Jersey Walk Residential Development – Elizabeth, NJ
STORMWATER MANAGEMENT MAINTENANCE PLAN

I. PURPOSE

In accordance with the New Jersey Stormwater Best Management Practices Manual (February 2004), this Stormwater Management Maintenance Plan is intended to establish an inspection protocol and to identify specific preventive and corrective maintenance procedures, schedules, and responsible parties for the care of the stormwater collection and detention systems of the proposed residential development at 907-931 East Jersey Street within the City of Elizabeth, Union County, NJ.

Regular and thorough maintenance is necessary for stormwater management measures to perform effectively and reliably. Failure to perform such maintenance can lead to diminished performance, deterioration and failure, in addition to a range of health and safety problems including mosquito breeding, vermin, and the potential for drowning. The potential for such problems to develop is accentuated by many of the very features and characteristics that allow stormwater management measures to do their job, including standing or slow moving water, dense vegetation, forebays, trash racks and the need to continually function in all types of weather.

II. RESPONSIBLE PARTIES:

CMT Developers, LLC
1950 Rutgers University Boulevard
Suite 102
Lakewood, NJ 08701
(212) 981-4650

III. STORMWATER MANAGEMENT SYSTEMS OVERVIEW

The site includes two (2) underground stormwater detention basins. Subsurface Detention System #1 is constructed beneath the grass/landscaped area within the courtyard, south of the proposed 10-story residential building and parking deck. The underground system consists of 8 rows of 48 LF 36" perforated pipes surrounded in a stone bed. The basin detains flow from Proposed Drainage Area 2 (PR-DA-2) before discharging to the proposed Subsurface Detention System #2 located to the south. As shown in the attached analysis, the system has the capacity to store up to approximately 6,324 cubic feet of runoff. A 4' rectangular weir allows flow to leave the system at a controlled rate.

The second detention basin, Subsurface Detention System #2, is constructed beneath the grass/landscaped area within the courtyard, north of the proposed 7-story residential building and parking deck. The underground system consists of 10 rows of 120 LF 36" perforated pipes surrounded in a stone bed. The basin detains flow from Proposed Drainage Areas 3A and 3B (PR-DA-3A and PR-DA-3B) before discharging to the reconstructed 42" RCP combination storm/sewer line within the Reid Street right-of-way. As shown in the attached analysis, the system has the capacity to store up to approximately 17,093 cubic feet of runoff. Two (2) circular orifices of 2.5" and 12" and a 4.5’ rectangular weir allow flow to leave the system at a controlled rate.

Appendix A describes the maintenance procedures for the underground detention systems. Refer to Appendix D for details and location (SK-01 Basin Location Map) of the subsurface pipe systems.
IV. INSPECTION & MAINTENANCE OVERVIEW

This Stormwater Management Maintenance Plan has two primary components: 1) Scheduled Inspections and 2) Maintenance of the Stormwater Management Systems. Discussions of each component are contained within the text of this manual.

Sample forms, to be completed by a qualified inspector, are also contained in this manual. These forms are meant to be a guide with the minimum amount of information to be reported during regular inspection and maintenance occurrences.

Bi-annually, the responsible party shall review this maintenance plan and evaluate, in writing, the effectiveness of the plan. Specifically, the following items should be addressed:

• Measures employed to educate users of the facility on the maintenance plan components.

• Ensure property maintenance contracts include corrective and preventive maintenance measures discussed in Section VIII and IX below.

• Evaluate the frequency of inspections, and corrective and preventive maintenance and ensure accurate records are being kept.

Copies of the written plan evaluations shall be kept at the facility and shall be provided to the City of Elizabeth upon request.

V. SAFETY

Keep safety considerations at the forefront of inspection procedures at all times. Likely hazards should be anticipated and avoided. Never enter a confined space (outlet structure, manhole, etc) without proper training or equipment. A confined space should never be entered without at least one additional person present.

If a toxic or flammable substance is discovered, leave the immediate area and contact the local Police Department at 911. Potentially dangerous (e.g., fuel, chemicals, hazardous materials) substances found in the areas must be referred to the local Police Department immediately for response by the Hazardous Materials Unit. The emergency contact number is 911.

