OTHERS					
6. PEST CONTROL					
A. GEESE					
B. MOSQUITO BREEDING					
C. RODENTS / RODENT HOLES					
D. OTHERS					
7. STRUCTURAL REPAIRS					
A. PIPES					
B. FLARED END SECTIONS					
C. INLETS					
D. MANHOLES					
E. OUTLET CONTROL STRUCTURES					
F. LOW FLOW CHANNELS					
G. RIP-RAP					
H. EMERGENCY SPILLWAY					
I. ACCESS AREA / ROADS					
J. FENCE					
K. TRASH RACKS					
L. OTHERS					

8. BASIN REPAIR					
A. EROSION					
B. SAND LAYER REPLACEMENT					
C. HARMFUL POLLUTANT REMOVAL					
D. BASIN LAYER					
E. SNOW / ICE REMOVAL					
F. OTHERS					
9. UNDERGROUND BASIN MAINTENANCE					
A. BOTTOMS					
B. OUTLETS AND TRASH RACKS					
C. ACCESS HATCHES					
D. OTHERS					
10. INFILTRATION BASIN MAINTENANCE					
A. TILING BOTTOM					
11. POND MAINTENANCE					
A. AERATION EQUIPMENT					
B. DEBRIS AND TRASH REMOVAL					
C. WEED REMOVAL					
D. PERMANENT POOL LEVEL					
E. OTHERS					
11. OTHER PREVENTIVE MAINTENANCE					
A. PARKING LOT SWEEPING					
B. EMPTYING TRASH RECEPTACLES					
C. PUMPS AND VALVES					
D. ELECTRICAL PANEL AND WIRING					
E. DEWATERING					
F. GRAFFITI REMOVAL					
E. OTHERS					

B. CORRECTIVE MAINTENANCE					
WORK ITEMS	ITEMS REQUIRED	DATE REQUIRED	ITEMS DONE	DATE DONE	COMMENTS AND SPECIAL INSTRUCTIONS
1. REMOVAL OF DEBRIS AND SEDIMENT					
2. STRUCTURAL REPAIRS					
3. EMBANKMENTS AND SIDE SLOPES					
4. DEWATERING					
5. BASIN MAINTENANCE					
6. CONTROL OF MOSQUITOES					
7. EROSION REPAIR					
8. FENCE REPAIR					
9. SNOW AND ICE REMOVAL					
10. SAND LAYER REPLACEMENT					
11. OTHER					

C. AESTHETIC MAINTENANCE					
WORK ITEMS	ITEMS REQUIRED	DATE REQUIRED	ITEMS DONE	DATE DONE	COMMENTS AND SPECIAL INSTRUCTIONS
1. GRAFFITI REMOVAL					
2. GRASS TRIMMING					
3. WEEDING					
4. OTHERS					

GENERAL NOTES AND REMARKS:

MAINTENANCE COMPLETED AND BASED ON ALL AREAS VISIBLE AND ACCESSIBLE AT THE TIME OF INSPECTION.

WORK PERFORMED BY: _____

SIGNED: _____ DATE: _____

INSPECTION LOG

**INSPECTION LOG
FOR STORMWATER MANAGEMENT FACILITIES**

NAME OF FACILITY: _____
 LOCATION: _____ DATE: _____
 WEATHER: _____
 INSPECTION PERFORMED BY: _____

A. PREVENTATIVE MAINTENANCE				
FACILITY ITEM	OK (1)	ROUTINE (2)	URGENT (3)	COMMENTS (4)
1. GRASS CUTTING				
A. BOTTOMS				
B. EMBANKMENTS AND SIDE SLOPES				
C. PERIMETER AREAS				
D. ACCESS AREAS AND ROADS				
E. OTHERS				
2. GRASS MAINTENANCE				
A. FERTILIZING				
B. RE-SEEDING				
C. DE-THATCHING				
D. PEST CONTROL				
E. OTHERS				
3. VEGETATIVE COVER				
A. FERTILIZING				
B. PRUNING				
C. PEST CONTROL				
D. POISONOUS PLANTS				
E. OTHERS				
4. TRASH AND DEBRIS REMOVAL				
A. BOTTOMS				
B. EMBANKMENTS AND SIDE SLOPES				
C. PERIMETER AREAS				
D. ACCESS AREAS AND ROADS				
E. INLETS				
F. OUTLETS AND TRASH RACKS				
G. OTHERS				
5. SEDIMENT REMOVAL				
A. INLETS				
B. OUTLETS AND TRASH RACKS				
C. LOW FLOW CHANNELS				
D. BOTTOMS				
E. OTHERS				
6. PEST CONTROL				
A. GEESE				
B. MOSQUITO BREEDING				
C. RODENTS / RODENT HOLES				
D. OTHERS				
7. STRUCTURAL REPAIRS				
A. PIPES				
B. FLARED END SECTIONS				
C. INLETS				
D. MANHOLES				
E. OUTLET CONTROL STRUCTURES				
F. LOW FLOW CHANNELS				
G. RIP-RAP				
H. EMERGENCY SPILLWAY				
I. ACCESS AREA / ROADS				
J. FENCE				
K. TRASH RACKS				
L. OTHERS				
8. BASIN REPAIR				
A. EROSION				
B. SAND LAYER REPLACEMENT				
C. HARMFUL POLLUTANT REMOVAL				
D. BASIN LAYER				
E. SNOW / ICE REMOVAL				
F. OTHERS				

