

STORMWATER MANAGEMENT OPERATIONS AND MAINTENANCE MANUAL

Located at

**BLOCK 7, LOT 2.03
501-511 LAKE TERRACE**

In

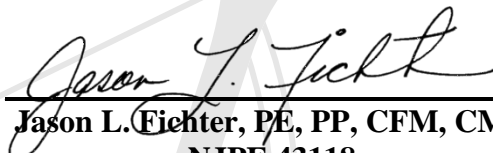
**BOROUGH OF BRADLEY BEACH
MONMOUTH COUNTY, NJ**

Has been prepared for

**501 LAKE TERRACE, LLC
1412 MAIN STREET
ASBURY PARK, NJ 07712**

on

June 1, 2021


**Jason L. Fichter, PE, PP, CFM, CME
NJPE 43118**

Insite Job #: 20-1472-01

InSite Engineering, LLC

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TABLE OF CONTENTS

I. INTRODUCTION 1
II. PROJECT DESCRIPTION..... 2
III. RESPONSIBILITY FOR OPERATION AND MAINTENANCE 3
IV. GENERAL MAINTENANCE INFORMATION..... 4
V. DESIGNATED INSPECTORS LIST 6
VI. INSPECTION AND INSPECTION CHECKLIST 7
VII. FUNCTIONAL MAINTENANCE..... 8
VIII. MAINTENANCE SCHEDULE 14
X. MAINTENANCE TOOLS AND EQUIPMENT..... 15
XI. MAINTENANCE COSTS..... 16
XII. REFERENCES 16

APPENDICES

I. MANUFACTURER’S RECOMMENDED MAINTENANCE PRECEDURE FOR
SUBSURFACE INFILTRATION/DETENTION SYSTEM
II. SAMPLE MAINTENANCE WORK ORDER, LOG, AND CHECKLIST
III. SAMPLE INSPECTION CHECKLIST
IV. SAMPLE INSPECTION LOG
V. OPINION OF PROBABLE COSTS
VI. GRADING AND DRAINAGE PLAN, LANDSCAPE PLAN,
AND CONSTRUCTION DETAILS

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I. INTRODUCTION

The proposed project is located at 501 – 511 Lake Terrace in the Borough of Bradley Beach, and is bounded existing residential buildings on all sides. The property is currently fully developed with two existing buildings, walkways and associated parking. The proposed project consists of the reconstruction of concrete walkways, expansion of an existing asphalt parking lot, and associated landscape and lighting improvements.

This manual addresses the maintenance issues for the specific components of the four subsurface infiltration/detention systems. This manual also addresses the functional maintenance category, as represented by the preventative maintenance component and the corrective maintenance component, as well as the aesthetic category of the stormwater management systems.

The primary emphasis of this maintenance program is on Preventative rather than Corrective Maintenance. Aesthetic maintenance will also play a key role on this maintenance program. When performed regularly, Aesthetic maintenance will help reduce the required amount of both Preventative and Corrective maintenance. It will maintain the visual appeal of a Stormwater Management Facility and allow it to reflect positively on the maintenance staff, owner, and community.

Both the Borough and NJDEP require the following procedures be followed as per NJAC 7:8-5.8:

- a. Copies of the maintenance plan must be provided to the owner and operator of the stormwater management measure. Copies must also be submitted to all reviewing agencies as part of each agency's approval process and in some instances recorded with the County Clerk.
- b. The title and date of the maintenance plan and the name, address, and telephone number of the person with stormwater management maintenance responsibility as specified in the plan must be recorded on the deed of the property on which the measure is located. Any change in this information due, for example, to a change in property ownership, must also be recorded on the deed.

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- c. The person with maintenance responsibility must evaluate the maintenance plan for effectiveness at least annually and revise as necessary.
- d. A detailed, written log of all preventative and corrective maintenance performed at the stormwater management measure must be kept, including a record of all inspections and copies of maintenance-related work orders.
- e. The person with maintenance responsibility must retain and, upon request, make available the maintenance plan and associated logs and other records for review by a public entity with administrative, health, environmental, or safety authority over the site.

II. PROJECT DESCRIPTION

The project is not considered a major development by the Stormwater Control section of the Borough of Bradley Beach Ordinance (Section 396-5) or the NJDEP Stormwater Management requirements (NJAC 7:8) and therefore water quality, water quantity and groundwater recharge measures are not required for the proposed improvements pursuant thereto. Furthermore, since there are no appreciable changes proposed to the land use, land cover, or topography of the site, no changes will occur to the hydrology of the site. Therefore, no additional stormwater management facilities are required. The impervious coverage, site runoff, and grading design closely matches the existing conditions and will have no negative impact on the project. However, to further improve the proposed improved conditions, we have proposed four (4) drywells to collect the roof runoff from the existing buildings to greatly reduce the stormwater runoff from the site.

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III. RESPONSIBILITY FOR OPERATION AND MAINTENANCE

This manual is prepared by InSite Engineering, LLC to provide a mechanism by which remedial repairs and routine maintenance items can be performed to avoid long term degradation of the stormwater management facilities.

The parties responsible for the shared maintenance repair, and guarantee of the stormwater management facilities onsite will be as follows:

501 LAKE TERRACE, LLC
1412 MAIN STREET
ASBURY PARK, NJ 07712

Contact Person:
Peter Siegel
PSiegel@rentjerseyshore.com
(732) 772-5656

The drainage plan and any future revisions shall be recorded upon the deed of record for the property. The responsible parties, as indicated above, are to contract directly with outside contractors for the maintenance and repair of the stormwater management facilities.

This includes maintenance of onsite landscape areas and required snow removal operations. Periodic maintenance of the stormwater management facilities is to be contracted with and performed by a qualified contractor.

Should ownership of the property change, permanent arrangements shall be made requiring that the operation and maintenance of all facilities shall pass to any successive owner.

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IV. GENERAL MAINTENANCE INFORMATION

This document has been prepared to provide direction in the maintenance of the Stormwater Management Facilities located at 501-511 Lake Terrace within Block 7, Lot 2.03, situated in the Borough of Bradley Beach, Monmouth County, New Jersey. A well-organized maintenance manual will protect the Stormwater Management Facility against deterioration while prolonging the life of the facility as well. The manual establishes a basic maintenance program based primarily on systematic inspections of the facility by a representative of the property owner.

A regular inspection means the visual inspection of the facilities at scheduled periods to check for any signs of deterioration in the materials or functioning of the constructed systems. The designated inspector shall perform informal inspections, also identified herein as maintenance inspections. Informal inspection means the visual inspection of the onsite facilities by the inspector to detect any deterioration of the facilities.

During each inspection, a checklist of items shall be used. The completed checklist shall be signed by the inspector and appropriately filed by the owner.

This manual is intended as a guide outlining the proper procedure for conducting routine maintenance for the Stormwater Management Facilities. A copy of this manual shall be provided to the appointed individual or company who will perform the onsite inspections. Should the individual/company responsible for the inspections change, a copy of this manual shall be given to the new inspector to maintain consistency of the inspection reports. A continuous record of the operations and maintenance of the facilities must be maintained. The designated inspectors list lists the official and various contractors responsible for inspections. This section shall be updated periodically pending any changes to the list.

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This section of the manual has been prepared to provide the Inspector with a simple and systematic method for inspecting, operating and maintaining the stormwater management system. For the most part, the maintenance for the facilities involves observation rather than evaluation. The following sections provide a step-by-step procedure to assist the inspector in performing all duties in a rational and orderly manner. The inspector must become familiar with the background information in this manual.

Finally, prior to conducting an inspection or performing routine maintenance, the inspector must review the Maintenance Tools and Equipment List, and the Inspection and Inspection Checklist located within this manual. Each time an inspection reveals the need for maintenance, the inspector shall notify the owner, who may hire a contractor to perform the work (under the direction of a New Jersey Licensed Professional Engineer as needed). Each time maintenance is performed on the stormwater management facilities, the inspector must record the incident and place a copy of the maintenance checklist on file. Inspections shall be performed a minimum of once every year and after each major storm event of 1 inch of rain or more. Routine maintenance shall be performed after each inspection and each major storm event as required.

This manual addresses the need to properly plan for the maintenance of the Stormwater Management Facilities by addressing the maintenance issues for varying components of the proposed underground detention/infiltration pipes, stormwater structures and basins as they relate to preventative maintenance, corrective maintenance, and aesthetic maintenance. This manual also addresses the costs associated with the maintenance requirements for the facilities.

The primary emphasis of this maintenance program is on Preventative rather than Corrective Maintenance. The goal of this maintenance program is to provide a sufficient amount of Preventative Maintenance to minimize (or entirely eliminate) any Corrective Maintenance procedures.

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V. DESIGNATED INSPECTORS LIST

This section must be updated periodically to reflect the name(s) and telephone number(s) of the Inspectors and Contractors who are appointed to perform the inspections and maintenance of the Stormwater Management Facilities:

Inspectors Name/Company Address Telephone Number

- 1.
- 2.
- 3.

Designated Contractor

- 1.
- 2.
- 3.

Professional Engineer Address Telephone Number

- 1.
- 2.
- 3.

Officers

- 1.
- 2.

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VI. INSPECTION AND INSPECTION CHECKLIST

The proposed Stormwater Management Facilities shall be inspected on a regular basis during informal maintenance procedures and after major rainfall events of 1” or more. Additional regularly scheduled inspections shall also occur by qualified personnel. The inspections shall include, but are not limited to, the following:

Informal Inspection:

- a. Inspect inlet structures for debris and trash along pavement areas.
- b. Inspect pavement for signs of settling (depressions) and ponding.
- c. Inspect outlet control structures for debris, trash, external damage to structure, and graffiti.
- d. Inspect system bottoms for standing water within 72 hours after storm event.

Regularly Scheduled Inspections

- a. All informal inspection items
- b. Inspect pipes for clogging by sediments, garbage, and debris
- c. Inspect outlet control structures interior for sediment, debris, garbage and structural damage.

The inspection checklist and log should be copied and completed for required items every time an inspection is performed. In general, informal inspections should be performed every 2-4 weeks year-round. After each inspection, maintenance operations shall be directed as necessary.

