

***Operation and Maintenance Plan
For
Stormwater Management Measures
Including Green Roof***

Prepared For

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1.0 INTRODUCTION:

The New Jersey Administrative Code NJAC 7:8-5.8 entitled “Maintenance Requirements” sets forth rules and refers to the New Jersey Stormwater Best Management Practices manual (the BMP manual) by the New Jersey department of Environmental Protection (NJDEP). Chapter 8 of the BMP manual entitled “Maintenance and Retrofit of Stormwater Management Measures” specifically addresses the requirements for maintenance of a major development. Major development, as defined in NJAC 7:8-5.8 is any development that provides for ultimately disturbing one or more acres of land or increasing the amount of impervious surface by one quarter of an acre or more.

The project site is approximately 0.371-acres, located at 361-373 JFK Blvd. , Block 262, Lot 7,9 - within the Township of Bayonne, Hudson County, New Jersey. The proposed project is a residential building which includes HDPE pipe (ADS, Type N-12, 30” pipe) subsurface detention system.

Although this project is not considered a major development, this report is prepared to address the maintenance component of the code to ensure the effective, efficient, and enduring service of a particular storm water measure. This maintenance plan contains preventive and corrective maintenance tasks and procedures. The proposed stormwater management measures incorporate number of elements as outlined below.

2.0 STORMWATER MAINTENANCE OBJECTIVE:

The stormwater system constructed for this development is intended to treat, attenuate and convey the stormwater that impacts the development. This maintenance plan is prepared to ensure the system in place is operating efficiently and reliably. The responsible party shall ensure the long term/perpetual operation, maintenance, repair, and safety of the stormwater management facilities. In the event that the stormwater management facility becomes a danger to public safety or public health, or it is in need of maintenance, the responsible party shall take immediate action to remove the danger.

Maintenance procedures are required to maintain the intended operation and safe condition of the stormwater management facility by reducing the occurrence of problems and malfunctions. To be effective, maintenance shall be performed on a regular basis and include such routine procedures as training of staff, periodic inspections, silt and debris removal and disposal, upkeep of moving parts,

control of mosquitoes and other insects, and review of maintenance and inspection work to identify where the maintenance program could be more effective.

Repairs procedures are required to correct problem or malfunction at a stormwater management facility and to restore the facility's intended operation and safe condition. Based on the severity of the problem, repairs shall be performed on an as-needed or emergency basis and include such procedures as structural repairs, mosquito control, removal of debris, sediment and trash which threaten discharge capacity, erosion repair, snow and ice removal, fence repair, and restoration of vegetation.

In the event that the stormwater management facility becomes a danger to the public safety or public health, or if it is need of maintenance, the responsible party will have fourteen (14) days to initiate maintenance and repair of the facility in a manner that is approved by the municipal engineer or is designee.

3.0 FACILITY/RESPONSIBLE PARTY INFORMATION:

The facility and the person responsible for the preventive and corrective maintenance of the stormwater measures described herein are:

Facility: 1721-1723 JFK. Blvd.

Owner: YM Kennedy LLC
94 Belmont Ave.
Jersey City, NJ 07304

4.0 STORMWATER CONVEYANCE SYSTEM

This element is comprised of the series of pipes and cleanouts designed to collect and convey roof runoff to the proposed underground pipe detention basin. It consists of the closed system of pipe. The proposed conveyance system has adequate access for inspection and/or maintenance. The use of proposed conveyance system allows for an optimized development while minimizing disturbance and is consistent with the community's surroundings for this area.

4.1 General Maintenance

All conveyance systems including cleanouts, manholes, concrete chambers, and pipes are expected to receive and/or accumulate debris and sediment. These systems must be inspected for clogging and excessive debris and sediment accumulation four (4) times annually as well as after every storm exceeding 1 inch of rainfall. Sediment removal should take place when all runoff has drained from conveyance network and the systems are reasonably dry. Disposal of debris, trash, sediment, and other waste material should be done at suitable disposal/recycling sites and in compliance with all applicable local, county, state, and federal waste regulations.

4.2 Structural Components

All structural components, such as inlets, manholes, concrete chambers, should be inspected for cracking, subsidence, breaching, wearing, and general deterioration at least once annually. The condition of surrounding and above lying materials shall be inspected for evidence of potential failures or deterioration. Structural damages must be repaired promptly. Analysis of structural damage and the design of structural repairs shall only be undertaken by qualified personnel.

4.3 Other Maintenance Criteria

Water, mosquito control chemicals, and concrete repair materials may also be required depending on the structure condition.

