

**STORMWATER MANAGEMENT FACILITY
MAINTENANCE PLAN MANUAL**

FOR

**SOUTH ORANGE AVENUE REDEVELOPMENT
BLOCK 1006, LOTS 1, 2, 3, 9, 10, 11, 13 & 14
VILLAGE OF SOUTH ORANGE
ESSEX COUNTY, NEW JERSEY**

SUBMITTED TO:

TOWNSHIP OF SOUTH ORANGE VILLAGE

PREPARED FOR:

**HUB REALTY, L.L.C.
447 NORTHFIELD AVENUE, SUITE 200
WEST ORANGE, N.J. 07052**

PREPARED BY:

**PETRY ENGINEERING, LLC
155 PASSAIC AVENUE
FAIRFIELD, NEW JERSEY 07004
973-227-7004**



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MARCH 26, 2020**



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Introduction

This Manual presents specific maintenance information about structural and nonstructural stormwater management measures that shall be used to address stormwater quality and quantity requirements of the NJDEP Stormwater Management Rules at N.J.A.C. 7:8, as applied to the proposed residential development site. Two specific structural measures, also known as structural Best Management Practices (BMPs), included in this manual are:

- I. HDPE Pipe Repair Options
- II. Detention System Maintenance

Information regarding maintenance of each BMP is presented in separate sections of this Manual. Generally, a site-specific maintenance plan will need to be established. The information provided in this manual provide minimum recommendations for maintenance.

The specific maintenance plans for the structural/non-structural BMPs included in this Manual will be followed by those parties responsible for their operation and maintenance. To assist the operator and maintenance inspector of the on-site stormwater management facilities, copies of tables, sample checklists, procedural steps and logs from the NJDEP Stormwater Management Facilities Maintenance manual are included in this Manual.

General maintenance for all stormwater management measures include:

- a. Inspection of inlets in parking areas for clogging and excessive debris and sediment accumulations at least 4 times annually as well as after every storm exceeding 1 inch of rainfall.
- b. 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.
- c. Parking lots within the site to be kept free of trash/debris and maintained to the greatest extent possible to prevent clogging of stormwater systems.
- d. All structural components such as outlet and inlet structures must be inspected for cracking, subsidence, spalling erosion and deterioration at least annual and repaired as required to restore components to original condition.
- e. Inspection of all underground systems shall be in strict accordance with OSHA recommendations for confined space entry and shall be performed during periods of dry weather.
- f. In no instance shall inspection of an underground system be performed less than 72 hours after the end of a rainfall event to allow proper drain time of the systems.



- g. If exterior gutters running along the façade of the building are installed, careful annual inspection of them shall be performed to ensure that they remain intact and connected to the roof leader/header pipes provided.

General HDPE (N-12) Detention Basin Maintenance:

- a. At the minimum, one annual inspection per year for the detention basin shall be performed. Inspection is required once every six months for the first year of operation. (Before winter season is recommended, and removal of sediment executed during periods of dry weather)
- b. Access/Inspection to the detention basin shall be through the 12" cleanouts, or Type 'E' inlets provided and connected to the detention basin.
- c. A stadia rod or string shall be used as a measuring device (with a point of reference) to determine sediment buildup in the bottom of the basin. Typically, cleaning should be considered where sediment build up is between 5-20% of the diameter of the pipe (approx. 1.5"-7" depth). If sediment buildup is in excess of 20% of the diameter of the pipe (>7" depth), cleaning should be performed at the earliest opportunity.
- d. Cleaning of the sediment shall be performed through the 12" cleanouts, or Type 'E' inlets that are connected to the system. Cleaning can be performed manually or with the use of a vacuum truck or water-jetting device.

General Outlet Structure (#1) Maintenance:

- a. At the minimum, two annual inspections per year for the Outlet Structure and trash rack shall be performed, or after any rainfall greater than 1 inch. (Before winter season is recommended, and removal of sediment executed during periods of dry weather)
- b. All debris attached to the trash rack shall be removed. Any debris or sediment blocking the orifices or weir shall also be removed and disposed of properly.
- c. Inspection of the inlet and outlet pipes for obstructions and debris shall be performed during each inspection of the outlet structure.

