STONEFIELD

STORMWATER OPERATIONS & MAINTENANCE MANUAL

PROPOSED COMMERCIAL DEVELOPMENT
BLOCK 701, LOT 1
TOWNSHIP OF NEPTUNE
MONMOUTH COUNTY, NEW JERSEY

PREPARED FOR:

M & M NEPTUNE, LLC

PREPARED BY:

STONEFIELD ENGINEERING & DESIGN, LLC
STONEFIELD ENGINEERING & DESIGN, LLC
92 PARK AVENUE
RUTHERFORD, NEW JERSEY

DECEMBER 29, 2020

JEFFREY A. MARTELL, PE
NJ PROFESSIONAL ENGINEER LICENSE # 47290

REPORT CONTENTS

1.0 PROJECT DESCRIPTION

M&M at Neptune, LLC is proposing to redevelop Block 701 Lot 1 (herein referred to as the "project site") to accommodate with a supermarket, retail store, fast food restaurant and a convenience store/gas station. The improvements include a total of 36,042 SF of building cover. Additional improvements include off-street parking, lighting, landscaping, and stormwater management facilities.

The project site is bound to the north by Asbury Avenue (County Route 16), to the south by NJ State Highway Route 35, a connection road to the west, and the Hollow Brook along the eastern property line and is assumed to have a 50 ft riparian zone. The site contains two intermediate resource value wetland areas located in the easterly portion of the lot. Generally, the vicinity of the project is developed with residential to the north and east, and commercial to the south and west. The project site itself currently contains a vacant warehouse and parking lot and woods occupying the eastern portion of the site where the wetlands and riparian zone are located.

The project site is 13.577 acres, the extent of land disturbance is 6.529 acres (including areas within the public right-of-way), and 1.119 acres of new impervious surfaces will be created by the project.

This Stormwater Operations & Maintenance Manual has been prepared to delineate operational and maintenance responsibilities for the stormwater best management practices (BMPs) proposed to meet the requirements set forth by the Township of Neptune, Freehold Soil Conservation District, Monmouth County and the New Jersey Department of Environmental Protection (NJDEP).

2.0 PROPOSED DEVELOPMENT

The proposed development will consist of the four commercial buildings (36,042 SF total) These building include a supermarket, retail store, fast food restaurant and a convenience store/gas station. Additional improvements include an off-street parking lot (242 parking spaces), landscaping, lighting and stormwater management facilities. The total proposed impervious coverage on site is 34.8% (205,765 SF). Access to the site will be provided via two full movement access drives on Asbury Avenue and Route 35.

Under proposed conditions, the general drainage patterns and ultimate points of interest will be maintained. The intent behind the proposed delineations is to reduce the direct runoff for all areas of undetained flow. The detained runoff will be routed to an underground basin where the peak discharge will be controlled via an outlet control structure.

3.0 STORMWATER MANAGEMENT OPERATIONAL PROCEDURES

Operation and maintenance of the permanent stormwater control BMPs shall be the responsibility of the operator of the project site at the time that the applicable maintenance is required. The current owner and responsible agent of the project is:

M & M at Neptune, LLC
1260 Stelton Road
Piscataway, NJ 08854

A copy of this report shall be kept on-site at all times both during and after construction. Upon reviewing agency approval, the title and date of the maintenance plan as well as the contact information of the current agent responsible for maintaining the stormwater management measures for the project shall be recorded on the deed of the property on which the measures are located. Any future change in this information such as change in property ownership shall also be recorded on the deed.

The current responsible agent shall evaluate the maintenance plan for effectiveness at least annually and revise the plan as necessary. A detailed, written log of all preventative and corrective maintenance performed for each stormwater management measure must be kept, including a record of all inspections and copies of maintenance-related work orders. Upon request from a public entity with jurisdiction over the project area the responsible agent shall make available the maintenance plan and associate logs and other records for review.

3.1 MAINTENANCE EQUIPMENT AND PERSONNEL

The current responsible agent shall ensure that adequate equipment and training is provided to maintenance personnel to perform the required maintenance tasks. Confined Space Entry Certification shall be required by personnel entering underground structures and pipes. The material and equipment necessary for inspection and maintenance activities shall include, but not be limited to, the following:

- *Detention Basins:* Instruments to perform visual inspection of underground pipes and outlet structures, equipment to pump stormwater from the basin in the event of maintenance, vacuum truck and hose for removal of sediment from basin bottom, and necessary safety equipment

- *Manufactured Treatment Device Equipment:* Inspection probe, scale to measure filter bags, disposal bags, replacement filter modules, skimmer or net and necessary safety equipment.