Vertical drops may be encountered in areas located within and around the facility. Avoid walking on top of retaining walls or other structures that have a significant vertical drop. If a vertical drop is identified within the pond that is greater than 48” in height, make the appropriate note/comment on the maintenance inspection form.

VI. FIELD INSPECTION EQUIPMENT

It is imperative that the appropriate equipment is taken to the field with the inspector(s). This is to ensure the safety of the inspector and allow the inspections to be performed as efficiently as
possible. Below is a list of the equipment that may be necessary to perform the inspections of all Stormwater Management Facilities:

- Protective clothing and boots
- Safety equipment (vest, hard hat, confined space entry equipment)
- Communication equipment
- Operation and Maintenance Manual for the site including stormwater management facility location maps
- Clipboard
- Stormwater Management System Inspection Report Forms
- Manhole Lid Remover
- Shovel

Some of the items identified above need not be carried by the inspector (manhole lid remover, shovel, and confined space entry equipment). However, this equipment should be available in the vehicle driven to the site.

VII. INSPECTING STORMWATER MANAGEMENT FACILITIES

The quality of stormwater entering the waters of the state relies heavily on the proper operation and maintenance of permanent Best Management Practices (BMPs). Stormwater management facilities must be periodically inspected to ensure that they function as designed. The inspection will determine the appropriate maintenance that is required for the facility.

A. Inspection Procedures

All stormwater management facilities are required to be inspected by a qualified individual quarterly or at least four (4) times annually; and following every storm event exceeding one (1) inch of rainfall. Additionally, the maintenance schedule shall include the inspection of all structural components for cracking, subsidence, spalling, erosion and deterioration at least annually.

B. Inspection Report

The person(s) conducting the inspection activities shall complete a Stormwater Management System Inspection Report Form for each stormwater management facility. Sample Inspection Report Forms are located in this plan. Inspection Report Forms shall be completed by the contractor completing the required inspections. The form shall then be reviewed by the property owner and retained indefinitely. A copy of the Inspection Report Form shall be provided to the City of Elizabeth upon request.

The following information explains how to fill out the Inspection Forms:

1. General Information

This section identifies the facility location, person conducting the inspection, the date and time the facility was inspected, and approximate days since the last rainfall. The reason for the inspection is also identified on the form depending on the nature of the
inspection. All facilities should be inspected on an annual basis at a minimum. In addition, all facilities should be inspected after a significant precipitation event to ensure the facility is draining appropriately and to identify any damage that occurred as a result of the increased runoff.

2. Inspection Scoring

For each inspection item, a score must be given to identify the urgency of required maintenance. The scoring is as follows:

0 = No deficiencies identified.

1 = Monitor – Although maintenance may not be required at this time, a potential problem exists that will most likely need to be addressed in the future. This can include items like minor erosion, concrete cracks/spalling, or minor sediment accumulation. This item should be revisited at the next inspection.

2 = Routine Maintenance Required – Some inspection items can be addressed through the routine maintenance program. This can include items like vegetation management or debris/trash removal.

3 = Immediate Repair Necessary – This item needs immediate attention because failure is imminent or has already occurred. This could include items such as structural failure of a feature, significant erosion, or significant sediment accumulation. This score should be given to an item that can significantly affect the function of the facility.

3. Inspection Summary/Additional Comments

Additional explanations to inspection items, and observations about the facility not covered by the form, are recorded in this section.

4. Overall Facility Rating

An overall rating must be given for each facility inspected. The overall facility rating should correspond with the highest score (0, 1, 2, 3) given to any feature on the inspection form.