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VII. FUNCTIONAL MAINTENANCE

A. Introduction

Functional Maintenance is the maintenance required to keep a Stormwater Management Facility functional or operational at all times. Functional Maintenance includes both preventative (routine) maintenance and corrective (emergency) maintenance.

1. Preventative Maintenance

Preventative Maintenance includes functional maintenance procedures that are required to maintain a Stormwater Management Facility's intended operation and safe condition by preventing the occurrence of problems and malfunctions. Preventative maintenance will be performed in accordance with the direction presented in this manual. Typical routine procedures include silt and debris removal, and upkeep of moving parts. Since it is performed on a regular basis, preventative maintenance is simpler to schedule and budget for and, ultimately, is easier and less expensive to perform than corrective maintenance.

2. Corrective Maintenance

Corrective maintenance includes the functional maintenance procedures that are required to correct a problem or malfunction at a Stormwater Management Facility and to restore the facility's intended operation and safe condition. Based upon the severity of the problem, corrective maintenance must be performed on an as-needed or emergency basis. By its nature, corrective maintenance is much more difficult to schedule and budget for and, ultimately, is generally more difficult and expensive to perform than preventative maintenance.

3. Aesthetic Maintenance

Aesthetic maintenance is the maintenance required to enhance or maintain the visual appeal of a facility. The stormwater facilities have been designed to be an integral component of the development. As such, these facilities should not have an impact on the aesthetic quality of the development as a whole.

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4. Procedures

- a. Copies of the maintenance plan must be provided to the owner and operator of the stormwater management measure. Copies must also be submitted to all reviewing agencies as part of each agency's approval process and in some instances recorded with the County Clerk.
- b. The title and date of the maintenance plan and the name, address, and telephone number of the person with stormwater management maintenance responsibility as specified in the plan must be recorded on the deed of the property on which the measure is located. Any change in this information due, for example, to a change in property ownership, must also be recorded on the deed.
- c. The person with maintenance responsibility must evaluate the maintenance plan for effectiveness at least annually and revise as necessary.
- d. A detailed, written log of all preventative and corrective maintenance performed at the stormwater management measure must be kept, including a record of all inspections and copies of maintenance-related work orders.
- e. The person with maintenance responsibility must retain and, upon request, make available the maintenance plan and associated logs and other records for review by a public entity with administrative, health, environmental, or safety authority over the site.

B. Underground Detention Systems

The manufacturer of the ADS pipe within the system has their own specific procedure for maintenance, which is included at the end of this manual. At a minimum, however, the following protocol shall be followed.

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i. Preventative Maintenance Procedures

The purpose of preventative maintenance procedures is to assure the detention systems remains operational and safe at all times, while minimizing the need for emergency or corrective maintenance.

1. Access to Facility

All manholes, risers, cleanouts, etc. shall remain in accessible condition at all times. This includes the prohibition of locking and/or blocking mechanisms.

2. Removal and Disposal of Trash and Debris

A regularly scheduled program of debris and trash removal from the detention and inlet/pipe conveyance system will reduce the chance of outlet structures and other components becoming clogged and inoperable during storm events. The detention and inlet/pipe conveyance systems are to be inspected for clogging and excessive debris and sediment accumulation at least four (4) times annually as well as after every storm exceeding one (1") of rainfall. This inspection should be done at least 2 or 3 days after a rain event so that all of the detention areas have been drained and the water is at the lowest level. Visually inspect the system at all manhole locations. Measure and document the amount of silt at manhole each location. Inspect each pipe opening to ensure that the silt level or any foreign objects are not blocking the pipes. Typically, a majority of the larger materials will be collected in the upstream catch basins, therefore these upstream catch basins should be inspected at the same time that the system is inspected to remove any large sediment or floatables.

Remove any blockages during the inspection process only if you can do so safely from the top of the system without entering into the system. **Do not go into the system under any circumstances** without proper ventilation equipment and training as required by OSHA. Pass the information on for action to the appropriate maintenance personnel if you cannot remove the blockages from above during the inspection process. Be sure to describe which structure and the type of material that needs to be removed.

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The sediment level in the underground detention system can be determined from the outside of the system by opening up all the structures and using a long measuring pole (such as a 2" diameter wooden rod) to measure the amount of sediment at each location. Force the pole to the bottom of the system and then remove it and measure the amount of sediment at that location. Again, do not go into the system under any circumstances without proper ventilation equipment and training as required by OSHA.

Disposal of debris and trash must comply with all local, county, state, and federal waste flow control regulations. Only suitable disposal and recycling sites should be utilized. Agencies regulating solid waste management should be contacted for information on disposal.

3. Outlet Structure

Any outlet structure shall be inspected for the following items:

- Outlet structure
- All attaching appurtenances
- Outfall pipes

The outlet structure is to be inspected for cracking, spalling or any other signs of degradation. The pop-up emitters are to be inspected to ensure that the plates, fasteners, and gaskets are in good working order. All hinges, angles, bolts, etc. shall be inspected for corrosion or degradation. All items that exhibit severe degradation are to be replaced. The outfall pipe shall be inspected for any visible signs of cracking, spalling, or wear. All degraded portions shall be repaired.

4. Structural Stability

The detention/infiltration system components shall be inspected for signs of degradation including vandalism, animal damage, settlement, any scouring, sloughing, seepage or rotting. Any signs of the above mentioned items shall be recorded on the appropriate form.

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5. System Structure Performance

The detention/infiltration system is estimated to completely drain in seventy-two (72) hours for the water quality design storm (1.25 in.) event. This time is used to evaluate the system's performance. If significant increases or decreases in the normal drain time are observed, the basin structures must be evaluated and appropriate measures are to be taken to restore the proper functioning of the system.

ii. Corrective Maintenance Procedures

1. Structural Repair Outlet Structure

Structural damage to outlet and inlet structures from vandalism, flood events, or other causes must be repaired promptly. Equipment, materials and personnel must be available to perform these repairs on short notice. The immediacy 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 qualified personnel. A list of qualified consultants and contractors shall be maintained in order to undertake the damage analysis and repairs in a timely fashion.

2. Snow and Ice Removal

Accumulation of snow and ice can threaten the function of the system, particularly at inlets and outlets. Provide the equipment, materials, and personnel to monitor and remove snow and ice from these areas as necessary to assure the continued function of the system during winter months.

3. Removal of Debris and Sediment

Sediment, debris and trash which threaten the discharge capacity of the system should be removed immediately and properly disposed of in a timely manner. Equipment and personnel must be available to perform the removal work on short notice. The lack of an available disposal site should not delay the removal of trash, debris and sediment. Temporary disposal sites should be identified and available for immediate use. A list of qualified contractors shall be maintained in order to respond to this situation.

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The detention/infiltration system should be completely cleaned whenever the sediment occupies more than 10 to 15% of the originally designed system's volume or as local code requires (check with your municipality in regards to cleaning criteria as the allowable sediment before cleaning may be more or less than described here).

Do not enter the underground stormwater detention/infiltration system unless you are properly trained, equipped, and qualified to enter a confined space as identified by local occupational safety and health regulations.

Sediment removal should take place when the basin is thoroughly 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, state and federal waste regulations.

There are many maintenance companies that are in business to help you clean your underground stormwater detention/infiltration and water quality units.

Maintenance is typically performed using a vacuum truck. Sediment should be flushed towards a vacuum hose for thorough removal. Remove the manhole cover at the top of the system and lower a vacuum hose into one of the rows of the system. Open up the manhole at the opposite end of the system and use sewer jetting equipment to force water in the same row from one end of the system row to the opposite side.

Place the vacuum hose and the sewer jetting equipment in the next row and repeat the process until all of the rows have been cleaned.

When finished, replace all covers that were removed and dispose of the collected material properly.

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iii. Aesthetic Maintenance

Aesthetic maintenance is primarily not applicable to underground facilities. However, above ground system components shall be kept clean and replaced in the event of vandalism and/or theft.

VIII. MAINTENANCE SCHEDULE

All maintenance shall be completed according to the following schedule. The inspection reports shall be summarized and signed by the inspector. These reports shall include a summary of the performance, condition of the entire stormwater system and recommendations for the repairs and/or replacement of facilities. If any deficiencies are observed in the stormwater management facility, the inspector shall notify the owner that corrective action should be implemented as soon as possible. The inspection reports shall be kept on file by the owners and shall be available for review by governing agencies as required.

Maintenance items required shall be completed as soon as possible after the item is identified for repair. Items under preventative maintenance shall be performed during routine maintenance of the site to ensure that the onsite systems are free of sediments, debris and garbage so that they continue to function in the appropriate manner.

The stormwater management systems shall have informal (preventative maintenance) inspections performed during regularly scheduled landscaping maintenance periods and after significant storm events of 1 inch of rain or more per 1 hour. These inspections shall occur year-round. A regular inspection for the stormwater facilities shall be performed once every year and shall be performed between the months of March and May or between September and November. The enclosed forms shall be used to assist in the inspection procedure. All maintenance repairs must be completed as outlined in this manual and records of it shall be kept as part of the annual inspection and maintenance report.

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IX. MAINTENANCE TOOLS AND EQUIPMENT

The following is a list of required inspection equipment for routine maintenance procedures and inspections.

1. A clipboard, a pencil and the inspection checklist – the inspection checklist is included in the Appendix.
2. A standard 6-foot collapsible ruler.
3. A camera – photographs or observed portions of the facilities will provide a measure of performance when comparing past and present maintenance practices or conditions.
4. A flashlight – a flashlight can be used to observe the inside of the inlets onsite.

The following is a list of tools and machinery that are typically required to maintain a Stormwater Management Facility.