- *Landscape Areas:* Material and equipment customary in landscape maintenance practices.

- *Street Sweeping:* Litter vacuum or leaf/litter blower to collect sediment from asphalt surface, brooms, and disposal bags.

The estimated cost of routine, scheduled maintenance activities is estimated to be approximately $16,000.00 per year. Approximate breakdown of yearly routine maintenance costs are noted below (excludes structural repairs): (discuss values with project manager) (keep all that apply)

MAINTENANCE COST BREAKDOWN

Basin Inspection and Maintenance	$8,000.00 per year
Manufactured Treatment Device(s)	$2,500.00 per year
Landscape Areas	$2,500.00 per year
Sediment Debris and Trash Removal	$1,500.00 per year
Street Sweeping	$1,500.00 per year

3.2 MAINTENANCE ACCESS POINTS

Underground Detention Basin Subsurface access is provided via manholes located along the perimeter of the structure as indicated on Sheet C-7 of the Site Plans referenced above. Reduced sheets (not to scale) can be found in the Appendix of this Manual.

4.0 STORMWATER BMP INVENTORY

The stormwater management measures incorporated into this development are listed below. The corresponding Field Manuals for the stormwater management measures are located in the Appendix of the Maintenance Plan.

4.1 DETENTION BASIN(S)

One (1) stormwater detention basins are proposed for the project:

- *Subsurface Detention Basin B-1:* Is proposed beneath the off-site parking area south of the proposed supermarket. This basin will attenuate peak stormwater runoff rates from the project site to the mandated regulatory levels.
- *Design Purposes:*
    1. Water quality and water quantity
    2. 1.25 inches in 2 hours
    3. 2-year storm (3.38 inches)
    4. 10-year storm (5.23 inches)
    5. 100-year storm (8.94 inches)
- Dimensions: 214.7 FT (Length) x 139.7 FT (Width) x 6.0 – 7.0 FT (Depth)
- State Plane Coordinates: Easting (X) – 622,179.58150 , Northing (Y) – 506803.74547

4.2 MANUFACTURED TREATMENT DEVICE(S)

(One) (1) manufactured treatment device(s) area proposed for the project:

- *Manufactured Treatment Device (MTD)*: A manufactured treatment device (MTD), specifically the Stormwater Management StormFilter (Stormfilter) by Contech Engineered Solutions LLC, will be installed downstream of the underground basin. The basin will be lined with an impervious liner as to prevent any infiltration of untreated runoff. Per the MTD Lab Certification issued by the NJDEP on December 14, 2016 the StormFilter has been certified to provide a TSS removal rate of 80%..
    - *Design Purposes:*
        1. *Water quality*
        2. *1.25 inches in 2 hours*
    - *Dimensions: 23.0 FT (Length) x 9.0 FT (Width) x 11.2 (Depth*
    - State Plane Coordinates: Easting (X) – 622407.22378 , Northing (Y) – 506810.90972
    - *Slope:* 1.00%

4.3 OTHER MAINTENANCE

In addition to the scheduled inspections for the above referenced stormwater BMPs, the following general maintenance tasks shall be performed:

1. All stormwater inlets and manholes shall be inspected for debris and sediment accumulation and structural integrity at least four (4) times annually. Debris and sediment removal shall be scheduled as required to maintain stormwater runoff conveyance efficiency and disposed of in compliance with all applicable local, state, and federal waste regulations.

2. Street sweeping shall occur at least once (1) monthly in all parking lot areas onsite. Regenerative air equipment shall be used.

3. Trash receptacles onsite shall be emptied, and their liners replaced at a minimum of three (3) times per week.

4. Landscaping within the developed portions of the site shall be trimmed/mowed twice (2) monthly during the growing season. Reforested portions of the site shall be left undisturbed to vegetate naturally.

5.0 STORMWATER BMP PREVENTATIVE MAINTENANCE ACTIONS

As per N.J.A.C. 7:8-5.8(b) & (e), preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measure, including, but not limited to, repairs or replacement to the structure; removal of sediment, debris, or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; and repair or replacement of non-vegetated linings

As per NJDEP BMP Manual Ch. 8 Feb. 2004), maintenance plans should include specific preventative and corrective maintenance tasks such as removal of sediment, trash, and debris; mowing, pruning, and restoration of vegetation; restoration of eroded areas; elimination of mosquito breeding habitats; control of aquatic vegetation; and repair or replacement of damaged or deteriorated components.