The responsible party for the subject site operation and maintenance is:

HUB Realty, L.L.C.
55 Harrison Road
West Orange, NJ 07052
Email: jared@hubnj.com



Section III – Maintenance Cost Estimate

Detention Basin & Outlet Structure.....\$1,500 per year

Maintenance cost estimate includes all maintenance tasks, including inspection as well as trash and debris removal. Maintenance cost estimates are based on engineering assumptions, manufacturer's recommendations as well as the relative frequency of maintenance. Actual costs may differ from estimate.



ADDITIONAL MAINTENANCE CRITERIA

MATERIAL DISPOSAL

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.

MAINTENANCE CRITERIA

- Two inspections are required during the first year of operation for the detention basin. Inspection in subsequent years is based on the maintenance plan that is developed in the first year, but should be inspected a minimum of once every year.
- Two inspections are required each year for the Outlet Structure. Inspection in subsequent years is based on the maintenance plan that is developed in the first year, but should be inspected a minimum of twice every year.
- The detention basin has been designed for 26 hours as the approximate time it would normally take to completely drain the maximum design storm (100 year storm event) runoff volume. If significant increases or decreases in the normal drain time are observed, the basin, the basin's outlet structure, or even tailwater levels must be evaluated and appropriate measures taken to comply with the maximum drain time requirements and maintain the proper functioning of the basin.



APPENDIX

HDPE PIPE REPAIR OPTIONS



TECHNICAL NOTE

HDPE Pipe Repair Options

TN 5.03
January 2010

Introduction

High-density polyethylene (HDPE) pipe is lightweight and very easy to handle. The attributes that make the pipe easy to use can also make it easy to abuse, resulting in damaged pipe or joints. This technical bulletin discusses some of the products available that can be used to repair damaged HDPE pipe or joints in the field.

Repair Options

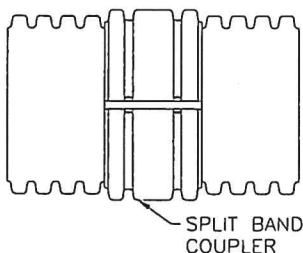
One of the primary considerations in selecting a repair method is the degree of joint performance required. Watertight repairs are generally used on pipe with watertight joints, and soil-tight repairs on pipe with soil-tight joints. This helps keep costs in line and prevents the repair from being the weak area of the pipe system.

The way in which a pipe can be accessed is another primary consideration which influences what type of repair alternative is selected. Pipe that is not yet buried, or can be easily excavated, can be repaired from the exterior. If the pipe is buried and cannot be conveniently excavated, an internal repair may be the best alternative. If the pipe is too small to enter, there are companies with remote controlled equipment that can install the product. Each situation must be considered individually.

The repair options addressed below are divided into external repairs and internal repairs. During any pipe repair, backfill should be placed and compacted per project specifications to provide proper support for the pipe and coupler.

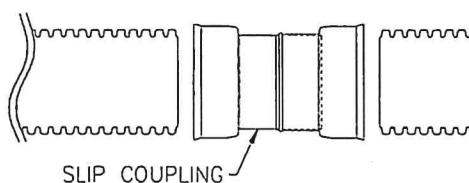
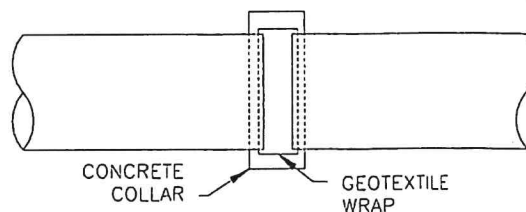
External Mechanical Repairs

Mar Mac Polyseal Pipe Coupler, 4- through 60-inch (100 - 1500 mm), consists of a mastic adhesive base layer, a cross-laminated polyethylene middle layer with a spun-bonded geotextile polypropylene cloth outer layer. The coupler incorporates a self-adhering rubberized bonding mastic and securing bands to insure a positive seal around the pipe. . If the pipe itself is damaged, the damaged area will need to be removed and a new pipe section spliced in before installing a coupler around both ends. Polyseal Pipe Couplers are reasonably priced, especially when considering the quality of the finished repair, and are typically used with soil-tight smooth interior corrugated HDPE pipe products. *Note: Mar-Mac bands shall be installed in accordance with manufacturer's recommendations.*