**TABLE 1**

*Summary of Inspection Activities*

<table>
<thead>
<tr>
<th>Inspection Activity</th>
<th>Minimum Frequency</th>
<th>Look for:</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Trash/Debris Removal</td>
<td>Quarterly, and after every storm exceeding</td>
<td>Trash &amp; debris within inlet filters</td>
<td>Schedule Corrective Maintenance</td>
</tr>
<tr>
<td>2. Sediment Removal</td>
<td>Quarterly, and after every storm exceeding 1 inch of rainfall</td>
<td>Accumulation of sediment in basin system, typically near inflow pipes</td>
<td>Schedule Corrective Maintenance</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------------------------------</td>
<td>----------------------------------------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>3. Condition of Drainage Systems</td>
<td>Quarterly, and after every storm exceeding 1 inch of rainfall</td>
<td>Damage and wear at inlet filters; structural integrity of vault system; condition of backflow preventer</td>
<td>Schedule Corrective Maintenance</td>
</tr>
<tr>
<td>4. Preventive Maintenance Opportunities</td>
<td>Quarterly, and after every storm exceeding 1 inch of rainfall</td>
<td>Sources of potential pollutants, proper lawn maintenance, areas of erosion</td>
<td>Schedule Corrective Maintenance</td>
</tr>
</tbody>
</table>

VIII. MAINTAINING STORMWATER MANAGEMENT FACILITIES

Stormwater management facilities must be properly maintained to ensure that they operate correctly and provide the water quality treatment for which they were designed. Routine maintenance performed on a frequently scheduled basis, can help avoid more costly rehabilitative maintenance that results when facilities are not adequately maintained.

A. Maintenance Categories

Stormwater management facility maintenance programs are separated into three broad categories of work. The categories are separated based upon the magnitude and type of the maintenance activities performed. A description of each category follows:

1. Routine Work

   The majority of this work consists of scheduled mowings and trash and debris pickups for stormwater management facilities during the growing season. This includes items such as the removal of debris/material that may be clogging structures as well as screens and trash racks. It also includes activities such as weed control, mosquito treatment, and algae treatment. These activities normally will be performed numerous times during the year. Table 2 below provides a summary of recommended routine maintenance activities.

2. Restoration Work

   This work consists of a variety of isolated or small-scale maintenance and work needed to address operational problems. Most of this work can be completed by a small crew, with minor tools, and small equipment. Restoration work includes the removal of accumulated sediment from the basin. Sediment should be removed often enough that the majority of the work can be performed by hand, by a small crew. However, use of a small excavator may be necessary to remove sediment and return the basin to its original condition, as designed. Dispose debris and sediment in a licensed disposal
facility in Union County. For a list of licensed disposal facilities contact a licensed disposal contractor or the Elizabeth DPW.

3. Rehabilitation Work

This work consists of large-scale maintenance and major improvements needed to address failures within the stormwater management facilities. This work may require an engineering design with construction plans to be prepared for review and approval. This work may also require more specialized maintenance equipment, surveying, construction permits or assistance through private contractors and consultants. Should rehabilitation work be required, contact the site engineer of record:

William R. Vogt Jr., PE
L2A Land Design, LLC
60 Grand Avenue
Englewood, NJ 07631
201-227-0300

B. Maintenance Personnel

Maintenance personnel must be qualified to properly maintain stormwater management facilities. Inadequately trained personnel can cause additional problems resulting in additional maintenance costs.

C. Maintenance Forms

The Stormwater Management System Maintenance Activity Form provides a record of maintenance activities. Sample Maintenance Activity Forms for each facility type are provided in this Plan. Maintenance Activity Forms shall be completed by the contractor completing the required maintenance items. The form shall then be reviewed by the property owner and retained indefinitely. A copy of the Maintenance Activity Form shall be provided to the City of Elizabeth upon request.

<table>
<thead>
<tr>
<th>Maintenance Activity</th>
<th>Minimum Frequency</th>
<th>Look for:</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Trash/Debris Removal</td>
<td>Quarterly, and after every storm exceeding 1 inch of rainfall</td>
<td>Trash &amp; debris within inlet filters</td>
<td>Remove trash and debris. Dispose away from site in licensed disposal facility</td>
</tr>
<tr>
<td>2. Sediment Removal</td>
<td>Quarterly, and after</td>
<td>Accumulation of</td>
<td>Remove sediment.</td>
</tr>
</tbody>
</table>
IX. PREVENTATIVE MEASURES TO REDUCE MAINTENANCE COSTS

The most effective way to maintain your water quality facility is to prevent the pollutants from entering the facility in the first place. Common pollutants include sediment, trash & debris, chemicals, dog wastes, runoff from stored materials, illicit discharges into the storm drainage system and many others. A thoughtful maintenance program will include measures to address these potential contaminants, and will save money and time in the long run. Key points to consider in your maintenance program include:

- Educate property owners/residents to be aware of how their actions affect water quality, and how they can help reduce maintenance costs.
- Keep properties, streets and gutters, and parking lots free of trash, debris, and lawn clippings.
- Ensure the proper disposal of hazardous wastes and chemicals.
- Plan lawn care to minimize the use of chemicals and pesticides.
- Sweep paved surfaces and put the sweepings back on the lawn.
- Be aware of automobiles leaking fluids. Use absorbents such as cat litter to soak up drippings – dispose of properly.
- Re-vegetate disturbed and bare areas to maintain vegetative stabilization.
- Clean out the upstream components of the storm drainage system, including inlets and storm sewers.
- Do not store materials outdoors (including landscaping materials) unless properly protected from runoff.

X. CORRECTIVE RESPONSE TO EMERGENCY CONDITIONS
The parties responsible for the stormwater management facilities should be well prepared to respond to emergencies and take necessary corrective action to prevent emergencies from happening. The following is a discussion of emergency response and emergency prevention.

**Emergency Response**

Below is a list of potential emergency conditions related to the detention basins and their appurtenances. In the case of any emergency, dial 911 immediately.

- **Accidental or Intentional Vehicular or Pedestrian Entry** – The initial response to any emergency is to call 911. Be prepared to give the exact location, by street address, of the emergency location. Flow in a detention basin can be very strong especially in the vicinity of the outlet structure. Only trained personnel should enter a full detention basin to attempt a rescue.

- **Hazardous Waste Spill** - The initial response to any emergency is to call 911. Inform the dispatcher that the emergency involves a hazardous waste spill. The dispatcher will contact the Union County Hazardous Materials Response Team. Follow the directions of the emergency responders upon their arrival. Do not go near the detention basin nor allow anyone to go near the detention basin or spill area. A hazardous spill of liquid chemicals that occurs within the property will likely drain to the detention basins onsite.

- **Flooding** – If a detention basin appears to be approaching a condition of flooding or overflow, contact the police by dialing 911. Do not attempt to unclog a blockage in the system to remedy the problem. Follow the directions of the emergency responders upon their arrival.

- **Downed Power Lines** - The initial response to any emergency is to call 911. Be prepared to give the exact location, by street address, of the emergency location. Keep a safe distance from any standing water. At a safe distance, stop vehicular and pedestrian traffic from approaching the area of the downed power line.

**Emergency Prevention**

Below is a list of measures that can be taken to help to prevent emergency situation from happening at the onsite detention basins.

- **Tree Pruning** – Periodically inspect tree branches that could impact power lines. Contact local utility provider for tree pruning in the vicinity of power lines.

**APPENDIX A**

**Underground Detention Basin Maintenance**

**Maintenance Protocol**

The underground stormwater detention system design provides easy access for inspection and maintenance as follows:

**Inspection**
Quarterly inspections, at least four (4) times annually, of the underground stormwater management systems and following every storm event exceeding 1 inch of rainfall are recommended. The detention system includes an Isolator Row to trap any sediment in a single row for easy cleaning and maintenance. If upon visual inspection it is found that the average depth of sediment in the Isolator Row exceeds **3 inches**, clean-out should be performed. The system is also equipped with inspection ports at the ends of each row. A review of the drain time for the system shall be observed to ensure that the functionality of the system is in accordance with the NJDEP BMP Manual. A stadia rod can be inserted at each inspection port to determine if the stormwater detention basin is not performing properly.

**Maintenance**

If inspection indicates the potential need for maintenance, access is provided standard manholes located at each of the four corners for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself through the system while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45” are best.

**Step 1)** Inspect detention system for sediment:

A) Remove all manhole cover at all components of the detention system.
B) Using a flashlight, inspect the detention system through the outlet pipe.
   a. Mirrors on poles or cameras may be used to avoid a confined space entry.
   b. Follow OSHA regulations for confined space entry if entering manhole.
C) If the average sediment level is approximately 3 inches in depth, proceed to Step 2. If not, proceed to Step 3.