5.1 UNDERGROUND DETENTION BASIN

Underground detention basin inspections shall be performed by entering the basin area via any of the associated manholes or outlet structures along the basin perimeter. The following maintenance tasks shall be performed for the infiltration basins.

5.1.1 QUARTERLY

All detention basin components which receive, or discharge stormwater must be checked for trapped debris and sediment accumulation at least four (4) times annually as well as after storm events exceeding one (1) inch of precipitation. These basin components include manholes, outlet structures piping etc. Disposal of debris and sediment shall be done in compliance with all applicable local, state, and federal waste regulations.

5.1.2 ANNUALLY

All structural components (manholes, outlet structures, piping etc.) shall be checked at least once (1) annually for cracking, subsidence, spalling, erosion and deterioration.

5.1.3 BASIN DRAWDOWN

The following table outlines the design drawdown time (time elapsed for basin to completely drain after the end of a storm event) for (add columns for additional basins)

Storm Event	*Precipitation (in)*	*B-1 Drawdown (hr)*
2 Year	3.38"	12.30 HR
10 Year	5.23"	12.30 HR
100 Year	8.94"	12.35 HR

This table shall be referenced to the actual drawdown times for the detention basin to evaluate performance. Should significant increases in drawdown time be noted or if stormwater runoff remains in the basin more than 72 hours after the end of a storm event, the basin's outlet structures, pipe storage and tailwater levels must be evaluated to determine appropriate measures to be taken to ensure proper basin functionality.

5.2 MANUFACTURED TREATMENT DEVICE

Underground detention basin inspections shall be performed by entering the basin area via any of the associated manholes/outlet structures along the basin perimeter. The following maintenance tasks shall be performed for the infiltration basins.

5.2.1 QUARTERLY

All water quality components which receive, or discharge stormwater must be checked for trapped debris and sediment accumulation at least four (4) times annually as well as after storm events exceeding one (1) inch of precipitation. These basin components include piping and CDS structure. Disposal of debris and sediment shall be done in compliance with all applicable local, state, and federal waste regulations.

5.2.2 ANNUALLY

All structural components (piping and CDS Structure).) shall be checked at least once (1) annually for cracking, subsidence, spalling, erosion and deterioration.

Refer to the manufacturer's NJDEP certification and instructions/maintenance plan in the Appendix of this manual for specific requirements for both water quality units.

5.3 GENERAL MAINTENANCE

In addition to the scheduled inspections for the above referenced stormwater BMPs, a periodic inspection by the Township will be performed. The following additional general maintenance tasks shall be performed.

5.3.1 MONTHLY

a. Street sweeping shall occur at least once (1) monthly in all parking lot areas onsite. Regenerative air equipment shall be used.

b. Trash receptacles onsite shall be emptied and their liners replaced at a minimum of three (3) times per week.

c. Landscaping within the developed portions of the site shall be trimmed/mowed twice (2) monthly during the growing season. Reforested portions of the site shall be left undisturbed to vegetate naturally.

5.3.2 QUARTERLY

a. All stormwater inlets and manholes shall be inspected for debris and sediment accumulation and structural integrity at least four (4) times annually. Debris and sediment removal shall be scheduled as required to maintain stormwater runoff conveyance efficiency and disposed of in compliance with all applicable local, state, and federal waste regulations.

5.3.3 ANNUALLY

a. A submission to the Township from the owner of the end-of-year maintenance records will be required.

6.0 STORMWATER BMP CORRECTIVE MAINTENANCE ACTIONS

Depending on many factors, such as the performance of preventative maintenance actions, weather, or unexpected incidents. Corrective requirements may not be precisely anticipated; however, a list of potential corrective maintenance actions may assist the responsible party in planning and estimating costs in advance.