Snap couplers, 4- through 8-inch (100 – 200 mm), and *split band couplers*, 10- through 30-inch (250 – 750 mm), will provide a soil-tight repair with or without gaskets. This repair method should only be used if the damaged area is in a non-trafficked green area, is cosmetic in nature, confined to a single corrugation, and is not defined as structural damage. The coupler shall be centered around the damaged area of pipe and tightened down with the nylon straps. If the damaged area is large or significant, the damaged area is to be cut out, and replaced with a new section of pipe. The replacement section is to be 'spliced' in place using snap or split band couplers. They are a convenient, low-cost repair alternative, and are typically used to repair soil-tight smooth interior corrugated HDPE pipe products.

Concrete collars also provide a soil-tight repair, dependent on the integrity of the installation. Installing a concrete collar involves building a form around the area to be repaired and encasing it in concrete. A geotextile is usually wrapped around the repair area prior to pouring the collar to keep the concrete from seeping into the pipe. Typically, approximately 6" (0.15m) is excavated beneath the pipe to allow for proper application of the geotextile and concrete encasement. If the pipe itself is damaged, the damaged area shall be removed and a replacement pipe section spliced in prior to pouring the collar. In order to provide a greater level of joint performance, a gasket can be installed on the pipe in the concrete encasement. Concrete collars are typically more costly and time consuming than snap couplers or split band couplers but are reasonable repair options for soil-tight smooth interior corrugated HDPE pipe products.



Slip Couplings 4- through 24-inch (100 – 600 mm), provides a watertight repair that will meet most pressure testing requirements, when installed correctly. The slip coupling uses PVC bells with gaskets. The gaskets are placed in the valleys on either side of the section to be repaired and slip couplings are then slid over the gaskets. PVC slip couplings are most commonly used with watertight smooth interior corrugated HDPE pipe products.

Internal Repairs

Internal mechanical repair products generally consist of a flexible cylindrical gasket sleeve, which is expanded to conform to the inner wall of the pipe. The feasibility of this repair method depends on the size of the damaged section or joint and available access into the pipe. Internal mechanical seals slightly restrict the inside diameter of the pipe. This should be considered when assessing the risk of debris obstruction.

NPC Internal Joint Seal, 18- through 60-inch (450 – 1500 mm), consists of an EPDM rubber seal and stainless steel bands. The rubber seal is inserted into the pipe and positioned over the joint. A torque wrench is used to expand the bands against the inner wall of the pipe. The Internal Joint Seal is designed to seal joints – not repair damaged pipe sections. The damaged area of the pipe must be removed and a replacement section spliced in if necessary in order to use the Internal Joint Seal. This system may provide a watertight joint when installed as recommended. The manufacture should be contacted to verify the product meets the specific application requirements including test requirements, if specified. If pressure tests are required, NPC should be contacted to ensure that the product is suitable for the specific test criteria.

Internal mechanical seals will slightly restrict the inside diameter of the pipe. This should be considered when assessing the risk of debris obstruction.

Link Pipe Grouting Sleeve™, 4 through 60 inch (100 – 1500 mm), is a stainless steel grouting sleeve that is installed with an inflatable plug. The sleeve may be used to seal a joint or repair short sections of damaged pipe. The manufacture should be contacted to verify the product meets the specific application requirements including test requirements, if specified.

Internal chemical sealing is another method of internal joint repair using chemically activated gel or grout to minimize joint leakage. The grout is typically applied with specialized remote-controlled equipment. Test/seal



packer is used to remotely seal a joint. The grouting chemicals are forced through the joint out into the surrounding soil where they gel with the soil. The gelled mass forms a waterproof collar around the pipe. The result is significantly reduced leakage. There are several types of chemical grouts available and the manufacturer should be contacted to review the specific situation and any joint tightness or pressure test criteria. Companies such as Avanti International, Strata Tech Inc., and Carylton Corporation manufacture and/or install chemical grout. Stephen's Technologies *New Life Coatings* and *NewLife Liner Systems* as well as Avast Hydro-Lining International, are examples of companies that offer cured in place epoxy lining systems that have been effectively used with HDPE pipe. Most pipe diameters can be chemically grouted provided the grouting contractor has the appropriate equipment.

