
STORMWATER MANAGEMENT FACILITIES OPERATION AND MAINTENANCE MANUAL

For

**1251 Jumping Brook Road
Block 128.03, Lot 47
Borough of Tinton Falls
Monmouth County, New Jersey**

Prepared For:

**W&M Associates, LLC
1481 Oak Tree Road
Iselin, NJ 08830**

Prepared By:

**Langan Engineering and Environmental Services, Inc.
300 Kimball Drive
Parsippany, New Jersey 07054
NJ Certificate of Authorization No: 24GA27996400**



**Richard Burrow, P.E.
Professional Engineer License No. 24GE04459300**

**Revised 05 January 2020
25 June 2020
100775501**

LANGAN

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1.0 INTRODUCTION

This manual addresses the operation and maintenance components of the stormwater management facilities for the proposed development at 1251 Jumping Brook Road in Tinton Falls, New Jersey, to ensure their effective, efficient, and enduring service. This plan contains preventative and corrective maintenance tasks and procedures.

As of the date of this report, the party responsible for the preventative and corrective maintenance of the stormwater measures described herein is:

W&M Associates, LLC
1481 Oak Tree Road
Iselin, NJ 08830

The responsible party may change if there is a change in property ownership. Refer to the property deed for additional property ownership and maintenance responsibility information.

2.0 PROJECT DESCRIPTION

The project site is approximately 50 acres and is known as Block 128.03, Lot 47 Tinton Falls, Monmouth County, New Jersey. The site is bound by Jumping Brook Road to the east, commercial and industrial properties to the south and west, and residential development to the north (Refer to Figure 1).

The proposed redevelopment consists of the construction of an approximate 113,016 square foot warehouse building, with associated areas for loading, van parking and car parking. In addition, associated site improvements including utilities, landscaping, and lighting will be incorporated into the proposed development. The proposed stormwater management facilities will include catch basins, pipes, and detention basins.

3.0 STORMWATER MAINTENANCE OBJECTIVES

This maintenance plan has been prepared to help ensure that the stormwater management facilities in place are operating efficiently and reliably. The responsible party shall ensure the long-term/perpetual operation, maintenance, repair, and safety of the stormwater management facilities.

Maintenance procedures are required to maintain safe operation of the stormwater management facility by reducing the occurrence of problems and malfunctions. To be effective, maintenance shall be performed on a regular basis and include such routine procedures as training of staff, periodic inspections, silt and debris removal, and annual review of maintenance and inspection work to identify where the maintenance program could be more effective.

Repair procedures may be required to correct problems or malfunctions of stormwater management facilities and to restore the intended means of operation and safe condition of the facilities. Based upon the severity of the problem, repairs shall be performed on an as-needed or emergency basis which may include procedures such as:

- structural repairs
- mosquito control
- erosion repair
- snow and ice removal
- restoration of vegetation
- removal of debris, sediment and trash which threaten discharge capacity or water quality

In the event that the stormwater management facility becomes a danger to public safety or public health, or if it is in need of maintenance, the municipality may notify the responsible party in writing. Upon receipt of that notice, the responsible party shall have fourteen (14) days to initiate maintenance and repair of the facility in a manner that is approved by the Municipal Engineer or their designee. If the responsible party fails or refuses to perform such maintenance and repair, the municipality may immediately proceed to do so and shall invoice the cost thereof to the responsible party.

4.0 MAINTENANCE OF CONVEYANCE SYSTEMS AND UNDERGROUND RECHARGE / DETENTION SYSTEM

The conveyance systems, including inlets and pipes, are expected to receive and/or accumulate debris and sediment. These systems must be inspected for clogging and excessive debris and sediment accumulation at least annually, as well as after every storm exceeding 1-inch of rainfall. Sediment removal should take place when all runoff has drained from the conveyance network and the systems are reasonably dry.

Disposal of debris, trash, sediment, and other waste material shall be done at suitable disposal/recycling sites and in compliance with all applicable local, county, state and federal waste regulations.

All structural components must be inspected for cracking, subsidence, breaching, wearing, and deterioration at least annually. The condition of surrounding above ground areas shall be inspected for evidence of potential failures or deterioration of buried stormwater facilities.

The routine equipment expected to be utilized for the maintenance tasks include the maintenance log, a pen, a jet vacuum vehicle, shovels, lighting equipment, and a wheel barrow or truck for the hauling of debris. Water and concrete repair materials may also be required depending on the condition of the structures. The cost to perform routine maintenance tasks including inspection of the facilities and removal of debris, sediment and trash is estimated to be \$3,000 per year.

Conveyance system and underground recharge / detention system inspection and maintenance activities shall be recorded on copies of the logs provided in Appendix A. Completed logs shall be kept onsite with this manual and used for future reference.

5.0 MAINTENANCE OF EXTENDED DETENTION BASINS

Extended detention basins are facilities constructed through filling and/or excavation that provide temporary storage of stormwater runoff. Extended detention basins have an outlet structure that detains and attenuates runoff inflows and promotes the settlement of pollutants. An extended detention basin is normally designed as a multi-stage facility that provides runoff storage and attenuation for both stormwater quality and quantity management.

Detention basins shall be inspected for accumulated sediment at least twice annually as well as after every storm exceeding 1-inch of rainfall. Sediment should be removed before it threatens the operation of the storage volume of the basin. Sediment removal should take place when all runoff has drained from the basin and the basin is reasonably dry. Disposal of debris, trash, sediment, and other waste material shall be done at suitable disposal/recycling sites and in compliance with all applicable local, county, State and federal waste regulations.

Basin outlet structures and headwalls shall be inspected for cracking, subsidence, breaching, wearing, and deterioration at least annually. The condition of the ground surface above the outlet pipe shall be inspected for evidence of potential failures or deterioration of the pipe. Structural damage to the outlet structure, trash racks, and headwalls shall be repaired promptly. The analysis of structural damage and the design and performance of structural repairs should only be undertaken by qualified personnel.

Mowing and/or trimming of non-wetland vegetation must be performed at least monthly during the growing season. Vegetated areas must be inspected at least annually for erosion and scour. Any depressions that develop in the basin bottoms shall be filled and replanted as a means of eliminating mosquito breeding habitat. Vegetated areas should also be inspected at least annually for unwanted growth, which should be removed with minimum disruption to the bottom surface and remaining vegetation. If vegetation has greater than 50 percent damage, the area should be reestablished. All vegetation deficiencies should be addressed without the use of fertilizers and pesticides whenever possible.

Damage to dams, embankments, and side slopes shall be repaired promptly. Typical problems include settlement, scouring, cracking, sloughing, seepage, and rutting. The analysis of damage and the design and performance of geotechnical repairs should only be undertaken by qualified personnel.

Snow and ice shall be removed as needed to assure the proper functioning of the basin outlet structure during the winter months.

The routine equipment expected to be utilized for the maintenance tasks include shovels, leaf rakes, soil rakes, topsoil, grass seed, soil amenities such as lime and fertilizer, chemicals such as pesticides and herbicides, riding mower, hand mower, lighting equipment, and a wheel barrow or truck for the hauling of debris. Water and concrete repair materials may also be required depending on the condition of the outlet structures. The cost to perform routine maintenance tasks including grass cutting and maintenance, inspection of the facilities, and removal of debris, sediment and trash is estimated to be \$10,000 per year.