Potential Corrective Maintenance Actions	***Stormwater Management Measures/No.***
▪ Repair/replacement of eroded or damaged riprap apron ▪ Repair/replacement of missing or damaged trash racks ▪ Repair/replacement of outlet pipes or orifices ▪ Revegetation of eroded side slope, aquatic bench, marsh, basin bottom, grass swales, etc.	e.g., Grass Swale (GS #1, GS#2), Infiltration Basin (Basin #1)
▪ Repair/ Replacement of eroded or damages riprap apron ▪ Repair/ Replacement of missing or damaged trash racks ▪ Repair/ Replacement of outlet pipes or orifices ▪ Revegetation of eroded side, aquatic bench, marsh, side slope, basin bottom, grass swales, etc.	e.g., Grass Swale(GS #1, GS#2), Infiltration Basin (Basin #1), Drywell (DW#1, DW#2)
▪ Repair/Replacement of eroded or damages riprap apron ▪ Repair/Replacement of missing or damaged trash racks ▪ Repair/Replacement of outlet pipes or orifices ▪ Revegetation of eroded side, aquatic bench, marsh, side slope, basin bottom, grass swales, etc.	e.g., Grass Swale(GS #1, GS#2), Infiltration Basin (Basin #1), Drywell (DW#1, DW#2)

The corrective maintenance actions should also be listed in the Field Manuals for the specific stormwater management measures on the site.

7.0 INSPECTION AND LOGS OF ALL PREVENTATIVE AND CORRECTIVE MEASURES

As per N.J.A.C. 7:8-5.8(f), the person responsible for maintenance shall maintain a detailed log of all preventative and corrective maintenance for the structural stormwater management measures incorporated into the design of the development, including a record of all inspections and copies of all maintenance-related work orders.

As per NJDEP BMP Manual Ch. 8 (Feb, 2004), a maintenance plan shall include a schedule of regular inspections and tasks, and detailed logs of all preventative and corrective maintenance performed on the stormwater management measure, including all maintenance-related work orders. 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. Inspection Checklists in the Field Manual for the stormwater management measures on this site include:

- Appendix C-1: General Inspection Checklist Log
- Appendix C-2: General Preventative Maintenance Log
- Appendix C-3: General Corrective Maintenance Log
- Appendix C-4: Manufactured Treatment Device Field Manual
- Appendix C-5: Manufactured Treatment Device Inspection and Maintenance Checklist
- Appendix C-6: Annual Evaluation Records

All inspection and maintenance activities shall be recorded to document frequency of inspection and maintenance, and implementation of corrective action. All regularly scheduled inspections, inspections following one (1) inch of precipitation, maintenance activities, and repairs shall be recorded. Refer to the Appendix of this Manual for the BMP Inspection & Maintenance Log for this facility. This log shall be considered a minimum standard for recording purposes, the Operator and Inspection/Maintenance Personnel are encouraged to supplement the Log with additional notes and photos.

8.0 ANNUAL EVALUATION OF THE EFFECTIVENESS OF THE PLAN

As per N.J.A.C. 7:8-5.8(g), the person responsible for maintenance shall evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed.

The responsible party should evaluate the effectiveness of the maintenance plan by comparing the maintenance plan with the actual performance of the maintenance. The items to evaluate may include, but not limited to,

- Whether the inspections have been performed as scheduled;
- Whether the preventive maintenance has been performed as scheduled;
- Whether the frequency of preventative maintenance needs to increase or decrease;
- Whether the planned resources were enough to perform the maintenance;
- Whether the repairs were completed on time;
- Whether the actual cost was consistent with the estimated cost;
- Whether the inspection, maintenance, and repair records have been kept.

If actual performance of those items has been deviated from the maintenance plan, the responsible party should find the causes and implement solutions in a revised maintenance plan.