Refer to the following Table for Schedule of Maintenance and Maintenance Requirements.

Maintenance Item	Schedule	Inspection Requirement	Maintenance Requirement
Visual Inspection	Four (4) Times Annually After Every Rainfall Exceeding One Inch	Inspect all grates, manholes and inlets for buildup of sediment/trash/debris. Evaluate on-site upstream and downstream conveyance systems for clogging or trash sediment buildup.	Removed excess sediment, trash, debris from grates and/or within inlets and pipes. If present, remediate clogging.
Structural Components – Visual Inspection	Once Annually	Inspect all structural components for cracking, subsidence, breaching, wearing, and general deterioration.	If required, consult engineer to determine safety and/or stability of the system. Repair structural components as required.

5.0 HIGH DENSITY POLYETHYLENE (HDPE) PIPE SUBSURFACE DETENTION SYSTEM

A HDPE retention/detention system is comprised of a series of pipes and fittings that form an underground storage area, which retains or detains storm water runoff from a given area. As sediment and debris settle out of the detained stormwater, build up occurs that requires the system to be regularly inspected and cleaned in order for the system to perform as originally designed. The following provides the guidelines for inspection and maintenance of an HDPE underground storage system.

5.1 *System Accessories and Fittings*

A. *Concentric Reducers*

Concentric Reducers are fittings that transition between two pipes, either in line with one another or at perpendicular angles. The centerlines of the two pipes are at the same elevation. When a concentric reducer is used to connect the manifold pipe to the lateral pipes, most debris will be trapped in the manifold pipe.

B. *Eccentric Reducers*

Eccentric Reducers are fittings that transition between two pipes, either in line with one another or at perpendicular angles. The inverts of the two pipes are at the same elevations. When an eccentric reducer is used to connect the manifold pipe to the lateral pipes, most debris will follow the flow of the storm water into the lateral pipes.

C. *Riser*

Each retention/detention system typically has risers strategically placed for maintenance and inspection of the system. These risers are typically 24" in diameter or larger and are placed on the manifold fittings.

D. *Manholes for cleaning access*

30" manholes are placed on the manifold fittings. They are used for entrance of a pipe from a vacuum truck or a water-jetting device.

5.2 *System Maintenance Overview*

Maintaining a clean and obstruction-free retention/detention system helps to ensure the system performs the intended function of the primary design. Buildup of debris may obstruct flow through the laterals in a retention system or block the entranceway of the outlet pipe in a detention system. This may result in ineffective operation or complete failure of the system. Additionally, surrounding areas may potentially run the risk of damage due to flooding or other similar issues.

5.3 *Inspection/Maintenance Frequency*

All retention/detention systems must be cleaned and maintained. Underground systems may be maintained more cost effectively if these simple guidelines are followed. Inspection should be performed at a minimum of once per year. Cleaning should be done at the discretion of individuals responsible to maintain proper storage and flow. While maintenance can generally be performed year round, it should be scheduled during a relatively dry season.

5.4 *Pre-Inspection*

A post-installation inspection should be performed to allow the owner to measure the invert prior to accumulation of sediment. This survey will allow the monitoring of sediment build-up without requiring access to the retention/detention system. The following is the recommended procedure for pre-inspections:

1. Locate the riser section or cleanouts of the retention/detention system. The riser will typically be 24" in diameter or larger and the cleanouts are usually 4", 6" or 8" in diameter.
2. Remove the lid of the riser or clean outs.
3. Insert a measuring device into the opening and make note to a point of reference on the stick or string. (This is done so that sediment build up can be determined in the future without having to enter the system).

5.5 *Inspection/Maintenance*

A retention/detention system should be inspected at a minimum of one time a year or after major rain events if necessary. The following is the recommended procedure to inspect system in service:

1. Locate the riser section of the retention/detention system. The riser will typically be 24" in diameter or larger.
2. Remove the lid from the riser.

3. Measure the sediment buildup at each riser and cleanout location. Only certified confined space entry personnel having appropriate equipment should be permitted to enter the retention/detention System.

4. Inspect each manifold, all laterals, and outlet pipes for sediment build up, obstructions, or other problems. Obstructions should be removed at this time.

5. If measured sediment build up is between 5% - 20% of the pipe diameter, cleaning should be considered; if sediment build up exceeds 20%, cleaning should be performed at the earliest opportunity. A thorough cleaning of the system (manifolds and laterals) shall be performed by either manual methods or by a vacuum truck.