Extended detention basin inspection and maintenance activities shall be recorded on copies of the logs provided in Appendix B. Completed logs shall be kept onsite with this manual and used for future reference.

6.0 MAINTENANCE OF RAIN GARDENS

A rain garden is a shallow depression in a landscaped area that captures stormwater runoff. Rain garden are planted with various native vegetation that remove pollutants from stormwater runoff while recharging groundwater.

Small-scale maintenance is required on a regular basis to evaluate the condition of the plant species and maintain a functioning drainage system. The rain gardens are to be inspected twice a year in the first 3 years after construction is complete. The first inspection is to occur during the growing season and the second in the non-growing season. The following information is to be recorded from these inspections:

- Dominant plant type and distribution with-in the area;
- Planted species type and distribution in the area;
- Invasive species type and distribution in the area (remove invasive species);
- Any indications of the planted species being replaced with other species;
- Survival rate of plants.

Maintenance post 3 year bi-annual inspection period is to occur annually.

- All invasive species and weeds are to be removed by hand.
- Leaf litter and other detritus shall be removed twice per year.
- At the end of the growing season perennial plantings may be trimmed to maintain aesthetic appearances.
- Trees and shrubs should be inspected twice per year to evaluate health and attended to as necessary.
- Bare spots on side slope are to immediately be reseeded after inspection to stabilize the slope and prevent further erosion.

The over flow structure is to be inspected to ensure there is no debris build up and that it is functioning properly.

Rain garden inspection and maintenance activities shall be recorded on copies of the logs provided in Appendix C. Completed logs shall be kept onsite with this manual and used for future reference.

7.0 MAINTENANCE OF WATER QUALITY UNIT

StormFilter

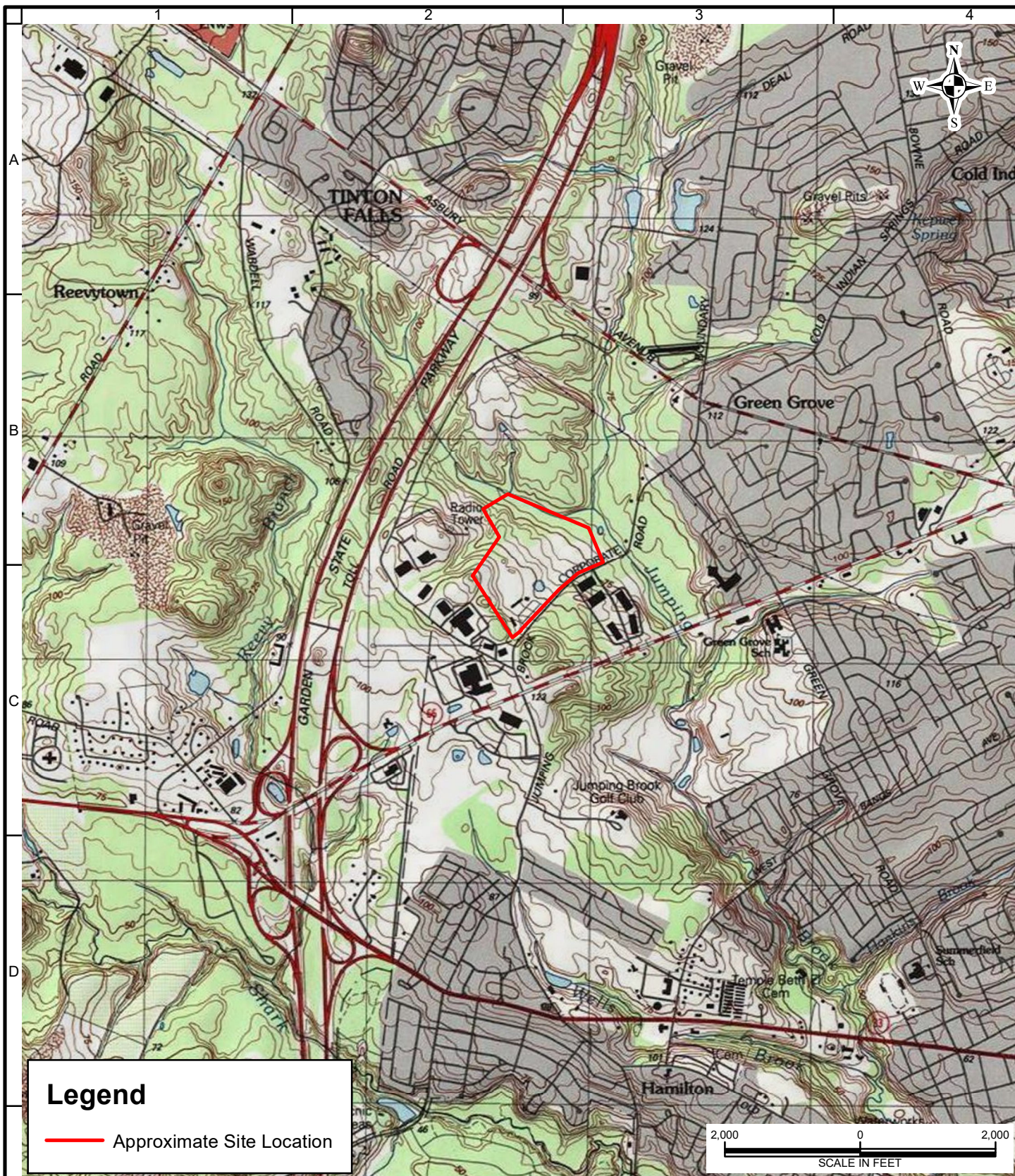
StormFilter is an underground stormwater treatment device comprised of one or more structures that house rechargeable, media-filled cartridges that trap particulates and adsorb pollutants from stormwater runoff such as total suspended solids, hydrocarbons, nutrients, metals, and other common pollutants.

Refer to the CDS Inspection and Maintenance Guide provided in Appendix D for information regarding the maintenance, inspection and cleaning of the CDS structures.

8.0 MAINTENANCE OF STORMWATER MANAGEMENT FACILITY PAPERWORK

All completed inspection logs, maintenance logs, maintenance-related work orders and any other maintenance-related records shall be maintained onsite with this Operation and Maintenance Manual. Upon request these records must be provided for review by a public entity with administrative, health, environmental or safety authority over the site. The maintenance plan outlined herein and completed inspection/maintenance logs shall be evaluated annually for effectiveness in achieving the Objectives outlined in Section 3.

FIGURES



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Langan Engineering, Environmental, Surveying and
Landscape Architecture, D.P.C.
Langan International LLC
Collectively known as Langan

NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

1251 JUMPING
BROOK ROAD

BLOCK No. 128.03, LOT No. 47

BOROUGH OF TINTON FALLS

MONMOUTH COUNTY NEW JERSEY

Drawing Title

USGS SITE
LOCATION MAP

Project No.