**Step 2)** Clean out detention system using the JetVac process:

A) A fixed culvert cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable.
B) Apply multiple passes of JetVac until backflush water is clean.
C) Vacuum manhole sump as required.

**Step 3)** Replace all lids and covers. Record observations and actions.

**Step 4)** Inspect & clean catch basins and manholes upstream of the detention system.
APPENDIX B
Product Literature & Details
HEAVY DUTY PIPE

With over 45 years experience, Advanced Drainage Systems, Inc. (ADS) has provided expert knowledge and innovative product solutions proven in a wide range of drainage applications. Our HDPE pipe delivers superior value while providing physical strength and structural design that just cannot be matched by metal or concrete.

APPLICATIONS:
- Culverts
- Paths & Walkway Drains
- Landscape/Subdrainage
- Golf Courses
- Sports Playing Fields
- Grain Aeration
- Pond Overflows & Dams
- Parking Lots
- Field Drainage
- Slope, Edge, Foundations
- Downspouts/Roof Drainage
- Waterway Terracing
- Land Reclamation
- Irrigation Ditch Enclosures

FEATURES/BENEFITS:
- Available in varying stick and coil lengths depending on the diameter. Longer lengths result in fewer joints
- Easy-to-handle, safe, lightweight pipe requires less labor and equipment for faster installation and reduced costs
- AASHTO HS-25 (Highway traffic loads) rated with a minimum of 12" (300 mm) of cover for 3" - 8" (75 - 200 mm) diameters
- Provides superior resistance to chemicals, road salts, motor oil and gasoline - will not rust, deteriorate or crumble
- Withstands repeated freeze/thaw cycles and continuous sub-zero temperatures

ADS Service: ADS representatives are committed to providing you with the answers to all your questions, including specifications, and installation and more.

The Most Advanced Name in Drainage Systems®
ADS SINGLE WALL HEAVY DUTY PIPE

SCOPE
This specification describes 3- through 24-inch (75 to 600 mm) ADS single wall heavy duty corrugated polyethylene highway pipe for use in gravity-flow drainage applications.

PIPE REQUIREMENTS
ADS single wall corrugated heavy duty pipe shall have annular interior and exterior corrugations.
• 3- through 6-inch (75 to 150 mm) shall meet ASTM F405.
• 8- through 24-inch (200 to 600 mm) shall meet ASTM F667

JOINT PERFORMANCE
Joints for 3- to 24-inch (75 – 600 mm) shall be made with split or snap couplings. Standard connections shall meet the requirements of the ASTM F405 or ASTM F667. Gasketed connections shall incorporate a closed-cell synthetic expanded rubber gasket meeting the requirements of ASTM D1056 Grade 2A2. Gaskets, when applicable, shall be installed by the pipe manufacturer.

FITTINGS
Fittings shall conform to ASTM F405 or ASTM F667.

MATERIAL PROPERTIES
Pipe and fitting material shall be high density polyethylene conforming with the minimum requirements of cell classification 423410C as defined and described in the latest version of ASTM D3350; or ASTM D1248 Type III, Class C, Category 4, Grade P33.

INSTALLATION
Installation shall be in accordance with ASTM D2321 and ADS recommended installation guidelines with the exception that minimum cover in trafficked areas for 3- through 24-inch (75 to 600 mm) diameters shall be one foot (0.3 m). Contact your local ADS representative or visit our website at www.ads-pipe.com for a copy of the latest installation guidelines.

PIPE DIMENSIONS

<table>
<thead>
<tr>
<th>Nominal Pipe (In.) (mm)</th>
<th>3 (75)</th>
<th>4 (100)</th>
<th>5 (125)</th>
<th>6 (150)</th>
<th>8 (200)</th>
<th>10 (250)</th>
<th>12 (300)</th>
<th>15 (375)</th>
<th>18 (450)</th>
<th>24 (600)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Pipe O.D. (In.) (mm)</td>
<td>3.6 (91)</td>
<td>4.6 (117)</td>
<td>5.6 (147)</td>
<td>7 (178)</td>
<td>9.2 (231)</td>
<td>12 (305)</td>
<td>14.5 (368)</td>
<td>18 (451)</td>
<td>22 (559)</td>
<td>28 (711)</td>
</tr>
</tbody>
</table>

*All diameters available with or without perforations.
*Check with sales representative for availability by region.
**Pipe O.D. values are provided for reference purposes only, values stated for 3- through 24-inch are ±0.5 inch. Contact a sales representative for exact values.
ADS N-12® PLAIN END PIPE (per AASHTO) SPECIFICATION

Scope
This specification describes 4- through 60-inch (100 to 1500 mm) ADS N-12 plain end pipe (per AASHTO) for use in gravity-flow drainage applications.