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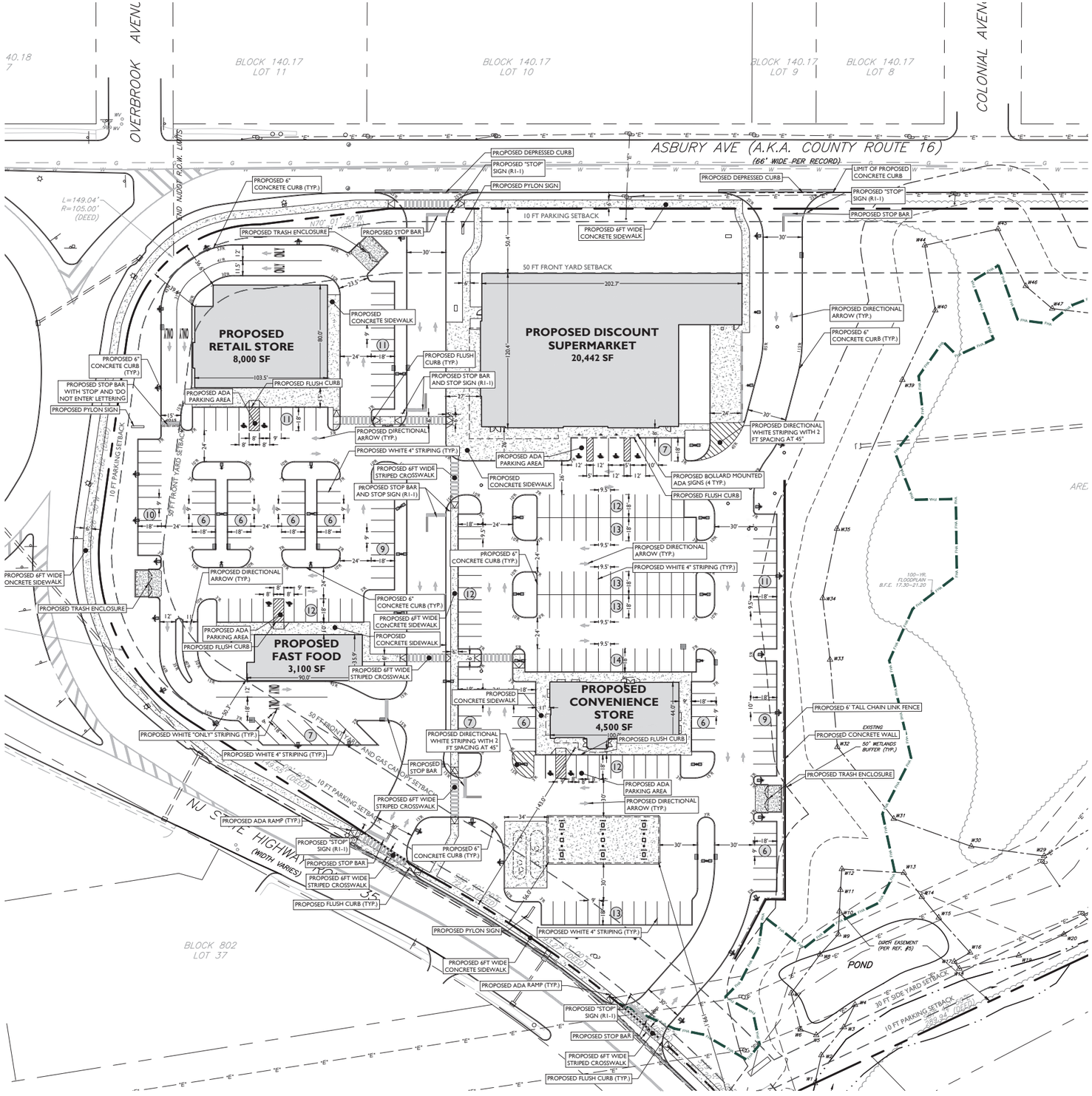
APPENDIX A:
PROJECT PLANS
(NOT TO SCALE)

APPENDIX A-1:
SITE PLAN



SYMBOL	DESCRIPTION
	PROPERTY LINE
	SETBACK LINE
	SAWCUT LINE
	PROPOSED CURB
	PROPOSED DEPRESSED CURB
	PROPOSED FLUSH CURB
	PROPOSED MOUNTABLE CURB
	PROPOSED EXTENDED CURB
	PROPOSED SIGNS / BOLLARDS
	PROPOSED BUILDING
	PROPOSED CONCRETE
	PROPOSED AREA LIGHT
	PROPOSED RETAINING WALL
	PROPOSED HANDRAIL
	PROPOSED CHAINLINK FENCE
	PROPOSED BOARD-ON-BOARD FENCE
	PROPOSED GUIDERAIL
	PROPOSED BUILDING DOORS