1. Transportation Equipment
 - a. Trucks for transportation of materials
 - b. Trucks for transportation of equipment
 - c. Vehicles for transportation of personnel
2. Debris, Trash and Sediment Removal Equipment
 - a. Vacuum truck
 - b. Water Jetting units
3. Miscellaneous Equipment
 - a. Shovels
 - b. Rakes
 - c. Picks
 - d. Wheel Barrows
 - e. Painting Equipment
 - f. Gloves
 - g. Standard Mechanics Tools
 - h. Tools for maintenance of equipment

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- i. Safety equipment
 - j. Tools for concrete work (mixers, forms, etc.)
4. Materials
- a. Paint
 - b. Paint removers
 - c. Spare parts for equipment
 - d. Concrete

X. MAINTENANCE COSTS

In order to properly implement a stormwater management facilities maintenance plan, the costs associated with the maintenance procedures must be budgeted into the overall design of the system. Please refer to the Probable Costs Data Sheet included within this manual for general costs associated with the necessary equipment needed to maintain the system properly.

XI. REFERENCES

New Jersey Department of Environmental Protection. April 2004/September 2014. *New Jersey Stormwater Best Management Practices Manual, as amended.*

Stormwater Management Facilities Maintenance Manual. New Jersey Department of Environmental Protection. Trenton, New Jersey.

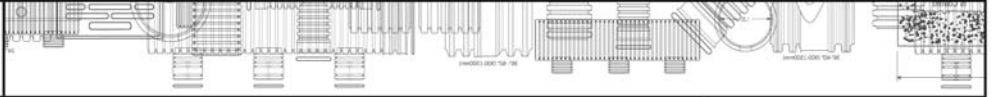
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APPENDIX I
MANUFACTURER'S RECOMMENDED
MAINTENANCE PRECEDURE FOR SUBSURFACE
INFILTRATION/DETENTION SYSTEM

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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.

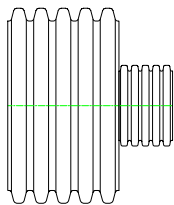
Introduction

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.

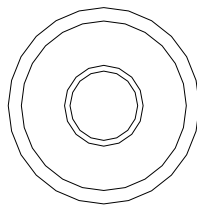
System Accessories and Fittings

Concentric Reducers

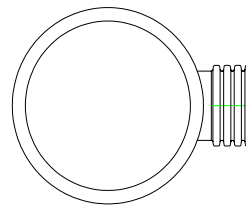
Concentric Reducers are fittings that transition between two pipes, either in line with one another or at perpendicular angles. The centerlines of the two pipes are at the same elevation. When a concentric reducer is used to connect the manifold pipe to the lateral pipes, most debris will be trapped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



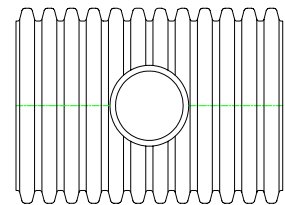
SIDE VIEW



SECTION VIEW



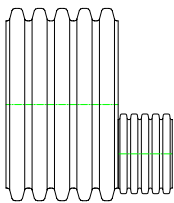
SIDE VIEW



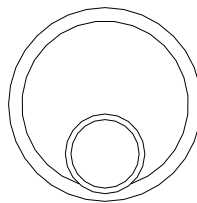
SECTION VIEW

Eccentric Reducers

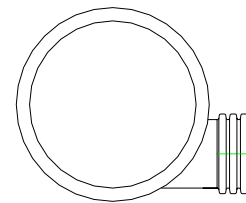
Eccentric Reducers are fittings that transition between two pipes, either in line with one another or at perpendicular angles. The inverts of the two pipes are at the same elevations. When an eccentric reducer is used to connect the manifold pipe to the lateral pipes, most debris will follow the flow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



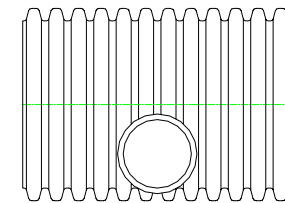
SIDE VIEW



SECTION VIEW



SIDE VIEW



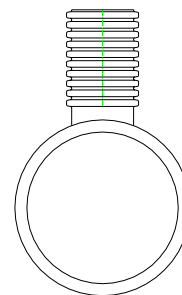
SECTION VIEW

Riser

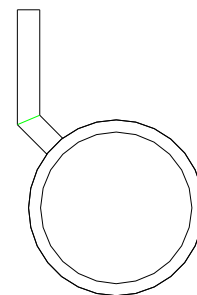
Each retention/detention system typically has risers strategically placed for maintenance and inspection of the system. These risers are typically 24" in diameter or larger and are placed on the manifold fittings.

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

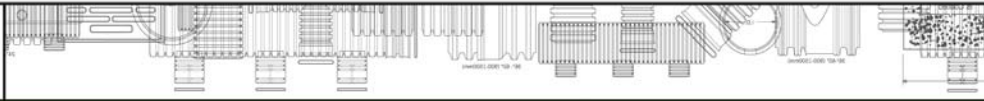
All retention/detention systems must be cleaned and maintained. Underground systems may be maintained more cost effectively if these simple guidelines are followed. Inspection should be performed at a minimum of once per year. Cleaning should be done at the discretion of individuals responsible to maintain 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.



TECHNICAL NOTE

N-12[®] HP Storm Drainage Pipe Repair Options

TN 5.12
January 2010

Introduction

ADS N-12 HP for storm drainage is made of polypropylene (PP) resin making the pipe 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 note discusses some of the products available that can be used to repair damaged PP pipe or joints in the field.

Repair Options

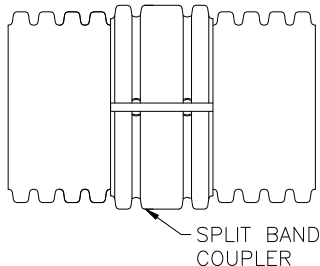
One of the primary considerations in selecting a repair method is the degree of joint performance required. Watertight repairs are generally used on pipe with watertight joints, and soil-tight repairs on pipe with soil-tight joints. This helps keep costs in line and prevents the repair from being the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

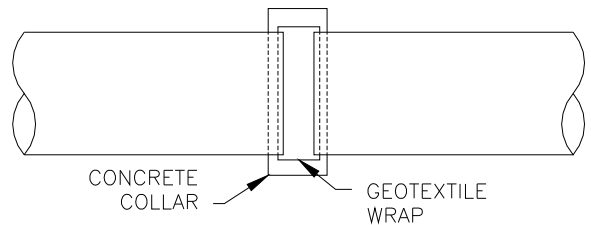
Mar Mac Polyseal Pipe Coupler, 12- through 60-inch (300 - 1500 mm), consists of a mastic adhesive base layer, a cross-laminated polyethylene middle layer with a spun-bonded geotextile polypropylene cloth outer layer. The coupler incorporates self-adhering rubberized bonding mastic and securing bands 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 thermoplastic pipe products. *Note: Mar-Mac bands shall be installed in accordance with manufacturer's recommendations.*



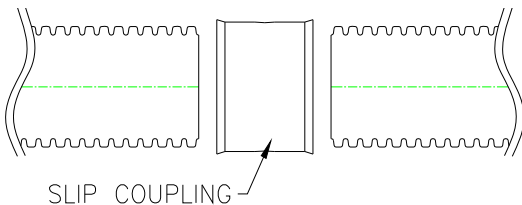
Split band couplers, 12- through 60-inch (300 – 1500 mm), will provide a soil-tight repair with or without gaskets. Split band couplers engage the exterior corrugations and therefore can only be used for corrugated exterior pipe. This repair method should only be used if the damaged area is in a non-trafficked green area, is cosmetic in nature, confined to a single corrugation, and is not defined as structural damage. The coupler shall be centered over 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 split band couplers. They are a convenient, low-cost repair alternative, and are typically used to repair soil-tight thermoplastic pipe products with a corrugated exterior.



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 thermoplastic pipe products.



Slip Couplings 12- through 24-inch (300 – 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. Due to the exterior gasket, the slip coupling can only be used on pipe with a corrugated exterior. PVC slip couplings are most commonly used with watertight smooth interior, corrugated exterior thermoplastic 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™, 12- 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: Thermoplastic 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.

APPENDIX II
SAMPLE MAINTENANCE WORK ORDER,
LOG, AND CHECKLIST

InSite Engineering, LLC

1955 Route 34, Suite A1 • Wall, NJ 07719
732-531-7100 (ph) • 732-531-7344 (fx) • InSite@InSiteEng.net • www.InSiteEng.net
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**Maintenance Work Order, Log, and Checklist
for
Stormwater Facilities
Located at
501 Lake Terrace, LCC; Block 7, Lot 2.03**

Date:

--	--	--	--	--

Preventative Maintenance

(place check in box of completed items for each date)

Work Item	Items Required	Items Done	Comments and Special Instructions
Trash and Debris Removal			
Bottom of Subsurface Basin			
Perimeter Areas			
Access Areas and Roads			
Outlet Structure and Trash Racks			
Inlets			
Discharge Pipe			
Other			
Sediment Removal			
Inlets			
Outlet Structure			
Discharge Pipe			
Trash Rack			
Bottom of Subsurface Basin			(Performed by Vacuum Truck)
Mechanical Components			
Locks			
Access Hatches			
Other Preventative Maintenance			

Corrective Maintenance

(place check in box of completed items for each date)

Removal of Debris & Sediment					
Structural Repairs					
Dewatering					
Erosion Repair					
Snow & Ice Removal					

Additional Maintenance Remarks and Notes:

APPENDIX III

SAMPLE INSPECTION CHECKLIST

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**Inspection Checklist
for
Stormwater Facilities
Located at
501 Lake Terrace, LCC; Block 7, Lot 2.03**

Facility Item	O.K.	Routine	Urgent	Comments
Bottom of Subsurface Basin				
Standing Water				
Settlement				
Trash and Debris				
Sediment				
Aesthetics				
Other				
Inlet Structure				
Condition of Structure				
Erosion				
Trash and Debris				
Sediment				
Aesthetics				
Other				
Outlet Structure				
Condition of Structure				
Erosion				
Trash and Debris				
Sediment				
Mechanical Components				
Aesthetics				
Other				
Other				
Miscellaneous				
Effectiveness of Existing Maintenance Program				

OK-The item checked is in good condition, and the maintenance program is adequate.