100775501

Date

9/4/2019

Scale

1" = 2,000'

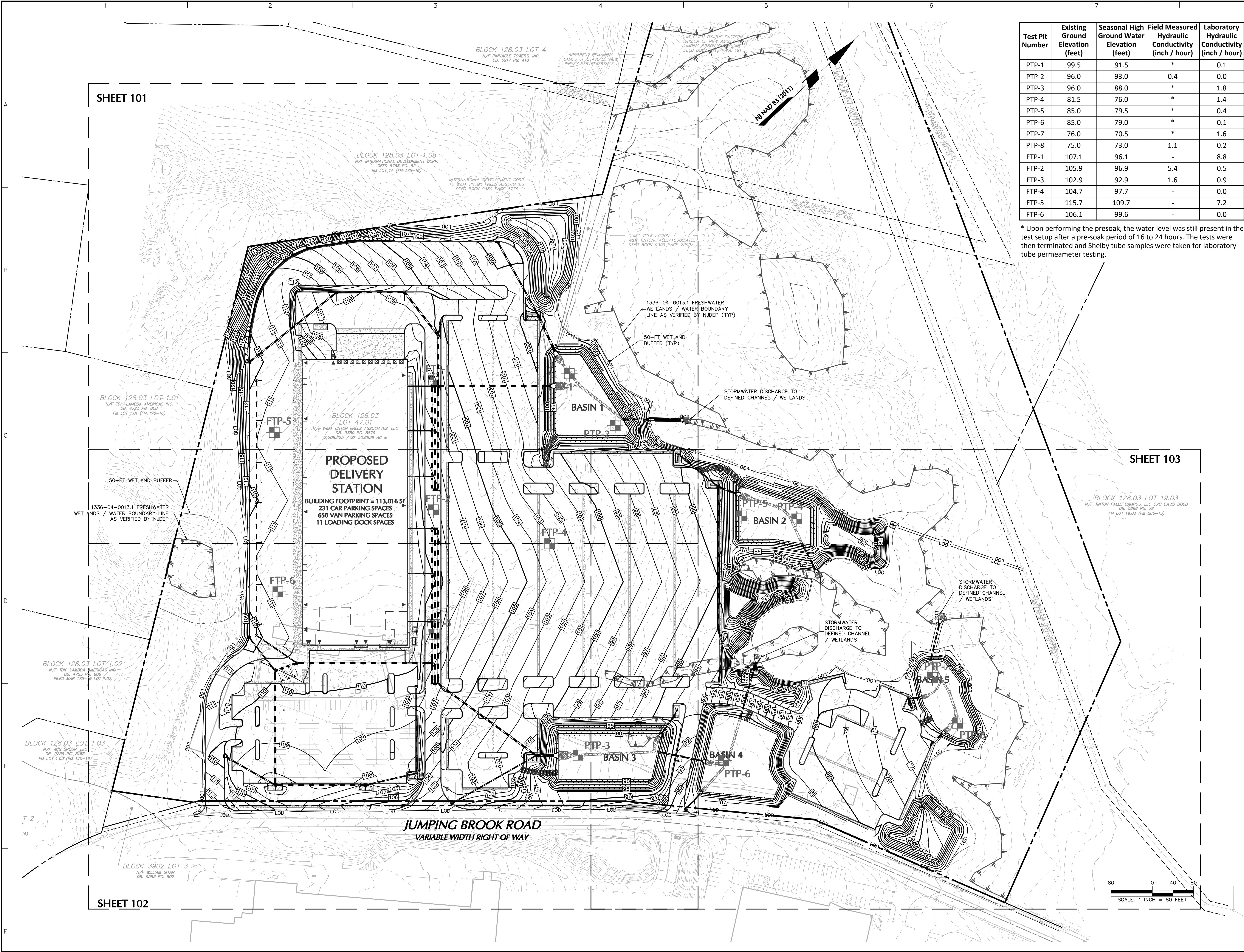
Drawn By

MWen

Figure

1

DRAWINGS



Test Pit Number	Existing Ground Elevation (feet)	Seasonal High Ground Water Elevation (feet)	Field Measured Hydraulic Conductivity (inch / hour)	Laboratory Hydraulic Conductivity (inch / hour)
PTP-1	99.5	91.5	*	0.1
PTP-2	96.0	93.0	0.4	0.0
PTP-3	96.0	88.0	*	1.8
PTP-4	81.5	76.0	*	1.4
PTP-5	85.0	79.5	*	0.4
PTP-6	85.0	79.0	*	0.1
PTP-7	76.0	70.5	*	1.6
PTP-8	75.0	73.0	1.1	0.2
FTP-1	107.1	96.1	-	8.8
FTP-2	105.9	96.9	5.4	0.5
FTP-3	102.9	92.9	1.6	0.9
FTP-4	104.7	97.7	-	0.0
FTP-5	115.7	109.7	-	7.2
FTP-6	106.1	99.6	-	0.0

* Upon performing the presoak, the water level was still present in the test setup after a pre-soak period of 16 to 24 hours. The tests were then terminated and Shelby tube samples were taken for laboratory tube permeameter testing.

- NOTES:
- BOUNDARY INFORMATION AND EXISTING FEATURES FOR BLOCK 128.03, LOTS 47 SHOWN HEREON ARE BASED ON "ALTA/NSPS LAND TITLE SURVEY" DATED 06/24/2020 PREPARED BY LANGAN ENGINEERING, THE CONTRACTOR SHALL VERIFY ALL INFORMATION TO HIS SATISFACTION PRIOR TO THE EXECUTION OF CONTRACTS OR COMMENCING WORK. ANY DISCREPANCIES SHALL BE IMMEDIATELY REPORTED TO THE ENGINEER OF RECORD.
 - ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
 - SITE GRADING SHALL BE PERFORMED IN ACCORDANCE WITH THESE PLANS AND SPECIFICATIONS. THE FILL MATERIAL, PLACEMENT OF FILL, COMPACTION REQUIREMENTS AND THE COMPACTION TESTING REQUIREMENTS ARE DEFINED IN THE GEOTECHNICAL REPORT.
 - THE CONTRACTOR SHALL BE RESPONSIBLE TO NOTIFY LOCAL WATER AND SEWER DEPARTMENTS TO MARK OUT THEIR UTILITIES.
 - CONTRACTOR TO CONFIRM ALL STRUCTURE INVERTS AND NOTIFY ENGINEER OF ANY INCONSISTENCIES PRIOR TO CONSTRUCTION.
 - CONTRACTOR TO BEGIN PIPE NETWORK CONSTRUCTION AT TIE-IN LOCATION (DOWNSTREAM) AND BUILD UPSTREAM.
 - REFER TO ARCHITECTURAL DRAWINGS FOR EXACT ROOF LEADER CONNECTION LOCATIONS. WHERE CONFLICTS EXIST BETWEEN THESE PLANS AND ARCHITECTURAL PLANS, CONTRACTOR TO NOTIFY THE ENGINEER BEFORE CONSTRUCTION.
 - ALL PIPES SHALL BE HDPE UNLESS OTHERWISE NOTED.
 - ALL INLETS SHALL BE TYPE B OR TYPE E UNLESS OTHERWISE NOTED.
 - PROPOSED PIPE CONNECTIONS TO STRUCTURES ARE TO BE EQUIPPED WITH WATER-TIGHT JOINTS.
 - SPOT GRADES REPRESENT PAVEMENT GRADES OR BOTTOM OF CURB UNLESS OTHERWISE NOTED.
 - ALL AREAS SHALL BE WELL GRADED TO MINIMIZE FLAT AREAS, TO PROVIDE PROPER DRAINAGE, AND TO PREVENT LOCALIZED PONDING.
 - ALL SLOPES SHALL BE EQUAL TO OR LESS THAN 3:1. WHERE SLOPES ARE GREATER THAN 3H:1V, EROSION CONTROL MATING SHALL BE USED.
 - ALL STORMWATER MANAGEMENT FEATURES ON THE PROPERTY SHALL BE INSPECTED AND CLEANED/REPAIRED UNDER THE SUPERVISION OF THE TOWNSHIP ENGINEER AT THE TIME OF CONSTRUCTION.
 - ALL STORMWATER INLETS ON THE PROPERTY AND ALONG ITS FRONTAGES SHALL BE EQUIPPED "N-ECO" GRATES. THE SIZES OF THE PROPOSED BERMS ARE SCHEMATICALLY SHOWN AND SUBJECT TO CHANGE BASED ON FIELD CONDITIONS.
 - ALL REINFORCED CONCRETE PIPES SHALL HAVE RUBBER O-RING GASKETS.