Debris, trash, sediment, and other waste materials removed from the basins shall be disposed of at a suitable disposal site and in accordance with all applicable local, state and federal waste regulations.

6.0 OUTLET STRUCTURES

Special attention should be given to the removal of floating debris (leaves, paper, trash, branches, and other manmade and natural materials), which can clog the devices. The benefits of debris removal include:

- Reducing the chance of clogging in the outlet structures and other facility components.
- Reducing potential mosquito breeding habitats.
- Improving facility performance.

6.1 *Structural Components*

All structural components must be inspected at least annually for cracking, subsidence, spalling, erosion, and general deterioration. Repairs shall be done in timely manner. Analysis of structural damage and the design of structural repairs shall only be undertaken by qualified personnel.

6.2 *Maintenance Schedule:*

Maintenance for the structure shall be performed as follows:

- The structure is to be cleared and inspected after each major storm.
- The structure is to be cleared and inspected each quarter regardless of storm activity.

7.0 REQUIRED EQUIPMENT FOR MAINTENANCE

The equipment required to facilitate the stormwater management procedures described in this operation and maintenance plan will include :

1. A stadia rod to measure depth of sediment.
2. Gas detectors to measure any gas buildup in structures.
3. OSHA required safety equipment.
4. If required, CCTV to monitor any sediment buildup.
5. Shovels, lighting equipment, wheel barrow, etc.
6. Debris hauling truck.
7. Personal Protective Equipment (PPE) like hard hat, gloves, work boots, etc.
8. Portable high pressure jet to perform cleaning if clogged.
9. In the event of mechanical lifting being required, a backhoe shall be used.

8.0 MAINTENANCE RECORDS AND REPORTING

All inspections, regular maintenance, and required repairs shall be documented. Written maintenance and repair records for all stormwater management elements shall be maintained for at least five years by the responsible party, and shall be provided to the municipality and/or NJDEP upon request

Detailed Logs of all inspections, preventative and corrective maintenance performed on the stormwater management system shall be filed and kept on-site, including all maintenance related work orders.

The maintenance logs shall include the following information:

- 1 – The name of the person(s) performing the inspection/maintenance.
- 2 – The date that the inspection/maintenance was performed.
- 3 – The location of the inspection/maintenance.
- 4 - A clear description of the inspection and type of maintenance/corrective actions performed.
- 5 – Any observations and comments.

Sample Inspection and Maintenance Log

Property Name:

Property Owner:

Property Address: _____

Inspection Date: _____

Type of Inspection: ☐ Quarterly ☐ Semi-annually

☐ After Heavy Rainfall Event

☐ Annually

☐ Other: _

Inspector(s): _____

Equipment:

Items	Observations	Maintenance Needed? (Y/N)	Type of Maintenance Required	Comments (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)
Visual Site Inspection (General)				
Visual Inspection (Structural)				
Inlets/Manholes				
Roof Leader/Header System				
Pipe Conveyance System				
Subsurface Detention System				
Outlet Control Structure				
Surrounding Site				
Miscellaneous				

GREEN ROOF MAINTENANCE

The following checklist procedures shall be followed to ensure that the green roof is working properly.

Operation Checklist

Project Address: _____

Inspected by: _____

Date: _____

Inspection Item	(YES/NO/N.A)	<u>Notes</u>
Weeding has been completed		
Plant replacement has been completed if deemed necessary		
Periodic fertilization has been performed if deemed necessary		
Soil testing should be performed annually, the last required test has been performed already		
Seasonal cleanup and leak testing has been performed as necessary. Manual leak test is done by filling with water and doing visual check.		
Maintenance inspection should be performed annually, the last required inspection has taken place, refer to Maintenance Checklist.		

Maintenance Checklist

Project Address: _____

Inspected by: _____

Date: _____

Project information:

Date of green roof installation: _____

Irrigation immediately prior to inspection:

Amount: _____

Frequency and duration: _____

Other notes:

Inspection Item	Criteria	<u>Additional Notes</u>
Growing conditions during inspection	Air temperature _____ Soil moisture (e.g. wet, dry etc.) _____ Sunny or cloudy (circle) Date of last rainfall: _____ Have actions items from last inspection been addressed? _____	
Vegetation	Percent cover of healthy acceptable plant species: _____ Diversity (number) of acceptable species: _____ Percent cover of weeds – list species in notes: _____	
Dominant species, note all species 5% cover or more	List including name, percent cover, and any notes _____ _____ _____ _____	

[illegible]