Routine-The item checked requires attention, but does not present an immediate threat to the facility function or other facility components.

Urgent-The item checked requires immediate attention to keep the facility operational or to prevent damage to other facility components.

Comments-Provide explanation and details if columns 2 or 3 are checked

Additional Maintenance Remarks and Notes:

--

APPENDIX IV
SAMPLE INSPECTION LOG

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**Inspection Log
for
Stormwater Facilities
Located at
501 Lake Terrace, LCC; Block 7, Lot 2.03**

(place check in box of completed items for each date)

Date:

--	--	--	--	--	--

Bottom of Subsurface Basin

Standing Water						
Settlement						
Trash and Debris						
Sediment						
Aesthetics						
Other						

Inlet Structure

Condition of Structure						
Erosion						
Trash and Debris						
Sediment						
Aesthetics						
Other						

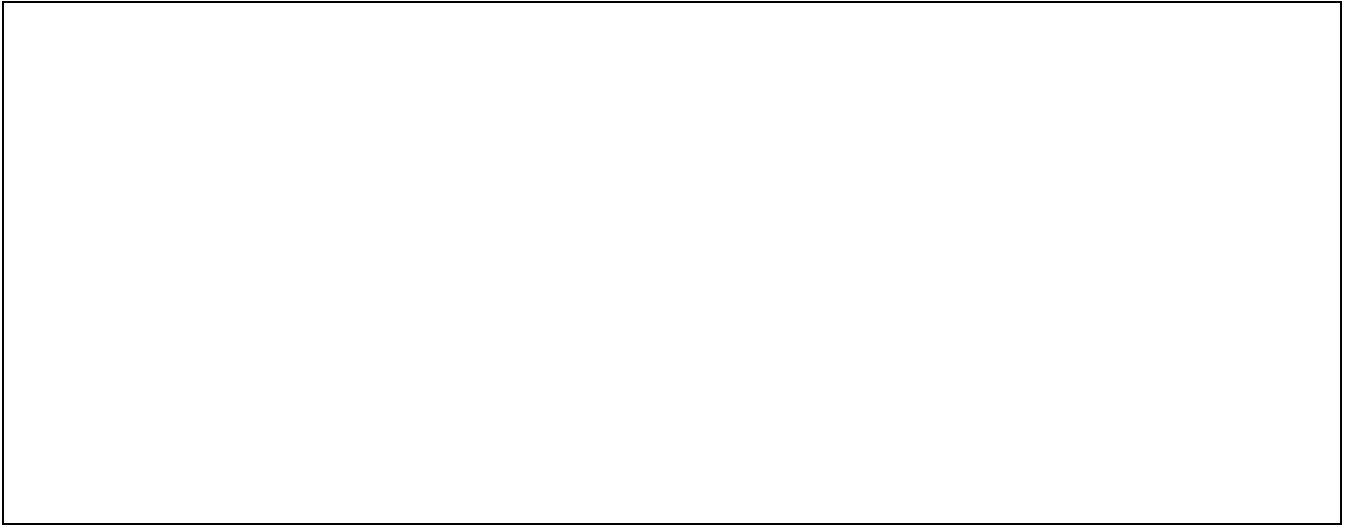
Outlet Structure

Condition of Structure						
Erosion						
Trash and Debris						
Sediment						
Mechanical Components						
Aesthetics						
Other						

Miscellaneous

Effectiveness of Existing Maintenance Program						

Additional Maintenance Remarks and Notes:

A large, empty rectangular box with a thin black border, intended for recording additional maintenance remarks and notes. The box is currently blank.

APPENDIX V
OPINION OF PROBABLE COSTS

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**ENGINEERS OPINION OF PROBABLE COSTS
FOR MAINTENCE OF STORMWATER MANAGMENT FACILITIES
PREPARED FOR
501 - 511 Lake Terrace
BLOCK 7; LOT 2.03**

ESTIMATED ANNUAL COST OF STORMWATER SYSTEMS MAINTENACE								
FREQUENCY	DESCRIPTION	CREW	COST PER HOUR PER CREW	EQUIPMENT	COST PER HOUR	EST. HOURS	COST	COST PER YEAR
Monthly	Litter pickup and grounds repair at and around systems, remove sediment/debris from systems	1 Laborer	\$40.00	Hand tools	\$40.00	6.0	\$240.00	\$2,880.00
Quarterly	Clean outlet control structures, system bottoms, repair any damage	2 Laborers	\$80.00	Water jet and vacuum trucks, pick-up truck and hand tools	\$160.00	8.0	\$1,280.00	\$5,120.00
TOTAL PER YEAR:								\$8,000.00
<p>Notes:</p> <p>1. This engineer's estimate has been prepared based upon review of plans entitled "Preliminary & Final Major Site Plan for 501-511 Lake Terrce" as prepared this office.</p>								