1/05/21	PER AGENCY COMMENTS	2
9/17/20	PER TOWNSHIP COMMENTS	1
Date	Description	No.

REVISIONS

SIGNATURE RICHARD BURROW DATE SIGNED
PROFESSIONAL ENGINEER
NJ Lic. No. 24GE04459300

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Project

**1251 JUMPING
BROOK ROAD**

BOROUGH OF TINTON FALLS
BLOCK 128.03, LOT 47

MONMOUTH COUNTY NEW JERSEY

Drawing Title

**OVERALL GRADING
AND DRAINAGE
PLAN**

Project No. Drawing No.

100775501

Date

06/25/2020

Drawn By

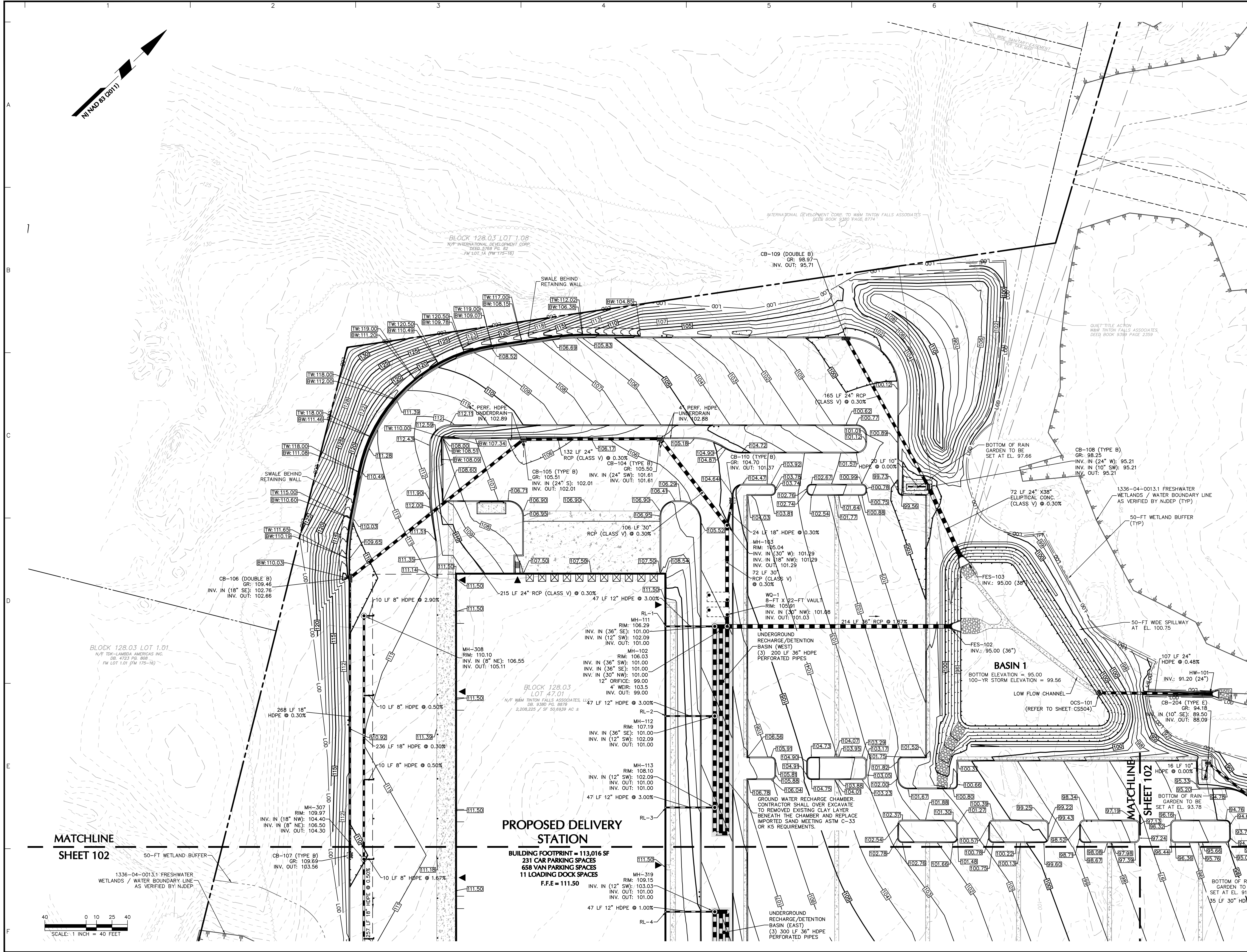
RY

Checked By

RB

CG100

Sheet 14 of 50



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PROFESSIONAL ENGINEER
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Project

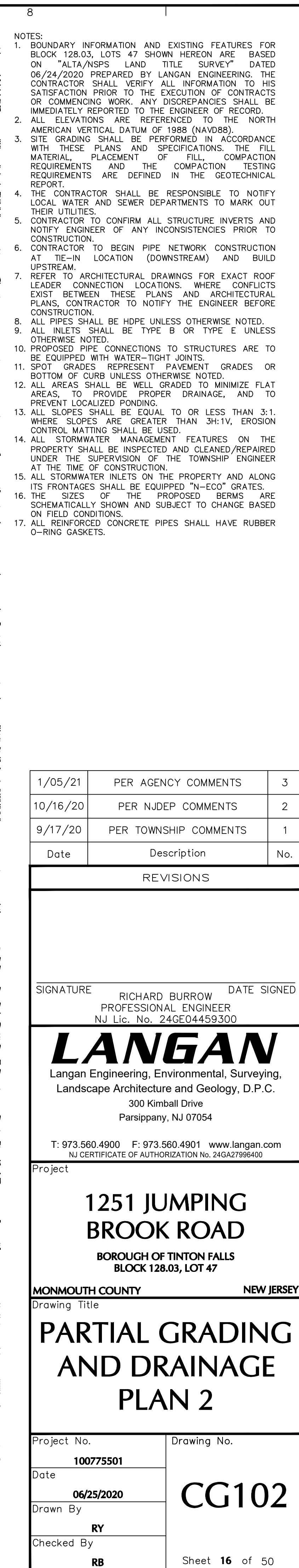
1251 JUMPING BROOK ROAD
BOROUGH OF TINTON FALLS
BLOCK 128.03, LOT 47