Pipe Requirements
ADS N-12 plain end pipe (per AASHTO) shall have a smooth interior and annular exterior corrugations.
- 4- through 10-inch (100 to 250 mm) shall meet AASHTO M252, Type S or SP.
- 12- through 60-inch (300 to 1500 mm) shall meet AASHTO M294, Type S or SP or ASTM F2306.
- Manning’s “n” value for use in design shall be 0.012.

Joint Performance
Pipe shall be joined with coupling bands covering at least two full corrugations on each end of the pipe. Standard connections shall meet or exceed the soil-tight requirements of AASHTO M252, AASHTO M294, or ASTM F2306. Gasketed connections shall incorporate a closed-cell synthetic expanded rubber gasket meeting the requirements of ASTM D1056 Grade 2A2. Gaskets, when applicable, shall be installed by the pipe manufacturer.

Fittings
Fittings shall conform to AASHTO M252, AASHTO M294 or ASTM F2306.

Material Properties
Virgin material for pipe and fitting production shall be high density polyethylene conforming with the minimum requirements of cell classification 424420C for 4- through 10-inch (100 to 250 mm) diameters, and 435400C for 12- through 60-inch (300 to 1500 mm) diameters, as defined and described in the latest version of ASTM D3350, except that carbon black content should not exceed 4%. The 12- through 60-inch (300 to 1500mm) virgin pipe material shall comply with the notched constant ligament-stress (NCLS) test as specified in Sections 9.5 and 5.1 of AASHTO M294 and ASTM F2306 respectively.

Installation
Installation shall be in accordance with ASTM D2321 and ADS recommended installation guidelines, with the exception that minimum cover in trafficked areas for 4- through 48-inch (100 to 1200 mm) diameters shall be one foot (0.3 m) and for 44- and 60-inch (1350 and 1500 mm) diameters, the minimum cover shall be 2 ft. (0.6 m) in single run applications. Backfill for minimum cover situations shall consist of Class 1, Class 2 (minimum 90% SPD) or Class 3 (minimum 90%) material. Maximum fill heights depend on embedment material and compaction level; please refer to Technical Note 2.01. Contact your local ADS representative or visit our website at www.ads-pipe.com for a copy of the latest installation guidelines.

Pipe Dimensions

<table>
<thead>
<tr>
<th>Pipe I.D. in (mm)</th>
<th>4 (100)</th>
<th>6 (150)</th>
<th>8 (200)</th>
<th>10 (250)</th>
<th>12 (300)</th>
<th>15 (375)</th>
<th>18 (450)</th>
<th>24 (600)</th>
<th>30 (750)</th>
<th>36 (900)</th>
<th>42 (1050)</th>
<th>48 (1200)</th>
<th>54* (1350)</th>
<th>60 (1500)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe O.D. in (mm)</td>
<td>4.8 (122)</td>
<td>6.8 (175)</td>
<td>9.1 (231)</td>
<td>11.4 (290)</td>
<td>14.5 (368)</td>
<td>18 (457)</td>
<td>22 (559)</td>
<td>28 (711)</td>
<td>36 (914)</td>
<td>42 (1067)</td>
<td>48 (1215)</td>
<td>54 (1372)</td>
<td>61 (1549)</td>
<td>67 (1702)</td>
</tr>
</tbody>
</table>

Perforations
All diameters available with or without perforations

**Pipe O.D. values are provided for reference purposes only, values stated for 12- through 60-inch are ± 1 inch. Contact a sales representative for exact values.