APPENDIX VI

**GRADING AND DRAINAGE PLAN, LANDSCAPE PLAN,
AND CONSTRUCTION DETAILS**

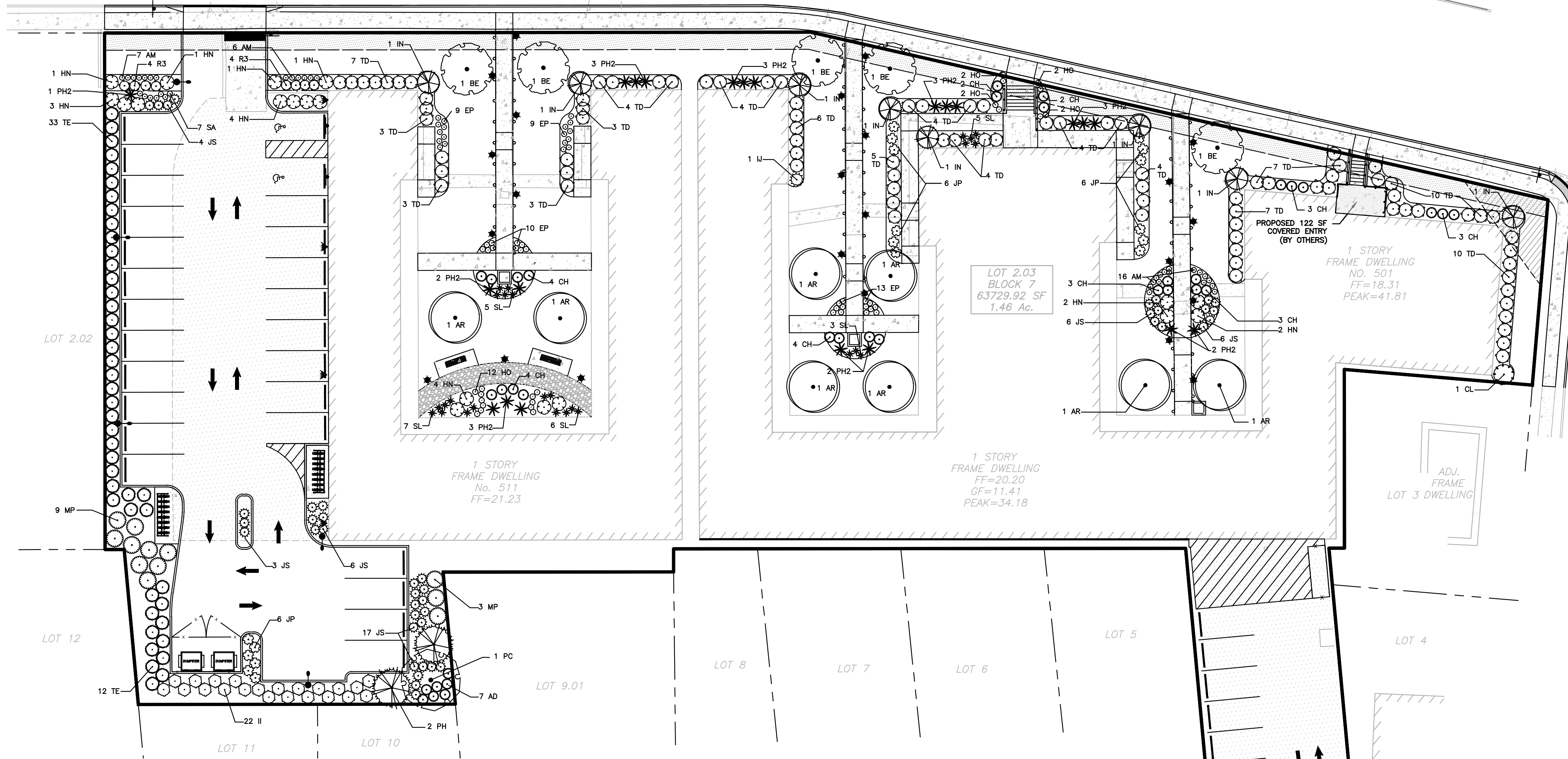
InSite Engineering, LLC

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GENERAL LANDSCAPE NOTES

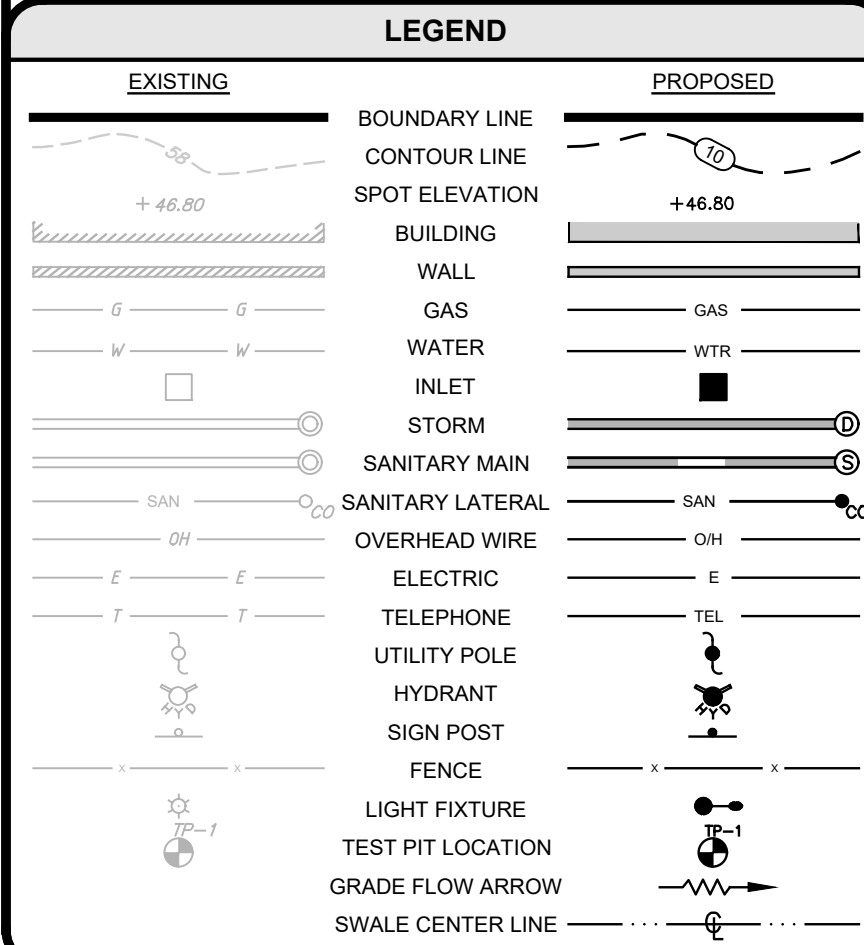
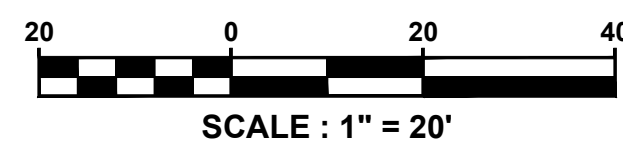
- THIS WORK INCLUDES, BUT IS NOT LIMITED TO THE FURNISHING OF ALL LABOR, MATERIALS, EQUIPMENT, FINAL GRADING, SEEDING, SOIL AMENDMENTS, ETC., AS MAY BE REQUIRED FOR A COMPLETE INSTALLATION.
- AN AGRONOMIC SOILS REPORT SHALL BE PREPARED BY THE OWNER AND FURNISHED TO THE CONTRACTOR, AND ALL RECOMMENDATIONS FROM SUCH REPORT SHALL BE INCORPORATED BY THE CONTRACTOR INTO INSTALLATION OF ALL PLANTING AREAS.
- QUANTITIES SHOWN IN PLANT LISTS ARE FOR CONVENIENCE ONLY. PLANS SHALL GOVERN.
- THE LANDSCAPE CONTRACTOR SHALL NOTIFY THE UNDERSIGNED OF ANY DISCREPANCIES IN PLANT LOCATIONS OR INSUFFICIENT PLANT QUANTITIES DUE TO DIFFERENCES IN PLAN AND ACTUAL FIELD CONDITIONS.
- ALL TREE AND SHRUB MATERIAL SPECIFIED MUST MEET STANDARD INDUSTRY SPECIFICATIONS FOR THE CONTAINER SIZE INDICATED. DOWNSIZING OR SUBSTITUTION OF PLANT MATERIAL WITHOUT PRIOR APPROVAL OF UNDERSIGNED WILL NOT BE ALLOWED.
- ALL LANDSCAPE AREAS SHALL BE GRADED TO A SMOOTH EVEN SURFACE PRIOR TO ANY PLANT INSTALLATION. ALL PLANT MATERIALS SHALL BE INSTALLED USING GOOD HORTICULTURAL PRACTICES IN ACCORDANCE WITH THE PLANS AND DETAILS.
- TREES SHALL NOT BE PLANTED CLOSER THAN FOUR (4) FEET FROM ANY WALKWAY OR PUBLIC SIDEWALK EXCEPT WHERE TREE WELLS OR PARKWAYS ARE PROVIDED IN THE SIDEWALK AREA. ALL TREES PLANTED WITHIN FIVE (5) FEET OF WALKS OR PUBLIC UTILITIES SHALL RECEIVE DEEP ROOT BARRIERS.
- TREE LOCATIONS SHOWN ON PLAN MAY REQUIRE ADJUSTMENT IN THE FIELD. WHENEVER FEASIBLE, TREES SHOULD BE PLANTED A MINIMUM OF TEN (10) FEET FROM ALL UNDERGROUND UTILITIES, STREET LIGHTS, HYDRANTS, AND OUT OF DRAINAGE FLOW LINES. SHOULD THIS NOT BE POSSIBLE, CONTACT THE UNDERSIGNED FOR DECISION ON PLACEMENT.
- ALL TREES IN TURF AREAS SHALL HAVE 12" MIN. CLR. CIRCUMFERENCE AROUND THE TRUNK BASE. PROVIDE 3" MIN. THK. MULCH AT BASE OF TRUNK.
- GROUND COVER TYPE SHOWN SHALL BE PLANTED IN ALL SHRUB AREAS AS SPECIFIED ON PLANS. GROUND COVER SHALL BE PLANTED AT 18" ON-CENTER UNIFORM TRIANGULAR SPACING, AND SHALL BE CONTINUOUS UNDER ALL TREE AND SHRUB MASSES AS SHOWN ON PLAN.
- MATURE PLANTINGS SHALL NOT INTERFERE WITH UTILITIES AND TRAFFIC SIGHT LINES.
- ALL TURF AREAS ARE TO BE SODDED WITH AN APPROVED GRASS MIXTURE.
- ALL TURF AREAS AND PLANTING AREAS ARE TO IRRIGATED. THE CONTRACTOR IS TO PROVIDE A DETAILED IRRIGATION PLAN AND GAIN TOWNSHIP APPROVAL PRIOR TO INSTALLATION.
- ALL PLANT MATERIAL SHALL BE GUARANTEED FOR A 1-YEAR PERIOD FROM THE RELEASE OF THE PERFORMANCE BOND. THE CONTRACTOR, AT NO COST TO THE OWNER, SHALL REPLACE ANY MATERIAL THAT FAILS TO GROW THROUGH THE SPECIFIED MAINTENANCE AND GUARANTEE PERIOD.
- PLANTING AREA BETWEEN THE SIDEWALK AND CURB SHALL REMAIN NATURAL GRASS.
- SEE LANDSCAPING DETAIL SHEET FOR ADDITIONAL PLANTING NOTES AND DETAILS.

LAKE TERRACE (COUNTY ROUTE 18)
(50' R.O.W.)



FLETCHER-LAKE AVENUE (50' R.O.W.)
(30' WIDE BIT. CONC.)

PLANTING SCHEDULE					
DECIDUOUS TREES	QTY	BOTANICAL NAME	COMMON NAME	CONT.	SIZE
AR	8	Amelanchier x grandiflora 'Robin Hill'	Robin Hill Apple Serviceberry	B & B	3" Cal
BE	5	Betula nigra 'Heritage'	Heritage River Birch	B & B	10'-12' HT
PC	1	Prunus virginiana 'Canada Red'	Canada Red Chokecherry	B & B	3" Cal
EVERGREEN TREES	QTY	BOTANICAL NAME	COMMON NAME	CONT.	SIZE
CL	1	Cupressocyparis x leylandii	Leyland Cypress	CONT.	5'-6" HT.
IN	8	Ilex x 'Nellie R. Stevens'	Nellie R. Stevens Holly	B & B	6'-7" HT.
PH	2	Picea pungens 'Hoopsii'	Hoopsii Blue Spruce	B & B	7'-8" HT.
TE	45	Thuja occidentalis 'Emerald'	Emerald Arborvitae	B & B	5'-6" HT.
SHRUBS	QTY	BOTANICAL NAME	COMMON NAME	ROOT	SIZE
AD	7	Azalea x 'Delaware Valley White'	Valley White Azalea	Cont.	18"-24" HT.
CH	28	Clethra alnifolia 'Hummingbird'	Hummingbird Summersweet	Cont.	18"-24" HT.
HN	19	Hydrangea macrophylla 'Nikko Blue'	Nikko Blue Hydrangea	Cont.	2'-2.5' HT.
IJ	1	Ilex crenata 'Steeds'	Steeds Japanese Holly	B & B	3'-4" HT.
II	22	Ilex glabra 'Compacta'	Compact holly	Cont.	2'-2.5' HT.
JP	18	Juniperus chinensis 'Pfitzeriana Nicks Compacta'	Nick's Compact Pfitzer Juniper	Cont.	18"-24" SPD.
JS	42	Juniperus chinensis sargentii	Sargent Juniper	Cont.	18"-24" SPD.
MP	12	Myrica pensylvanica	Northern Bayberry	B & B	3'-4" HT.
R3	8	Rosa x 'Radrazz'	Knock Out Shrub Rose	Cont.	3 GAL.
TD	88	Taxus x media 'Densiformis'	Dense Yew	B & B	2'-2.5' HT.
ANNUALS/PERENNIALS	QTY	BOTANICAL NAME	COMMON NAME	ROOT	SIZE
AM	29	Achillea x 'Moonshine'	Moonshine Yarrow	Cont.	1 GAL.
EP	40	Echinacea purpurea	Purple Coneflower	Cont.	1 GAL.
HO	20	Hemerocallis x 'Stella de Oro'	Stella de Oro Daylily	Cont.	1 GAL.
SA	7	Sedum x 'Autumn Joy'	Autumn Joy Sedum	Cont.	1 GAL.
GRASSES	QTY	BOTANICAL NAME	COMMON NAME	ROOT	SIZE
PH2	22	Panicum virgatum 'Heavy Metal'	Heavy Metal Switch Grass	Cont.	3 GAL.
SL	26	Schizachyrium scoparium	Little Bluestem Grass	Cont.	3 GAL.



NEWARK AVENUE (50' R.O.W.)
(30' WIDE BIT. CONC.)