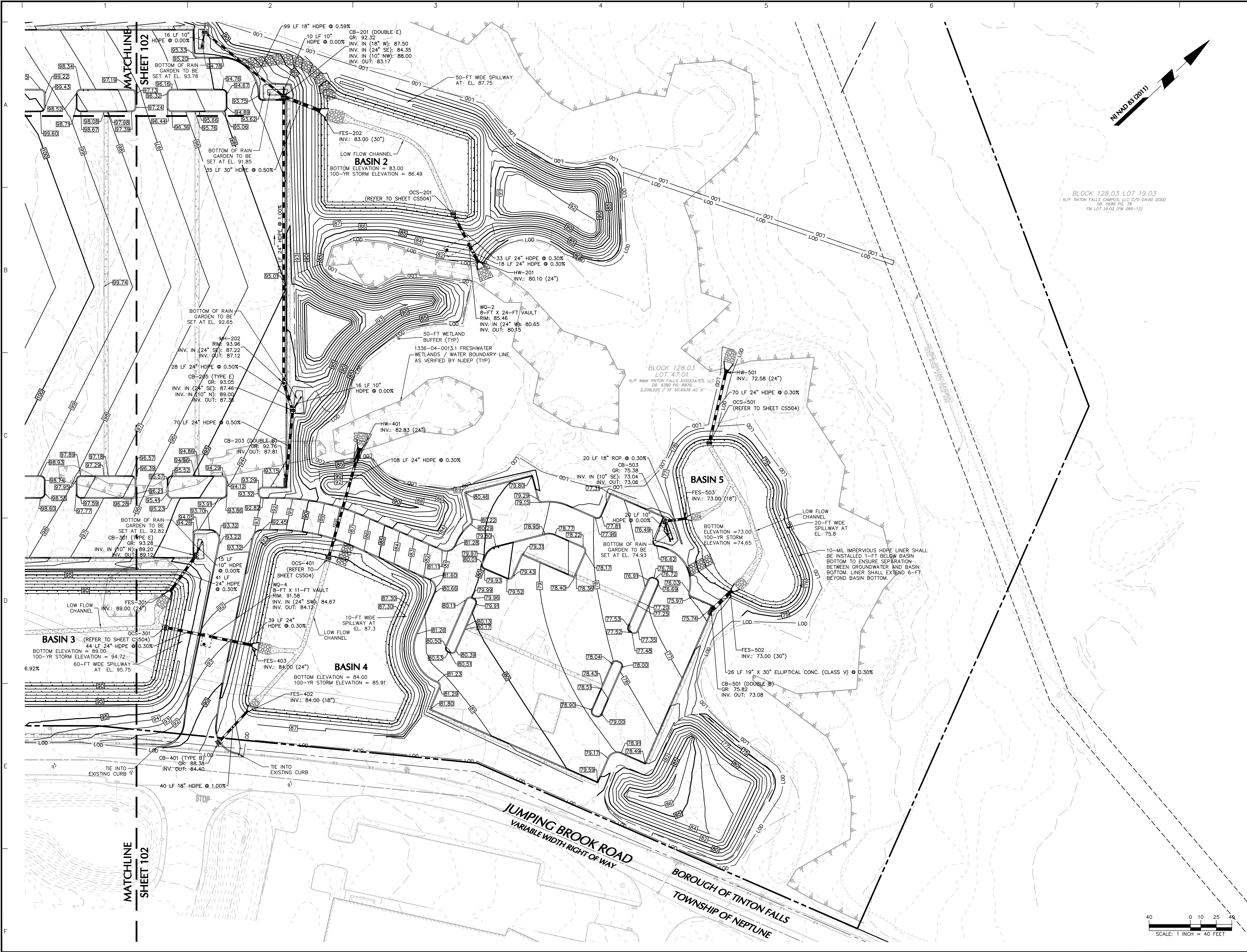
MONMOUTH COUNTY NEW JERSEY

Drawing Title

PARTIAL GRADING AND DRAINAGE PLAN 1

Project No.	Drawing No.
100775501	CG101
Date	06/25/2020
Drawn By	RY
Checked By	RB
Sheet 15 of 50	





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1/05/21	PER AGENCY COMMENTS	3
10/16/20	PER NUDEP COMMENTS	2
9/17/20	PER TOWNSHIP COMMENTS	1
Date	Description	No.

REVISIONS

SIGNATURE RICHARD BURROW DATE SIGNED
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Project

1251 JUMPING BROOK ROAD
BOROUGH OF TINTON FALLS
BLOCK 128.03, LOT 47

MONMOUTH COUNTY NEW JERSEY

Drawing Title

PARTIAL GRADING AND DRAINAGE PLAN 3

Project No.	Drawing No.
100775501	CG103
Date	06/25/2020
Drawn By	RY
Checked By	RB
Sheet 17 of 50	

40 0 10 25 40
SCALE: 1 INCH = 40 FEET



APPENDIX A

CONVEYANCE SYSTEMS AND RECHARGE / DETENTION BASIN MAINTENANCE AND INSPECTION LOGS

MAINTENANCE INSPECTION FOR CONVEYANCE SYSTEMS

**Block 128.03 , Lot 47
Tinton Falls, New Jersey**

**NOTE: INSPECTIONS TO BE PERFORMED DURING A
PERIOD OF DRY WEATHER.**

Yes	No	Maintenance Evaluation	Action(s) Required if Answer "Yes"
<input type="checkbox"/>	<input type="checkbox"/>	Is there a buildup of sediment (in excess of 3 inches), trash, debris or any other stormwater pollution?	Remove sediment and evaluate on-site upstream systems. Dispose debris in accordance with local, county, state and federal requirements.
<input type="checkbox"/>	<input type="checkbox"/>	Is there standing water?	Evaluate downstream systems for clogging or trash sediment buildup.
<input type="checkbox"/>	<input type="checkbox"/>	Is there any structural failure?	Consult engineer to determine safety and/or stability of the system.
<input type="checkbox"/>	<input type="checkbox"/>	Are there visible signs of cracking, subsidence, erosion or deterioration of any of the storm conveyance systems?	Consult engineer to determine safety and/or stability of the system.
<input type="checkbox"/>	<input type="checkbox"/>	Are there any root intrusions or any other vegetation within catch basins?	Remove roots and dispose vegetation in accordance with local, county, state and federal requirements.
<input type="checkbox"/>	<input type="checkbox"/>	Are ladder rungs in catch basins or manholes damaged, missing or misaligned?	Repair or replace.
<input type="checkbox"/>	<input type="checkbox"/>	Are grates or covers missing, damaged or only partially in place at any catch basin or manhole?	Repair or replace.
<input type="checkbox"/>	<input type="checkbox"/>	Does the existing maintenance program need to be amended to provide a more effective maintenance program?	Address suggested changes to the responsible party for the stormwater maintenance facility.
<input type="checkbox"/>	<input type="checkbox"/>	Are basin fences broken or damaged?	Repair or replace.
<input type="checkbox"/>	<input type="checkbox"/>	Are safety ledges damaged?	Reconstruct and revegetate.