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Notes:

1. Anchoring method, design and placement to be determined by the project design engineer.

2. See standard detail 101 for pipe installation.

Recommendations:
1. All pipe systems shall be installed in accordance with ASTM D2321, "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications," Latest Addition

2. Measures should be taken to prevent migration of native fines into backfill material, when required.

3. Foundation: Where the trench bottom is unstable, the contractor shall excavate to a depth required by the engineer and replace with suitable material as specified by the engineer. As an alternative and at the discretion of the design engineer, the trench bottom may be stabilized using a geotextile material.

4. Bedding: Suitable material shall be Class I, II or III; the contractor shall provide documentation for material specification to engineer, unless otherwise noted by the engineer. Minimum bedding thickness shall be 4" (100mm) for 4"-12" (100mm-300mm); 6" (150mm) for 30"-60" (750mm-900mm).

5. Initial backfill: Suitable material shall be Class I, II or III in the pipe zone extending not less than 6" above crown of pipe. The contractor shall provide documentation for material specification to engineer, material shall be installed as required in ASTM D2321, Latest Edition.

6. Minimum cover: Minimum cover, H, in non-traffic applications (grass or landscape areas) is 12" from the top of pipe to ground surface. Additional cover may be required to prevent flotation. For traffic applications, minimum cover, H, is 12" up to 48" diameter pipe and 24" of cover for 54"-60" diameter pipe, measured from top of pipe to bottom of flexible pavement or to top of rigid pavement.

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**RECOMMENDED MINIMUM TRENCH WIDTHS**

<table>
<thead>
<tr>
<th>PIPE DIAM</th>
<th>MIN. TRENCH WIDTH</th>
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<tbody>
<tr>
<td>4&quot;</td>
<td>21&quot;</td>
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<tr>
<td>6&quot;</td>
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<td>8&quot;</td>
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<td>88&quot;</td>
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<tr>
<td>60&quot;</td>
<td>90&quot;</td>
</tr>
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</table>

**MINIMUM RECOMMENDED COVER BASED ON VEHICLE LOADING CONDITIONS**

<table>
<thead>
<tr>
<th>PIPE DIAM</th>
<th>H-25</th>
<th>HEAVY CONSTRUCTION (75T AXLE LOAD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&quot;-48&quot;</td>
<td>12&quot;</td>
<td>48&quot;</td>
</tr>
<tr>
<td>54&quot;-60&quot;</td>
<td>24&quot;</td>
<td>60&quot;</td>
</tr>
</tbody>
</table>

*: Vehicles in excess of 75t may require additional cover

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**MINIMUM RECOMMENDED COVER BASED ON RAILWAY LOADING CONDITIONS**

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<thead>
<tr>
<th>PIPE DIAM</th>
<th>COOPER E-85</th>
</tr>
</thead>
<tbody>
<tr>
<td>UP TO 24&quot;</td>
<td>24&quot;</td>
</tr>
<tr>
<td>30&quot;-36&quot;</td>
<td>36&quot;</td>
</tr>
<tr>
<td>42&quot;-60&quot;</td>
<td>48&quot;</td>
</tr>
</tbody>
</table>

**: Cover is measured from top of pipe to bottom of railway tie.

**: E-80 cover requirements, are only applicable to ASTM F 2036 pipe.
NOTES:

1. ANCHORING METHOD, DESIGN AND PLACEMENT TO BE DETERMINED BY THE PROJECT DESIGN ENGINEER

2. SEE STANDARD DETAIL 101 FOR PIPE INSTALLATION RECOMMENDATIONS

---

**Diagrams:**

- **Secure Anchor Straps in the Valley Between Corrugations**
- **Native Soil**
- **Tie Downs Provided by Others**
- **Initial Backfill**
- **Bedding Class 1 Material Only**
- **Suitable Foundation**
- **Undisturbed Earth**
- **Geotextile Wrap**
- **Native Soil**
- **Suitable Foundation**
NOTES:

1. ALL REFERENCES TO CLASS I OR II MATERIAL ARE PER ASTM D3211 "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS", LATEST EDITION.

2. ALL RETENTION AND DETENTION SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D3211, LATEST EDITION AND THE MANUFACTURER'S PUBLISHED INSTALLATION GUIDELINES.