PROJECT INFORMATION

501-511 LAKE TERRACE

PROJECT LOCATION: BLOCK 7, LOT 2.03
501-511 LAKE TERRACE
BOROUGH OF BRADLEY BEACH
MONMOUTH COUNTY, NJ
TAX MAP SHEET #1

OWNER: 501 LAKE TERRACE, LLC
1412 MAIN STREET
ASBURY PARK, NJ 07712
(732) 772-5656

APPLICANT: 501 LAKE TERRACE, LLC
1412 MAIN STREET
ASBURY PARK, NJ 07712
(732) 772-5656

APPLICANT'S PROFESSIONALS

ATTORNEY: FOX ROTHSCHILD, LLP
49 MARKET STREET
MORRISTOWN, NJ 07960

ARCHITECT: MICHAEL SAVARESE ASSOCIATES
34 SYCAMORE AVENUE, UNIT #1E
LITTLE SILVER, NJ 07739

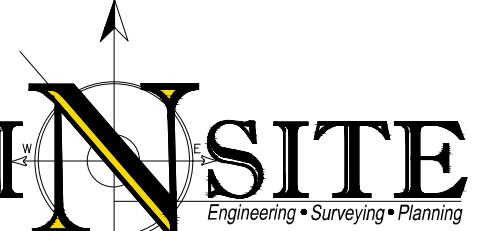
LANDSCAPE ARCHITECT: BML STUDIO, LLC
11 PERMINKLE DRIVE
BARNEGAT, NJ 08005

SURVEYOR: INSITE SURVEYING, LLC
1955 ROUTE 34, SUITE 1A
WALL, NJ 07719



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NJ ONE CALL... 800-272-1000

ELECTRIC	RED
Gas	YELLOW
COMMUNICATION / TV	ORANGE
WATER	BLUE
SEWER	GREEN
TEMP. SURVEY MARKINGS	MAGENTA
BOUNDARY SURVEYING	WHITE



InSite Engineering, LLC
CERTIFICATE OF AUTHORIZATION: 24GA28083200
1955 ROUTE 34, SUITE 1A, WALL, NJ 07719
732-531-7100 (PH) 732-531-7344 (FAX)
InSite@InSiteEng.net www.InSiteEng.net

LICENSED IN: NEW JERSEY, NEW YORK, PENNSYLVANIA, DELAWARE, CONNECTICUT, NORTH CAROLINA, COLORADO, & DISTRICT OF COLUMBIA

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Jason T. Fichter
JASON T. FICHTER, PE, PP, CFM, CME
NJPE #3718 NJPP #726 PAPE 61968
DEPE #013 NYPE #02295 CYPE 23391
NCPCE 33336 DCPE 900682 COPE 38605

REVISIONS

Rev.#	Date	Comment
2	05/01/21	REV. PER CLIENT COMMENTS
1	05/06/21	REV. PER COUNTY COMMENTS
0	11/20/20	INITIAL RELEASE

SCALE: 1"=20' DESIGNED BY: CMB
DATE: 11/20/20 DRAWN BY: JLS
JOB #: 20-1472-01 CHECKED BY: JLF
CAD ID: 20-1472-01/2

NOT FOR CONSTRUCTION APPROVED BY:

FOR CONSTRUCTION PLAN INFORMATION

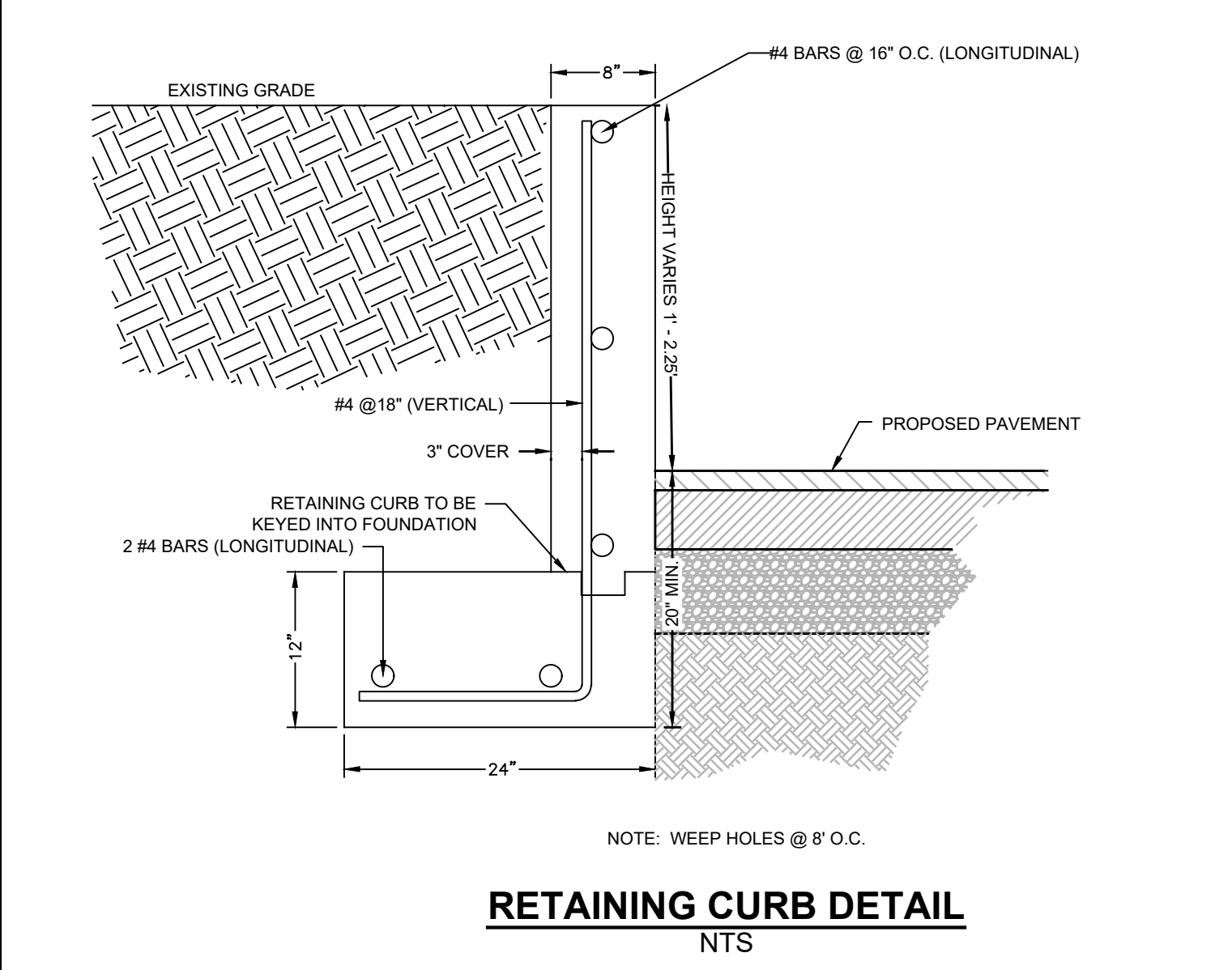
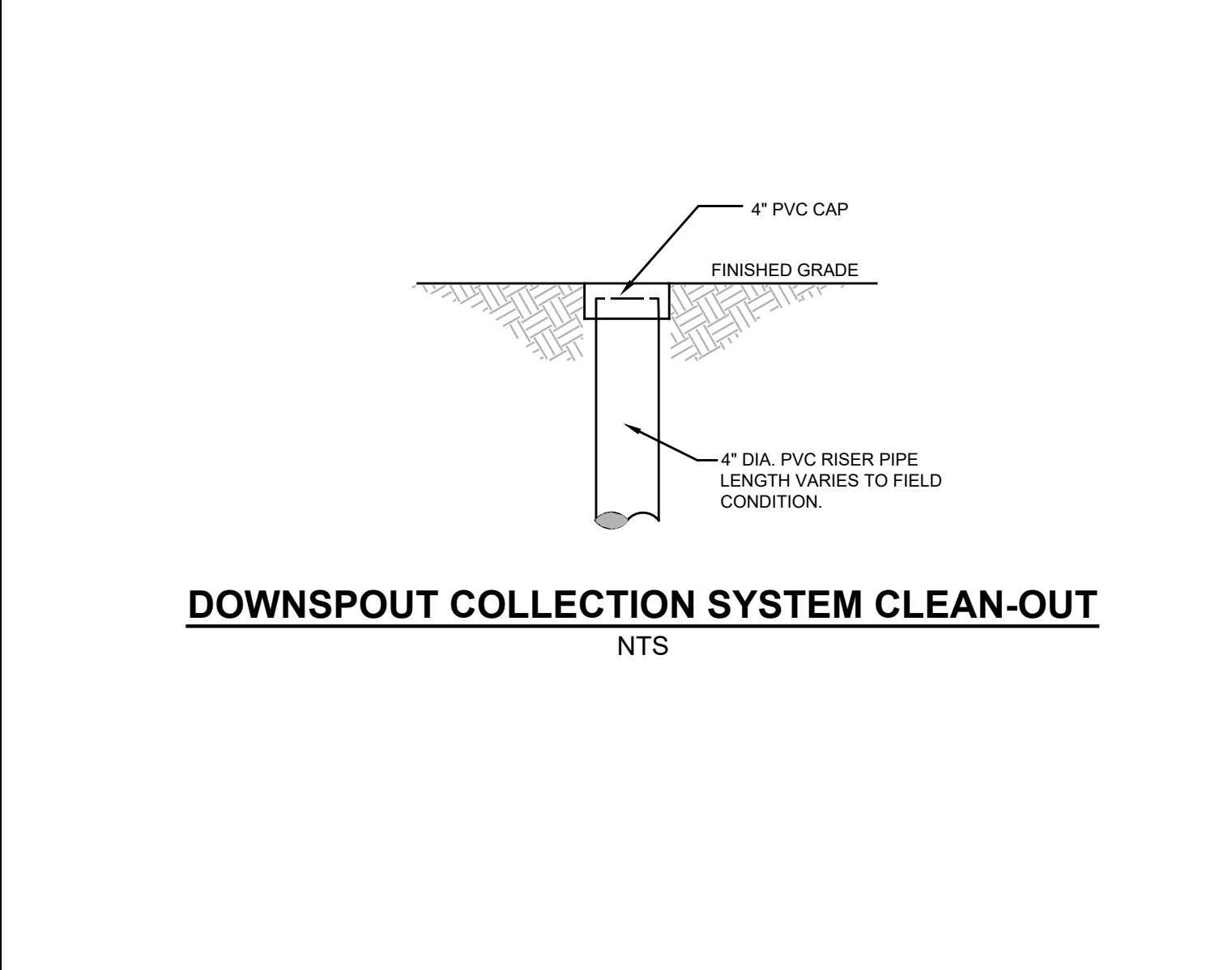
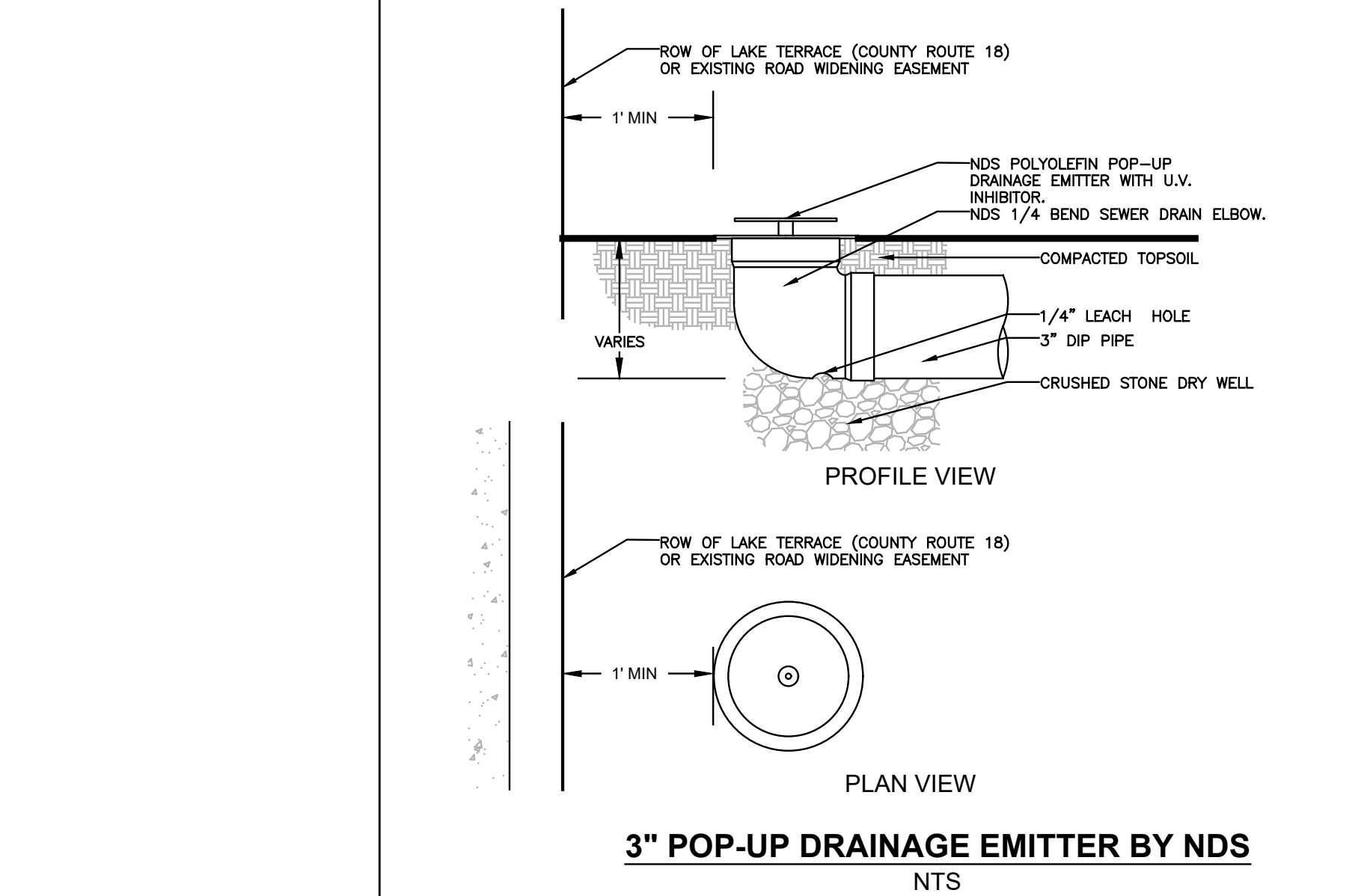
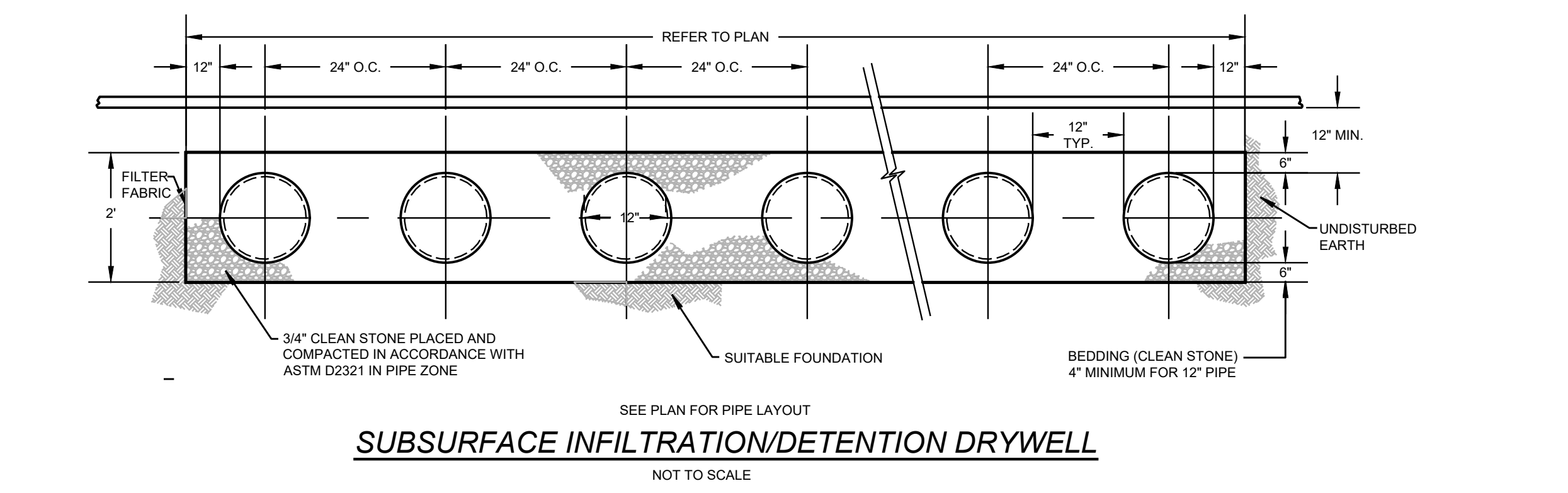
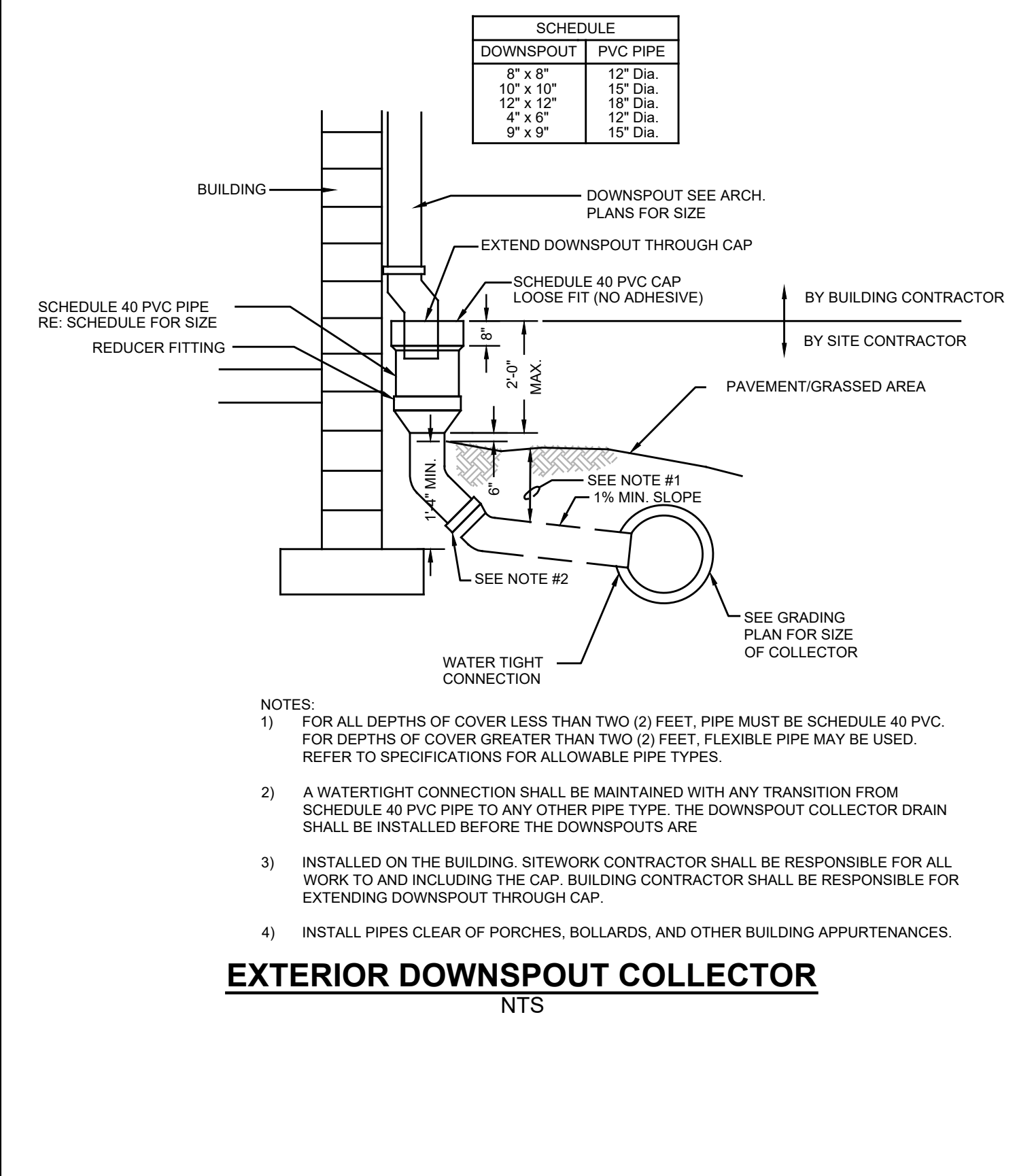
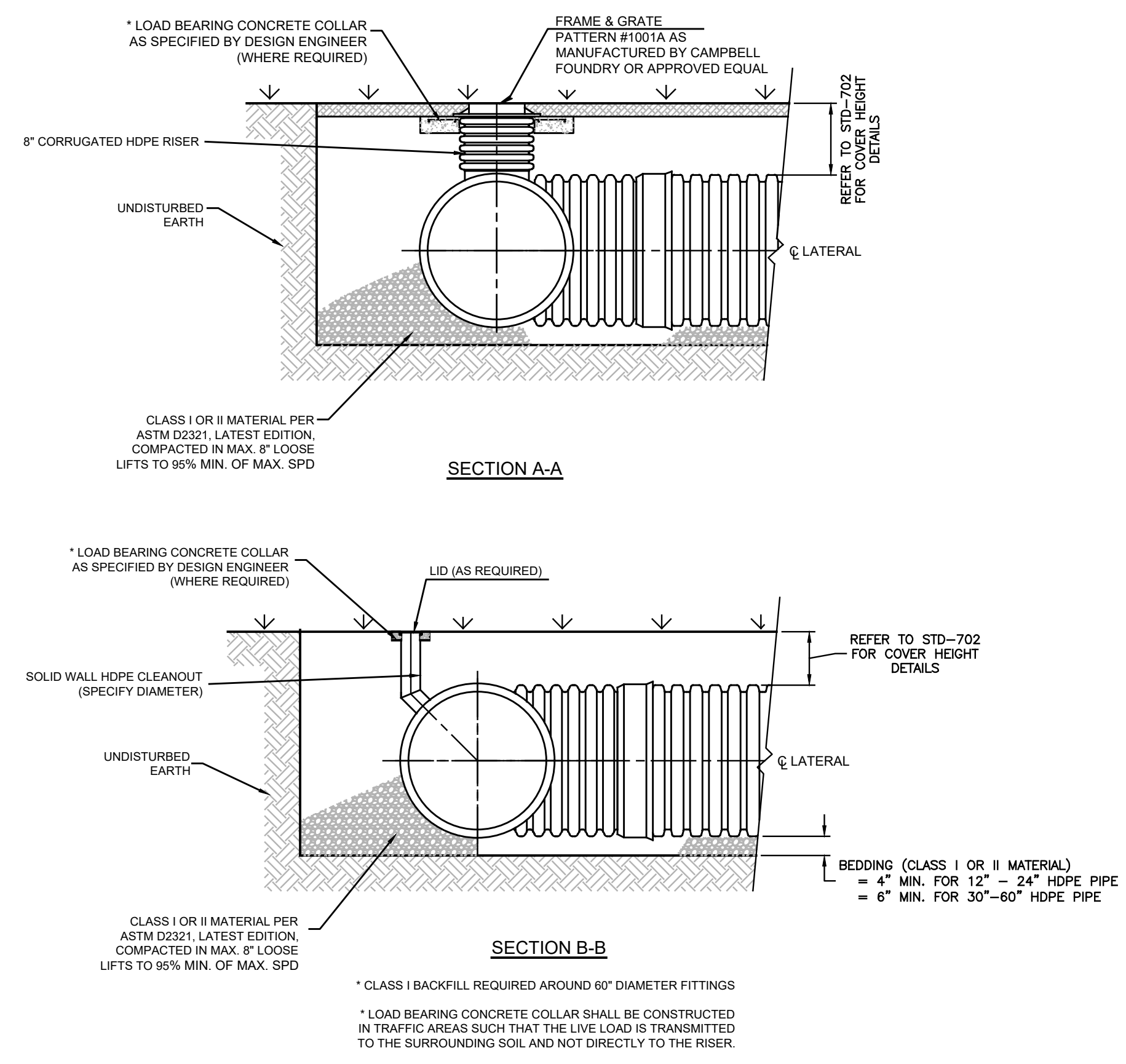
PRELIMINARY & FINAL MAJOR SITE PLAN