MAINTENANCE LOG FOR CONVEYANCE

**Block 128.03 , Lot 47
Tinton Falls, New Jersey**

INSTRUCTIONS:

**THIS LOG SHALL BE UPDATED TO INCLUDE ALL MAINTENANCE
PERFORMED AT A SPECIFIC STORMWATER MEASURE.**

\\LANGAN.COM\DATA\PAR\DATA5\100775501\PROJECT DATA\DISCIPLINE\SITE
CIVIL\REPORTS\STORMWATER MAINTENANCE\APPENDICES\100775501 - APPENDIX A -
MAINTENANCE LOG CONVEYANCE.DOC

DATE	PERSON CONDUCTING MAINTENANCE	AREA OF MAINTENANCE	PROBLEM(S) FOUND	ACTION(S) TAKEN

MAINTENANCE INSPECTION FOR RECHARGE / DETENTION SYSTEMS

**Block 128.03 , Lot 47
Tinton Falls, New Jersey**

**NOTE: INSPECTIONS TO BE PERFORMED DURING A
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Yes	No	Maintenance Evaluation	Action(s) Required if Answer "Yes"
<input type="checkbox"/>	<input type="checkbox"/>	Is there a buildup of sediment (in excess of 3 inches), trash, debris or any other stormwater pollution?	Remove sediment and evaluate on-site upstream systems. Dispose debris in accordance with local, county, state and federal requirements.
<input type="checkbox"/>	<input type="checkbox"/>	Is there standing water?	Evaluate downstream systems for clogging or trash sediment buildup.
<input type="checkbox"/>	<input type="checkbox"/>	Is there any structural failure?	Consult engineer to determine safety and/or stability of the system.
<input type="checkbox"/>	<input type="checkbox"/>	Are there visible signs of cracking, subsidence, erosion or deterioration of any of the storm conveyance systems?	Consult engineer to determine safety and/or stability of the system.
<input type="checkbox"/>	<input type="checkbox"/>	Are there any root intrusions or any other vegetation within catch basins?	Remove roots and dispose vegetation in accordance with local, county, state and federal requirements.
<input type="checkbox"/>	<input type="checkbox"/>	Are ladder rungs in catch basins or manholes damaged, missing or misaligned?	Repair or replace.
<input type="checkbox"/>	<input type="checkbox"/>	Are grates or covers missing, damaged or only partially in place at any catch basin or manhole?	Repair or replace.
<input type="checkbox"/>	<input type="checkbox"/>	Does the existing maintenance program need to be amended to provide a more effective maintenance program?	Address suggested changes to the responsible party for the stormwater maintenance facility.
<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>		

MAINTENANCE LOG FOR RECHARGE / DETENTION SYSTEMS

**Block 128.03 , Lot 47
Tinton Falls, New Jersey**

**INSTRUCTIONS:
THIS LOG SHALL BE UPDATED TO INCLUDE ALL MAINTENANCE
PERFORMED AT A SPECIFIC STORMWATER MEASURE.**

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CIVIL\REPORTS\STORMWATER MAINTENANCE\APPENDICES\100775501 - APPENDIX A -
MAINTENANCE LOG DETENTION.DOC

DATE	PERSON CONDUCTING MAINTENANCE	AREA OF MAINTENANCE	PROBLEM(S) FOUND	ACTION(S) TAKEN

APPENDIX B

EXTENDED DETENTION MAINTENANCE AND INSPECTION LOGS

MAINTENANCE INSPECTION FOR EXTENDED DETENTION BASINS

**Block 128.03 , Lot 47
Tinton Falls, New Jersey**

**NOTE: INSPECTIONS TO BE PERFORMED DURING A
PERIOD OF DRY WEATHER.**

Yes	No	Maintenance Evaluation	Action(s) Required if Answer "Yes"
<input type="checkbox"/>	<input type="checkbox"/>	Is there a buildup of sediment in a localized area of the basin?	Remove and dispose of sediment in accordance with local, county, state and federal requirements.
<input type="checkbox"/>	<input type="checkbox"/>	Is there an excessive buildup of sediment that threatens the storage volume of the basin?	Remove and dispose of sediment in accordance with local, county, state and federal requirements.
<input type="checkbox"/>	<input type="checkbox"/>	Is there a buildup of trash, debris or any other stormwater pollution?	Remove and dispose of debris in accordance with local, county, state and federal requirements.
<input type="checkbox"/>	<input type="checkbox"/>	Are there any areas of settlement or rutting creating localized ponding of water?	Regrade areas to remove the depressions and then reestablish vegetation.
<input type="checkbox"/>	<input type="checkbox"/>	Are there any areas of settlement, scouring, cracking, sloughing, seepage, or rutting on the embankments?	Consult engineer to determine safety and/or stability of the system.
<input type="checkbox"/>	<input type="checkbox"/>	Are there any depressions in the basin bottom?	Fill in the depressions and reestablish vegetation.
<input type="checkbox"/>	<input type="checkbox"/>	Are there any areas of erosion or scouring at the conveyance system outfalls?	Regrade the areas and reestablish vegetation. Repair/replace rip-rap apron if it has been disturbed.
<input type="checkbox"/>	<input type="checkbox"/>	Are there any areas of erosion or scouring at the basin outfall headwall?	Consult engineer to determine safety and/or stability of the system.
<input type="checkbox"/>	<input type="checkbox"/>	Is there a buildup of sediment (in excess of 3 inches), trash, debris or any other stormwater pollution in the outlet structure?	Evaluate downstream systems for clogging or trash sediment buildup.
<input type="checkbox"/>	<input type="checkbox"/>	Is there any structural failure in the outlet structure?	Consult engineer to determine safety and/or stability of the system.
<input type="checkbox"/>	<input type="checkbox"/>	Are there visible signs of cracking, subsidence, erosion or deterioration of the outlet pipe?	Consult engineer to determine safety and/or stability of the system.
<input type="checkbox"/>	<input type="checkbox"/>	Are there any root intrusions or any other vegetation within the outlet structure?	Remove roots and dispose vegetation in accordance with local, county, state and federal requirements.
<input type="checkbox"/>	<input type="checkbox"/>	Are ladder rungs in the outlet structure damaged, missing or misaligned?	Repair or replace.
<input type="checkbox"/>	<input type="checkbox"/>	Are trash racks missing, damaged or only partially in place at the outlet structure?	Repair or replace.
<input type="checkbox"/>	<input type="checkbox"/>	Are there any areas with damaged vegetation or a lack of vegetation?	Evaluate causes of vegetation damage and reestablish vegetation.
<input type="checkbox"/>	<input type="checkbox"/>	Is the vegetation improperly mowed/trimmed?	Evaluate if proper maintenance procedures are being followed.
<input type="checkbox"/>	<input type="checkbox"/>	Does the existing maintenance program need to be amended to provide a more effective maintenance program?	Address suggested changes to the responsible party for the stormwater maintenance facility.