9. UNDERGROUND BASIN MAINTENANCE				
A. BOTTOMS				
B. OUTLETS AND TRASH RACKS				
C. ACCESS HATCHES				
D. OTHERS				
10. INFILTRATION BASIN MAINTENANCE				
A. TILING BOTTOM				
11. POND MAINTENANCE				
A. AERATION EQUIPMENT				
B. DEBRIS AND TRASH REMOVAL				
C. WEED REMOVAL				
D. PERMANENT POOL LEVEL				
E. OTHERS				
11. OTHER PREVENTIVE MAINTENANCE				
A. PARKING LOT SWEEPING				
B. EMPTYING TRASH RECEPTACLES				
C. PUMPS AND VALVES				
D. ELECTRICAL PANEL AND WIRING				
E. DEWATERING				
F. GRAFFITI REMOVAL				
E. OTHERS				

B. CORRECTIVE MAINTENANCE				
FACILITY ITEM	OK (1)	ROUTINE (2)	URGENT (3)	COMMENTS (4)
1. REMOVAL OF DEBRIS AND SEDIMENT				
2. STRUCTURAL REPAIRS				
3. EMBANKMENTS AND SIDE SLOPES				
4. DEWATERING				
5. BASIN MAINTENANCE				
6. CONTROL OF MOSQUITOES				
7. EROSION REPAIR				
8. FENCE REPAIR				
9. SNOW AND ICE REMOVAL				
10. SAND LAYER REPLACEMENT				
11. OTHER				

C. AESTHETIC MAINTENANCE				
FACILITY ITEM	OK (1)	ROUTINE (2)	URGENT (3)	COMMENTS (4)
1. GRAFFITI REMOVAL				
2. GRASS TRIMMING				
3. WEEDING				
4. OTHERS				

REMARKS

- (1) ITEM CHECKED IS IN GOOD CONDITION, AND THE MAINTENANCE PROGRAM IS ADEQUATE.
- (2) ITEM CHECKED REQUIRES ATTENTION, BUT DOES NOT PRESENT AN IMMEDIATE THREAT TO THE FACILITY FUNCTION OR OTHER FACILITY COMPONENTS.
- (3) THE ITEM CHECKED REQUIRES IMMEDIATE ATTENTION TO KEEP THE FACILITY OPERATIONAL OR TO PREVENT DAMAGE TO OTHER FACILITY COMPONENTS.
- (4) PROVIDE EXPLANATION AND DETAILS IF COLUMNS 2 OR 3 ARE CHECKED.

GENERAL NOTES AND REMARKS:

INSPECTION COMPLETED AND BASED ON ALL AREAS VISIBLE AND ACCESSIBLE AT THE TIME OF INSPECTION.

WORK PERFORMED BY: _____

SIGNED: _____ DATE: _____

**PERVIOUS PAVEMENT SYSTEM GUIDE
CONSTRUCTION SPECIFICATION**

Adjacent Landscaping

- Runoff from pervious areas should be directed away from the pervious paving system, where possible.
- Where it is not possible to direct runoff from adjacent landscaping away from a pervious paving system, a gravel strip or swale should be provided to filter and reduce the intrusion of sediment, with additional monitoring and corrective measures added to the maintenance plan.

Care should be taken in the selection of top dressing for nearby vegetated areas; particulates transported by wind or during rainfall or snowmelt could result in the clogging of the surface course. Preventative measures should be included in the maintenance plan and should be re-evaluated as necessary to ensure long-term functionality of the system.

Maintenance

Regular and effective maintenance is crucial to ensure effective pervious paving system performance; in addition, maintenance plans are required for all stormwater management facilities on a major development. In addition to the manufacturer's maintenance requirements, there are a number of required elements in all maintenance plans, pursuant to N.J.A.C. 7:8-5.8; these are discussed in more detail in *Chapter 8: Maintenance of Stormwater Management Measures*. Furthermore, maintenance activities are required through various regulations, including the New Jersey Pollutant Discharge Elimination System (NJPDES) rules, N.J.A.C. 7:14A. Specific maintenance requirements for pervious paving systems are presented below; these requirements must be included in the maintenance plan for pervious paving systems. Detailed inspection and maintenance logs must be maintained.