GENERAL NOTES

1. THE CONTRACTOR SHALL VERIFY AND FAMILIARIZE THEMSELVES WITH THE EXISTING SITE CONDITIONS AND THE PROPOSED SCOPE OF WORK (INCLUDING DIMENSIONS, LAYOUT, ETC.) PRIOR TO INITIATING THE IMPROVEMENTS IDENTIFIED WITHIN THESE DOCUMENTS. SHOULD ANY DISCREPANCY BE FOUND BETWEEN THE EXISTING SITE CONDITIONS AND THE PROPOSED WORK THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. PRIOR TO THE START OF CONSTRUCTION.
2. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND ENSURE THAT ALL REQUIRED APPROVALS HAVE BEEN OBTAINED PRIOR TO THE START OF CONSTRUCTION. COPIES OF ALL REQUIRED PERMITS AND APPROVALS SHALL BE KEPT ON SITE AT ALL TIMES DURING CONSTRUCTION.
3. ALL CONTRACTORS WILL, TO THE FULLEST EXTENT PERMITTED BY LAW, INDEMNIFY AND HOLD HARMLESS STONEFIELD ENGINEERING & DESIGN, LLC, AND IT'S SUB-CONSULTANTS FROM AND AGAINST ANY DAMAGES AND LIABILITIES INCLUDING ATTORNEY'S FEES ARISING OUT OF CLAIMS BY EMPLOYEES OF THE CONTRACTOR IN ADDITION TO CLAIMS CONNECTED TO THE PROJECT AS A RESULT OF NOT CARRYING THE PROPER INSURANCE FOR WORKERS COMPENSATION, LIABILITY INSURANCE, AND LIMITS OF COMMERCIAL GENERAL LIABILITY INSURANCE.
4. THE CONTRACTOR SHALL NOT DEVIATE FROM THE PROPOSED IMPROVEMENTS IDENTIFIED WITHIN THIS PLAN SET UNLESS APPROVAL IS PROVIDED IN WRITING BY STONEFIELD ENGINEERING & DESIGN, LLC.
5. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE THE MEANS AND METHODS OF CONSTRUCTION.
6. THE CONTRACTOR SHALL NOT PERFORM ANY WORK OR CAUSE DISTURBANCE ON A PRIVATE PROPERTY NOT CONTROLLED BY THE PERSON OR ENTITY WHO HAS AUTHORIZED THE WORK WITHOUT PRIOR WRITTEN CONSENT FROM THE OWNER OF THE PRIVATE PROPERTY.
7. THE CONTRACTOR IS RESPONSIBLE TO RESTORE ANY DAMAGED OR UNDERMINED STRUCTURE OR SITE FEATURE THAT IS IDENTIFIED TO REMAIN ON THE PLAN SET. ALL REPAIRS SHALL USE NEW MATERIALS TO RESTORE THE FEATURE TO ITS EXISTING CONDITION AT THE CONTRACTORS EXPENSE.
8. CONTRACTOR IS RESPONSIBLE TO PROVIDE THE APPROPRIATE SHOP DRAWINGS, PRODUCT DATA, AND OTHER REQUIRED SUBMITTALS FOR REVIEW. STONEFIELD ENGINEERING & DESIGN, LLC. WILL REVIEW THE SUBMITTALS IN ACCORDANCE WITH THE DESIGN INTENT AS REFLECTED WITHIN THE PLAN SET.
9. THE CONTRACTOR IS RESPONSIBLE FOR TRAFFIC CONTROL IN ACCORDANCE WITH MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION.
10. THE CONTRACTOR IS REQUIRED TO PERFORM ALL WORK IN THE PUBLIC RIGHT-OF-WAY IN ACCORDANCE WITH THE APPROPRIATE GOVERNING AUTHORITY AND SHALL BE RESPONSIBLE FOR THE PROCUREMENT OF STREET OPENING PERMITS.
11. THE CONTRACTOR IS REQUIRED TO RETAIN AN OSHA CERTIFIED SAFETY INSPECTOR TO BE PRESENT ON SITE AT ALL TIMES DURING CONSTRUCTION & DEMOLITION ACTIVITIES.
12. SHOULD AN EMPLOYEE OF STONEFIELD ENGINEERING & DESIGN, LLC. BE PRESENT ON SITE AT ANY TIME DURING CONSTRUCTION, IT DOES NOT RELIEVE THE CONTRACTOR OF ANY OF THE RESPONSIBILITIES AND REQUIREMENTS LISTED IN THE NOTES WITHIN THIS PLAN SET.