MAINTENANCE LOG FOR EXTENDED DETENTION BASINS

**Block 128.03 , Lot 47
Tinton Falls, New Jersey**

INSTRUCTIONS:

**THIS LOG SHALL BE UPDATED TO INCLUDE ALL MAINTENANCE
PERFORMED AT A SPECIFIC STORMWATER MEASURE.**

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MAINTENANCE LOG DETENTION BASIN.DOC

DATE	PERSON CONDUCTING MAINTENANCE	AREA OF MAINTENANCE	PROBLEM(S) FOUND	ACTION(S) TAKEN

APPENDIX C

RAIN GARDEN MAINTENANCE AND INSPECTION LOGS

MAINTENANCE INSPECTION FOR RAIN GARDEN

**Block 128.03 , Lot 47
Tinton Falls, New Jersey**

**NOTE: INSPECTIONS TO BE PERFORMED DURING A
PERIOD OF DRY WEATHER.**

Yes	No	Maintenance Evaluation	Action(s) Required if Answer "Yes"
<input type="checkbox"/>	<input type="checkbox"/>	Is there a buildup of sediment (in excess of 3 inches), trash, debris or any other stormwater pollution?	Remove sediment and or any debris present. Dispose debris in accordance with local, county, state and federal requirements.
<input type="checkbox"/>	<input type="checkbox"/>	Is there standing water?	Evaluate downstream systems for clogging or trash sediment buildup.
<input type="checkbox"/>	<input type="checkbox"/>	Is anything blocking or clogging inlets?	Remove any debris or sediment that may be preventing water from flowing in to or out of the rain garden.
<input type="checkbox"/>	<input type="checkbox"/>	Are weeds or invasive plants present?	Pull weeds and invasive plants out by the roots to prevent them from returning. Spot treat perennial weeds with appropriate herbicide if necessary.
<input type="checkbox"/>	<input type="checkbox"/>	Are there areas of bare soil or erosion?	Add mulch where it has been depleted and add additional plants where necessary. Use appropriate erosion control methods for more serious cases of erosion.
<input type="checkbox"/>	<input type="checkbox"/>	Is there standing water 48 or more hours after a rainfall?	This is an indication that your rain garden is not functioning as designed, likely due to a larger problem that will require further study and action.
<input type="checkbox"/>	<input type="checkbox"/>	Does the existing maintenance program need to be amended to provide a more effective maintenance program?	Address suggested changes to the responsible party for the stormwater maintenance facility.
<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>		

MAINTENANCE LOG FOR RAIN GARDEN

**Block 128.03 , Lot 47
Tinton Falls, New Jersey**

INSTRUCTIONS:

**THIS LOG SHALL BE UPDATED TO INCLUDE ALL MAINTENANCE
PERFORMED AT A SPECIFIC STORMWATER MEASURE.**

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CIVIL\\REPORTS\\STORMWATER MAINTENANCE\\APPENDICES\\100775501 - APPENDIX C -
MAINTENANCE LOG RAIN GARDEN.DOC

DATE	PERSON CONDUCTING MAINTENANCE	AREA OF MAINTENANCE	PROBLEM(S) FOUND	ACTION(S) TAKEN

APPENDIX D

MAINTENANCE OF WATER QUALITY UNIT

StormFilter Inspection and Maintenance Procedures



Maintenance Guidelines

The primary purpose of the Stormwater Management StormFilter® is to filter and prevent pollutants from entering our waterways. Like any effective filtration system, periodically these pollutants must be removed to restore the StormFilter to its full efficiency and effectiveness.

Maintenance requirements and frequency are dependent on the pollutant load characteristics of each site. Maintenance activities may be required in the event of a chemical spill or due to excessive sediment loading from site erosion or extreme storms. It is a good practice to inspect the system after major storm events.

Maintenance Procedures

Although there are many effective maintenance options, we believe the following procedure to be efficient, using common equipment and existing maintenance protocols. The following two-step procedure is recommended::

1. Inspection

- Inspection of the vault interior to determine the need for maintenance.

2. Maintenance

- Cartridge replacement
- Sediment removal

Inspection and Maintenance Timing

At least one scheduled inspection should take place per year with maintenance following as warranted.

First, an inspection should be done before the winter season. During the inspection the need for maintenance should be determined and, if disposal during maintenance will be required, samples of the accumulated sediments and media should be obtained.

Second, if warranted, a maintenance (replacement of the filter cartridges and removal of accumulated sediments) should be performed during periods of dry weather.

In addition to these two activities, it is important to check the condition of the StormFilter unit after major storms for potential damage caused by high flows and for high sediment accumulation that may be caused by localized erosion in the drainage area. It may be necessary to adjust the inspection/maintenance schedule depending on the actual operating conditions encountered by the system. In general, inspection activities can be conducted at any time, and maintenance should occur, if warranted, during dryer months in late summer to early fall.

Maintenance Frequency

The primary factor for determining frequency of maintenance for the StormFilter is sediment loading.

A properly functioning system will remove solids from water by trapping particulates in the porous structure of the filter media inside the cartridges. The flow through the system will naturally decrease as more and more particulates are trapped. Eventually the flow through the cartridges will be low enough to require replacement. It may be possible to extend the usable span of the cartridges by removing sediment from upstream trapping devices on a routine as-needed basis, in order to prevent material from being re-suspended and discharged to the StormFilter treatment system.

The average maintenance lifecycle is approximately 1-5 years. Site conditions greatly influence maintenance requirements. StormFilter units located in areas with erosion or active construction may need to be inspected and maintained more often than those with fully stabilized surface conditions.

Regulatory requirements or a chemical spill can shift maintenance timing as well. The maintenance frequency may be adjusted as additional monitoring information becomes available during the inspection program. Areas that develop known problems should be inspected more frequently than areas that demonstrate no problems, particularly after major storms. Ultimately, inspection and maintenance activities should be scheduled based on the historic records and characteristics of an individual StormFilter system or site. It is recommended that the site owner develop a database to properly manage StormFilter inspection and maintenance programs..





Inspection Procedures

The primary goal of an inspection is to assess the condition of the cartridges relative to the level of visual sediment loading as it relates to decreased treatment capacity. It may be desirable to conduct this inspection during a storm to observe the relative flow through the filter cartridges. If the submerged cartridges are severely plugged, then typically large amounts of sediments will be present and very little flow will be discharged from the drainage pipes. If this is the case, then maintenance is warranted and the cartridges need to be replaced.

Warning: In the case of a spill, the worker should abort inspection activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct an inspection:

Important: Inspection should be performed by a person who is familiar with the operation and configuration of the StormFilter treatment unit.

1. If applicable, set up safety equipment to protect and notify surrounding vehicle and pedestrian traffic.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the access portals to the vault and allow the system vent.
4. Without entering the vault, visually inspect the inside of the unit, and note accumulations of liquids and solids.
5. Be sure to record the level of sediment build-up on the floor of the vault, in the forebay, and on top of the cartridges. If flow is occurring, note the flow of water per drainage pipe. Record all observations. Digital pictures are valuable for historical documentation.
6. Close and fasten the access portals.
7. Remove safety equipment.
8. If appropriate, make notes about the local drainage area relative to ongoing construction, erosion problems, or high loading of other materials to the system.
9. Discuss conditions that suggest maintenance and make decision as to whether or not maintenance is needed.