LANDSCAPE PLAN

SHEET NO. C600

File: S:\Web\1472 - 501 Lake Terrace_Bradley Beach, NJ\20147201040\Map\05-Landscape.dwg -> 0600 Landscape
Plot: S:\Web\1472 - 501 Lake Terrace_Bradley Beach, NJ\20147201040\Map\05-Landscape.dwg -> 0600 Landscape
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STORAGE VOLUME CALCULATION			
DRYWELL SYSTEM A		DRYWELL SYSTEM B	
Roof runoff $Q = (P \cdot 0.25) / 2$ (SCS Equation) $(P = 0.85)$	Roof runoff $Q = (P \cdot 0.25) / 2$ (SCS Equation) $(P = 0.85)$	Roof runoff $Q = (P \cdot 0.25) / 2$ (SCS Equation) $(P = 0.85)$	Roof runoff $Q = (P \cdot 0.25) / 2$ (SCS Equation) $(P = 0.85)$
$Q =$ Runoff (inches) $P =$ Rainfall = 1.25 in $CH =$ Runoff curve no. = 98 $S = (1000 / CH) \cdot 10 = 0.20$ in	$Q =$ Runoff (inches) $P =$ Rainfall = 1.25 in $CH =$ Runoff curve no. = 98 $S = (1000 / CH) \cdot 10 = 0.20$ in	$Q =$ Runoff (inches) $P =$ Rainfall = 1.25 in $CH =$ Runoff curve no. = 98 $S = (1000 / CH) \cdot 10 = 0.20$ in	$Q =$ Runoff (inches) $P =$ Rainfall = 1.25 in $CH =$ Runoff curve no. = 98 $S = (1000 / CH) \cdot 10 = 0.20$ in
$Q = 1.03$ in	$Q = 1.03$ in	$Q = 1.03$ in	$Q = 1.03$ in
Roof Area = 2084.00 sf Runoff Volume = 179.67 cf	Roof Area = 6539.00 sf Runoff Volume = 563.76 cf	Roof Area = 8948.00 sf Runoff Volume = 693.85 cf	Roof Area = 7257.00 sf Runoff Volume = 625.66 cf
Drywell volume (perf pipe + stone)	Drywell volume (perf pipe + stone)	Drywell volume (perf pipe + stone)	Drywell volume (perf pipe + stone)
Perf pipe diameter 12 in Stone surround 6 in Length of pipe 90 ft trench dim's (square) 2.00 ft pipe diameter 1.00 ft pipe volume/LF 0.79 cf void ratio 0.40 stone volume/LF 1.29 cf	Perf pipe diameter 12 in Stone surround 6 in Length of pipe 275 ft trench dim's (square) 2.00 ft pipe diameter 1.00 ft pipe volume/LF 0.79 cf void ratio 0.40 stone volume/LF 1.29 cf	Perf pipe diameter 12 in Stone surround 6 in Length of pipe 340 ft trench dim's (square) 2.00 ft pipe diameter 1.00 ft pipe volume/LF 0.79 cf void ratio 0.40 stone volume/LF 1.29 cf	Perf pipe diameter 12 in Stone surround 6 in Length of pipe 310 ft trench dim's (square) 2.00 ft pipe diameter 1.00 ft pipe volume/LF 0.79 cf void ratio 0.40 stone volume/LF 1.29 cf
Total storage volume 186.41 cf	Total storage volume 569.59 cf	Total storage volume 704.22 cf	Total storage volume 642.08 cf
Total roof runoff volume 179.67 cf	Total roof runoff volume 563.76 cf	Total roof runoff volume 693.85 cf	Total roof runoff volume 625.66 cf



PROJECT INFORMATION

PROJECT NAME: 501-511 LAKE TERRACE

PROJECT LOCATION: BLOCK 7, LOT 2.03 501-511 LAKE TERRACE BOROUGH OF BRADLEY BEACH MONMOUTH COUNTY, NJ TAX MAP SHEET #1

OWNER: 501 LAKE TERRACE, LLC 1412 MAIN STREET ASBURY PARK, NJ 07712 (732) 772-5656

APPLICANT: 501 LAKE TERRACE, LLC 1412 MAIN STREET ASBURY PARK, NJ 07712 (732) 772-5656

APPLICANT'S PROFESSIONALS:

ATTORNEY: FOX ROTHCHILD, LLP 49 MARKET STREET MORRISTOWN, NJ 07960

ARCHITECT: MICHAEL SAVARESE ASSOCIATES 34 SYCAMORE AVENUE, UNIT #1E LITTLE SILVER, NJ 07739

LANDSCAPE ARCHITECT: BML STUDIO, LLC 11 PERMINKLE DRIVE BARNEGAT, NJ 08005

SURVEYOR: WASTE SURVEYING, LLC 1955 ROUTE 34, SUITE 1A WALL, NJ 07719

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REVISIONS

Rev.#	Date	Comment
2	05/01/21	REV. PER CLIENT COMMENTS
1	05/06/21	REV. PER COUNTY COMMENTS
0	11/20/20	INITIAL RELEASE

SCALE: AS SHOWN DESIGNED BY: CMB

DATE: 11/20/20 DRAWN BY: JLS

JOB #: 20-1472-01 CHECKED BY: JLF

CAD ID: 20-1472-01r2

NOT FOR CONSTRUCTION APPROVED BY:

FOR CONSTRUCTION PLAN INFORMATION

DRAWING TITLE: PRELIMINARY & FINAL MAJOR SITE PLAN

SHEET TITLE: CONSTRUCTION DETAILS

SHEET NO.: C802

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