40' 0' 40' 80'
GRAPHIC SCALE IN FEET
1" = 40'

ISSUE	DATE	BY	DESCRIPTION
1	12/29/20	PC	FIRST SUBMISSION

NOT APPROVED FOR CONSTRUCTION

STONEFIELD engineering & design
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PRELIMINARY & FINAL MAJOR SITE PLANS

M&M NEPTUNE, LLC

PROP IMPROVEMENTS

BLOCK 701, LOT 1 (TAX MAP SHEET 7)
704 NJ. ROUTE 35
TOWNSHIP OF NEPTUNE
MONMOUTH COUNTY, NEW JERSEY

JEFFREY A. MARTELL, P.E.
NEW JERSEY LICENSE No. 47290
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

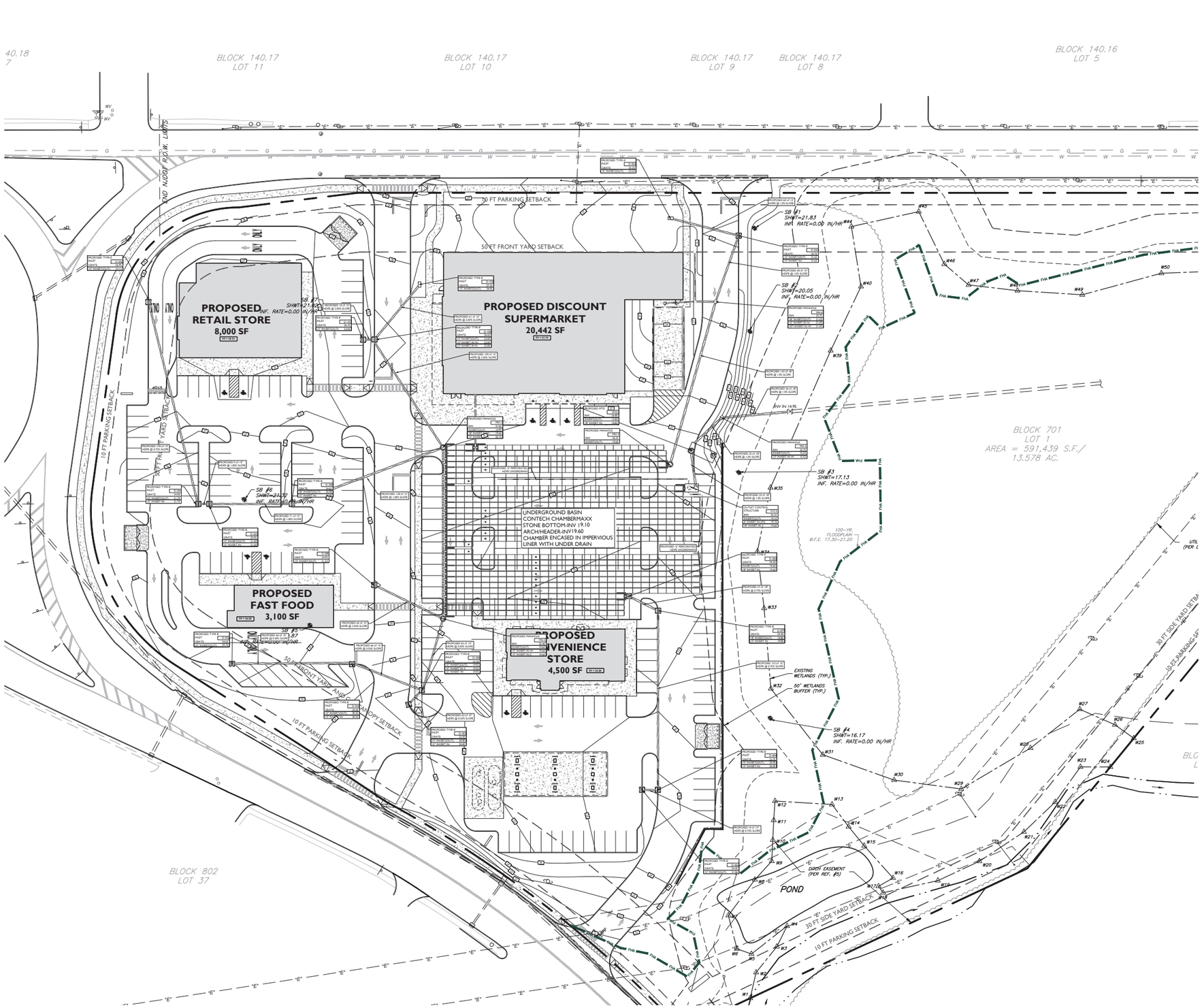
SCALE: 1" = 40' | PROJECT ID: PRI-200142