Maintenance Decision Tree

The need for maintenance is typically based on results of the inspection. The following Maintenance Decision Tree should be used as a general guide. (Other factors, such as Regulatory Requirements, may need to be considered)

1. Sediment loading on the vault floor.
 - a. If $>4"$ of accumulated sediment, maintenance is required.
2. Sediment loading on top of the cartridge.
 - a. If $>1/4"$ of accumulation, maintenance is required.
3. Submerged cartridges.
 - a. If $>4"$ of static water above cartridge bottom for more than 24 hours after end of rain event, maintenance is required. (Catch basins have standing water in the cartridge bay.)
4. Plugged media.
 - a. If pore space between media granules is absent, maintenance is required.
5. Bypass condition.
 - a. If inspection is conducted during an average rain fall event and StormFilter remains in bypass condition (water over the internal outlet baffle wall or submerged cartridges), maintenance is required.
6. Hazardous material release.
 - a. If hazardous material release (automotive fluids or other) is reported, maintenance is required.
7. Pronounced scum line.
 - a. If pronounced scum line (say $\geq 1/4"$ thick) is present above top cap, maintenance is required.



Maintenance

Depending on the configuration of the particular system, maintenance personnel will be required to enter the vault to perform the maintenance.

Important: If vault entry is required, OSHA rules for confined space entry must be followed.

Filter cartridge replacement should occur during dry weather. It may be necessary to plug the filter inlet pipe if base flows is occurring.

Replacement cartridges can be delivered to the site or customers facility. Information concerning how to obtain the replacement cartridges is available from Contech Engineered Solutions.

Warning: In the case of a spill, the maintenance personnel should abort maintenance activities until the proper guidance is obtained. Notify the local hazard control agency and Contech Engineered Solutions immediately.

To conduct cartridge replacement and sediment removal maintenance:

1. If applicable, set up safety equipment to protect maintenance personnel and pedestrians from site hazards.
2. Visually inspect the external condition of the unit and take notes concerning defects/problems.
3. Open the doors (access portals) to the vault and allow the system to vent.
4. Without entering the vault, give the inside of the unit, including components, a general condition inspection.
5. Make notes about the external and internal condition of the vault. Give particular attention to recording the level of sediment build-up on the floor of the vault, in the forebay, and on top of the internal components.
6. Using appropriate equipment offload the replacement cartridges (up to 150 lbs. each) and set aside.
7. Remove used cartridges from the vault using one of the following methods:

Method 1:

- A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.

Using appropriate hoisting equipment, attach a cable from the boom, crane, or tripod to the loose cartridge. Contact Contech Engineered Solutions for suggested attachment devices.

- B. Remove the used cartridges (up to 250 lbs. each) from the vault.



Important: Care must be used to avoid damaging the cartridges during removal and installation. The cost of repairing components damaged during maintenance will be the responsibility of the owner.

- C. Set the used cartridge aside or load onto the hauling truck.
- D. Continue steps a through c until all cartridges have been removed.

Method 2:

- A. This activity will require that maintenance personnel enter the vault to remove the cartridges from the under drain manifold and place them under the vault opening for lifting (removal). Disconnect each filter cartridge from the underdrain connector by rotating counterclockwise 1/4 of a turn. Roll the loose cartridge, on edge, to a convenient spot beneath the vault access.
- B. Unscrew the cartridge cap.
- C. Remove the cartridge hood and float.
- D. At location under structure access, tip the cartridge on its side.
- E. Empty the cartridge onto the vault floor. Reassemble the empty cartridge.
- F. Set the empty, used cartridge aside or load onto the hauling truck.
- G. Continue steps a through e until all cartridges have been removed.

8. Remove accumulated sediment from the floor of the vault and from the forebay. This can most effectively be accomplished by use of a vacuum truck.
9. Once the sediments are removed, assess the condition of the vault and the condition of the connectors.
10. Using the vacuum truck boom, crane, or tripod, lower and install the new cartridges. Once again, take care not to damage connections.
11. Close and fasten the door.
12. Remove safety equipment.
13. Finally, dispose of the accumulated materials in accordance with applicable regulations. Make arrangements to return the used **empty** cartridges to Contech Engineered Solutions.

Related Maintenance Activities - Performed on an as-needed basis

StormFilter units are often just one of many structures in a more comprehensive stormwater drainage and treatment system.

In order for maintenance of the StormFilter to be successful, it is imperative that all other components be properly maintained. The maintenance/repair of upstream facilities should be carried out prior to StormFilter maintenance activities.

In addition to considering upstream facilities, it is also important to correct any problems identified in the drainage area. Drainage area concerns may include: erosion problems, heavy oil loading, and discharges of inappropriate materials.

Material Disposal

The accumulated sediment found in stormwater treatment and conveyance systems must be handled and disposed of in accordance with regulatory protocols. It is possible for sediments to contain measurable concentrations of heavy metals and organic chemicals (such as pesticides and petroleum products). Areas with the greatest potential for high pollutant loading include industrial areas and heavily traveled roads.

Sediments and water must be disposed of in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. This typically requires coordination with a local landfill for solid waste disposal. For liquid waste disposal a number of options are available including a municipal vacuum truck decant facility, local waste water treatment plant or on-site treatment and discharge.



Inspection Report

Date: Personnel:

Location: _____ System Size: _____

System Type: Vault ☐ Cast-In-Place ☐ Linear Catch Basin ☐ Manhole ☐ Other ☐

Sediment Thickness in Forebay: _____ Date: _____

Sediment Depth on Vault Floor: _____

Structural Damage: _____

Estimated Flow from Drainage Pipes (if available): _____

Cartridges Submerged: Yes ☐ No ☐ Depth of Standing Water: _____

StormFilter Maintenance Activities (check off if done and give description)

☐ Trash and Debris Removal: _____

☐ Minor Structural Repairs: _____

☐ Drainage Area Report _____

Excessive Oil Loading: Yes ☐ No ☐ Source: _____

Sediment Accumulation on Pavement: Yes ☐ No ☐ Source: _____

Erosion of Landscaped Areas: Yes ☐ No ☐ Source: _____

Items Needing Further Work: _____

Owners should contact the local public works department and inquire about how the department disposes of their street waste residuals.

Other Comments:

Review the condition reports from the previous inspection visits.

StormFilter Maintenance Report

Date: _____ Personnel: _____

Location: _____ System Size: _____

System Type: Vault ☐ Cast-In-Place ☐ Linear Catch Basin ☐ Manhole ☐ Other ☐

List Safety Procedures and Equipment Used: _____

System Observations

Months in Service: _____

Oil in Forebay (if present): Yes ☐ No ☐

Sediment Depth in Forebay (if present): _____

Sediment Depth on Vault Floor: _____

Structural Damage: _____

Drainage Area Report

Excessive Oil Loading: Yes ☐ No ☐ Source: _____

Sediment Accumulation on Pavement: Yes ☐ No ☐ Source: _____

Erosion of Landscaped Areas: Yes ☐ No ☐ Source: _____

StormFilter Cartridge Replacement Maintenance Activities

Remove Trash and Debris: Yes ☐ No ☐ Details: _____

Replace Cartridges: Yes ☐ No ☐ Details: _____

Sediment Removed: Yes ☐ No ☐ Details: _____

Quantity of Sediment Removed (estimate?): _____

Minor Structural Repairs: Yes ☐ No ☐ Details: _____

Residuals (debris, sediment) Disposal Methods: _____

Notes:



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Support

- Drawings and specifications are available at www.conteches.com.
- Site-specific design support is available from our engineers.

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