General Maintenance

- Failure to correctly maintain a pervious paving system will shorten its lifespan or result in system failure; therefore, the maintenance plan must ensure proper training of personnel and include the special equipment necessary in accordance with the industry's or manufacturer's requirements.
- The surface course must be inspected after every storm exceeding 1 inch of rainfall. If mud or sediment is tracked onto the surface course, it must be removed as soon as possible. Removal should take place when all runoff has drained from the surface course.
- The surface course must be inspected, at least once annually, for cracking, subsidence, spalling, erosion, deterioration and unwanted vegetation. Remedial measures must be taken as soon as possible. Herbicides must not be applied.
- The surface course of a pervious paving system must be vacuum swept, not power swept, at least four times per year. Vacuum sweeping must be followed by either air blowing or high-pressure power washing performed in accordance with the specifications recommended for the particular type of system. All dislodged material must be promptly removed.
 - The first annual maintenance must be performed in the spring.
 - Maintenance must additionally be performed in the autumn, after the fallen leaves are collected and removed.

- Each spring, after the last snow or ice event, the infiltration rate of the surface course must be tested in accordance with the methods of either ASTM C1701 or C1781, as corresponds to the post-construction test performed for the system. At least 3 locations must be tested. One of the locations must be in an area where sediment is most likely to be deposited, such as, but not limited to, a parking lot entrance. The other test locations must be evenly spaced across the system surface. The locations and results obtained must be recorded in the maintenance plan for future reference and compared to the as-built testing results as a metric for determining if a system requires corrective action. The chart provided below shows the approximate infiltration rate based upon the time it takes to infiltrate either 8 or 40 pounds of water specified in the above-cited tests. This chart should be included in the maintenance plan for future reference. The infiltration rate, I , is based upon the following calculation:

$$I = (K * M) / (D^2 * t), \text{ where}$$

K = 126,870 in-lbs

M = water mass, lbs

D = ring diameter = 12 inches

t = time, in seconds

Test Methods Per ASTM C1701 or C1781		
Time to Infiltrate the Specified Amount of Water (seconds)	Approximate Surface Infiltration Rate (inches per hour)	
	$M = 8$ lbs	$M = 40$ lbs
30	235	1175
60	118	587
100	70.5	352
200	35.2	176
350	20.1	100.7
360	19.6	97.9
380	18.5	92.7
900	7.8	39.2
1760	4.0	20.0
1910	3.7	18.5
3600	2.0	9.8
5400	1.3	6.5
5470	1.3	6.4
6000	1.2	5.9

Take note that should the test be performed with a different quantity of water, the values in the chart above cannot be used.

- Corrective action must be immediately taken to restore the infiltration capacity of the pervious paving system under the following scenarios:
 - Standing water is observed on the surface course; or
 - The testing methods above show an infiltration rate of 20 inches per hour or less for a system designed for quantity control or 6.4 or less for a system designed for water quality control only.
- Disposal of debris, trash, sediment and other waste material must be done at suitable disposal/recycling sites and in compliance with all applicable local, state and federal waste regulations.
- Under no circumstances may any sealants or coatings be applied to pervious paving systems, except for those approved by the manufacturer to improve surface course resistance to de-icing chemicals or refresh traffic striping.
- Over the lifetime of the surface course, no more than 10% of its surface area may be patched with impervious material such as bituminous asphalt or concrete. All patching must be recorded in the maintenance manual for future reference to prevent exceedance of this maximum.
- A detailed, written log of all preventative and corrective maintenance performed on the pervious paving system must be kept, including a record of all inspections and copies of maintenance-related work orders. Additional maintenance guidance can be found at https://www.njstormwater.org/maintenance_guidance.htm.

Storage Bed Drain Time

- The approximate drain time for the maximum design storm runoff volume below the top of the surface course must be indicated in the maintenance manual.
- If the actual drain time is significantly different from the design drain time, the components and groundwater levels must be evaluated and appropriate measures taken to return the pervious paving system to minimum and maximum drain time requirements.
- If the system fails to drain the maximum design storm volume within 72 hours, corrective action must be taken.

Cold Weather Maintenance

- Care must be taken when removing snow from the surface course; pervious paving surface courses may be damaged by snowplows or loader buckets set too low to the ground or not equipped with a rubber blade guard. Sand, grit or cinders may not be used on surface courses for snow/ice control.
- De-icing chemicals may not be used on pervious concrete less than one year old.
- De-icers containing magnesium chloride, calcium magnesium acetate or potassium acetate may never be used on pervious concrete.