Manufacturer Contact Information

Contact the Regional Engineer or Application Engineering Department for assistance with other unique conditions or for contact information regarding any companies listed in this technical note.

Note: The HDPE pipe products are solely intended for the conveyance of fluids. Access into this product for maintenance, inspection, repair, or other reason should be done in strict accordance with OSHA recommendations for confined space entry.

**HDPE DETENTION
SYSTEM MAINTENANCE**

TECHNICAL NOTE

Retention/Detention System Maintenance

TN 6.01
February 2007

This document is provided for informational purposes only and is meant only to be a guide. Individuals using this information should make their own decisions as to suitability of this guideline for their individual projects and adjust accordingly.

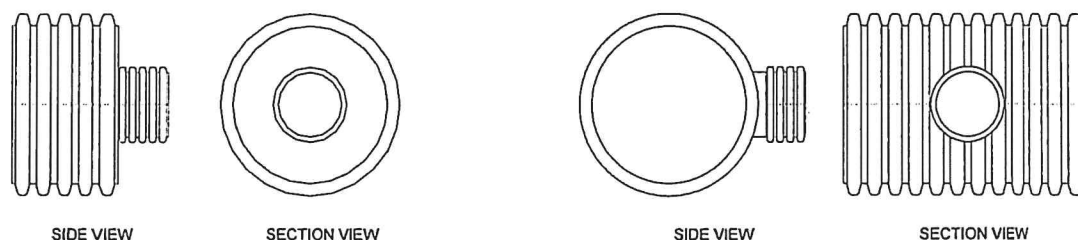
Introduction

A 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 available fittings and guidelines for inspection and maintenance of an HDPE underground storage system.

System Accessories and Fittings

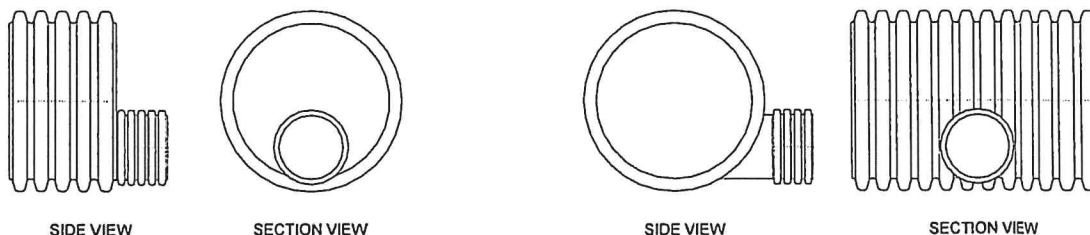
Concentric Reducers

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.



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.



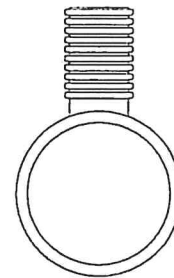


Riser

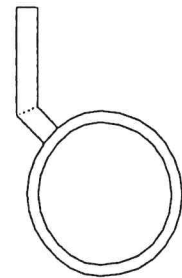
Each retention/detention system typically has risers strategically placed for maintenance and inspection of the system. These risers are typically 24" in diameter or larger and are placed on the manifold fittings.

Cleanouts

Cleanout ports are usually 4-, 6-, or 8-in diameter pipe and are placed on the manifold fittings. They are used for entrance of a pipe from a vacuum truck or a water-jetting device.



RISER
CROSS-SECTION VIEW



CLEANOUT
CROSS-SECTION VIEW

For a complete listing of available fittings and components please refer to the *ADS Fittings Manual*.

Maintenance Overview of a Retention/Detention System

Maintaining a clean and obstruction-free retention/detention system helps to ensure the system performs the intended function of the primary design. Build up 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.

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.

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.)



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.