3. MEASURES SHOULD BE TAKEN TO PREVENT THE MIGRATION OF NATIVE FINES INTO THE BACKFILL MATERIAL. WHEN REQUIRED, SEE ASTM D3211.

4. FILTER FABRIC: A GEOTEXTILE MAY BE USED AS SPECIFIED BY THE ENGINEER TO PREVENT THE MIGRATION OF FINES FROM THE NATIVE SOIL INTO THE SELECT BACKFILL MATERIAL.


6. BEDDING: SUITABLE MATERIAL SHALL BE CLASS I OR II. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MINIMUM BEDDING THICKNESS SHALL BE 4" (100MM) FOR 4-24" (100MM-600MM) 6" (150MM) FOR 30-48" (750MM-900MM).

7. INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I OR II IN THE PIPE EXTENDING NOT LESS THAN 6" ABOVE CROWN OF PIPE. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D3211, LATEST EDITION.

8. MINIMUM COVER: MINIMUM COVER OVER ALL RETENTION/DETENTION SYSTEMS IN NON-TRAFFIC APPLICATIONS (GRAVEL OR LANDSCAPE AREAS) IS 12" FROM TOP OF PIPE TO GROUND SURFACE. ADDITIONAL COVER MAY BE REQUIRED TO PREVENT FLOATATION. TRAFFIC APPLICATIONS, MINIMUM COVER IS 12" UP TO 30" DIAMETER PIPE AND 24" OF COVER FOR 42" - 60" DIAMETER PIPE, MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT.

*CLASS I BACKFILL REQUIRED AROUND 60" DIAMETER FITTINGS.
APPENDIX C
Maintenance and Inspection Forms
### MAINTENANCE ACTIVITIES PERFORMED

#### ROUTINE WORK

- ______ Trash/Debris Removal
- ______ Accumulated Sediment Removal
- ______ Other (Describe)

#### Describe Restoration and Rehabilitation Work

---

Estimated Manhours:

Equipment/Material Used:

Comments:

---

This Maintenance Activity Form shall be kept indefinitely and made available to the City of Elizabeth Engineering Department upon request.
## STORMWATER MANAGEMENT SYSTEM
### INSPECTION REPORT FORM
(Underground Infiltration/Detention Basins and Storm Sewers)

**Date:** __________________________

**Development Name:** Jersey Walk Residential Development

**Address:** 907-931 East Jersey Street, City of Elizabeth, NJ  
**Inspector:**

**Weather:**

**Date of Last Rainfall:**

**Amount:**

**Inches:**

**Detention Basin Location:**

### Reason for Inspection:

<table>
<thead>
<tr>
<th>Routine</th>
<th>Complaint</th>
<th>After Significant Rainfall Event</th>
</tr>
</thead>
</table>

### INSTRUCTION SCORING - For each facility inspection item, insert one of the following scores:

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No deficiencies identified</td>
</tr>
<tr>
<td>1</td>
<td>Monitor (potential for future problem exists)</td>
</tr>
<tr>
<td>2</td>
<td>Routine maintenance required</td>
</tr>
<tr>
<td>3</td>
<td>Immediate repair necessary</td>
</tr>
<tr>
<td>N/A</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

### FEATURES

#### 1.) Catch Basins

- Sediment/Debris Accumulation
- Condition of Casting
- Condition of Concrete Box
- Condition of Pipe Penetrations
- Other (Explain Below)

#### 4.) Basin Access/Inspection Manhole

- Sediment/Debris Accumulation
- Condition of Pipes
- Other (Explain Below)

#### 4.) Basin Control Structure

- Sediment/Debris Accumulation
- Condition of Casting
- Condition of Concrete Box
- Condition of Pipe Penetrations
- Other (Explain Below)

#### 5.) Backflow Preventer

- Sediment/Debris Accumulation
- Condition of Concrete Box
- Other (Explain Below)

#### 3.) Storm Sewers

- Sediment/Debris Accumulation
- Cracking of Pipe
- Deformation
- Asphalt Settlement Above
- Other (Explain Below)

**Inspection Summary / Additional Comments:**

---

**OVERALL FACILITY RATING** (Circle One)

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
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This inspection form shall be kept indefinitely and made available to the City of Elizabeth Engineering Department upon request.