TITLE:
SITE PLAN

DRAWING:
C-5

Z:\PROJECTS\PRI\2020\PRI-200142\DESIGN\CAD\PROPERTIES - 704 ROUTE 35, NEPTUNE, NJ\CAD\SITE\PLOT\LDP-SS-SITE.DWG

APPENDIX A-2:
DRAINAGE PLAN



SYMBOL	DESCRIPTION
	PROPERTY LINE
100	PROPOSED GRADING CONTOUR
RIDGELINE	PROPOSED GRADING RIDGELINE
	PROPOSED STORMWATER STRUCTURES
	PROPOSED STORMWATER PIPING

DRAINAGE AND UTILITY NOTES

1. THE CONTRACTOR TO PERFORM A TEST PIT PRIOR TO CONSTRUCTION (RECOMMEND 30 DAYS PRIOR) AT LOCATIONS OF EXISTING UTILITY CROSSINGS FOR STORMWATER IMPROVEMENTS. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. IN WRITING.
2. CONTRACTOR SHALL START CONSTRUCTION OF STORM LINES AT THE LOWEST INVERT AND WORK UP-GRADIENT.
3. THE CONTRACTOR IS REQUIRED TO CALL THE APPROPRIATE AUTHORITY FOR NOTICE OF CONSTRUCTION/EXCAVATION AND UTILITY MARK OUT PRIOR TO THE START OF CONSTRUCTION IN ACCORDANCE WITH STATE LAW. CONTRACTOR IS REQUIRED TO CONFIRM THE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES IN THE FIELD. SHOULD A DISCREPANCY EXIST BETWEEN THE FIELD LOCATION OF A UTILITY AND THE LOCATION SHOWN ON THE PLAN SET OR SURVEY, THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. IMMEDIATELY IN WRITING.
4. THE CONTRACTOR IS RESPONSIBLE TO MAINTAIN A RECORD OF THE AS-BUILT LOCATIONS OF ALL PROPOSED UNDERGROUND INFRASTRUCTURE. THE CONTRACTOR SHALL NOTE ANY DISCREPANCIES BETWEEN THE AS-BUILT LOCATIONS AND THE LOCATIONS DEPICTED WITHIN THE PLAN SET. THIS RECORD SHALL BE PROVIDED TO THE OWNER FOLLOWING COMPLETION OF WORK.

EXCAVATION, SOIL PREPARATION, AND DEWATERING NOTES

1. THE CONTRACTOR IS REQUIRED TO REVIEW THE REFERENCED GEOTECHNICAL DOCUMENTS PRIOR TO CONSTRUCTION. THESE DOCUMENTS SHALL BE CONSIDERED A PART OF THE PLAN SET.
2. THE CONTRACTOR IS REQUIRED TO PREPARE SUBGRADE SOILS BENEATH ALL PROPOSED IMPROVEMENTS AND BACKFILL ALL EXCAVATIONS IN ACCORDANCE WITH RECOMMENDATIONS BY THE GEOTECHNICAL ENGINEER OF RECORD.
3. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING SHORING FOR ALL EXCAVATIONS AS REQUIRED. CONTRACTOR SHALL HAVE THE SHORING DESIGN PREPARED BY A QUALIFIED PROFESSIONAL. SHORING DESIGNS SHALL BE SUBMITTED TO STONEFIELD ENGINEERING & DESIGN, LLC. AND THE OWNER PRIOR TO THE START OF CONSTRUCTION.
4. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ALL OPEN EXCAVATIONS ARE PERFORMED AND PROTECTED IN ACCORDANCE WITH THE LATEST OSHA REGULATIONS.
5. THE CONTRACTOR IS RESPONSIBLE FOR ANY DEWATERING DESIGN AND OPERATIONS, AS REQUIRED, TO CONSTRUCT THE PROPOSED IMPROVEMENTS. THE CONTRACTOR SHALL OBTAIN ANY REQUIRED PERMITS FOR DEWATERING OPERATIONS AND GROUNDWATER DISPOSAL.

STORMWATER INFILTRATION BMP CONSTRUCTION NOTES

1. PRIOR TO THE START OF CONSTRUCTION, ANY AREA DESIGNATED TO BE USED FOR AN INFILTRATION BMP (E.G. BASIN, BIORETENTION AREA, ETC.) SHALL BE FENCED OFF AND SHALL NOT BE UTILIZED AS STORAGE FOR CONSTRUCTION EQUIPMENT OR AS A STOCKPILE AREA FOR CONSTRUCTION MATERIALS. NO ACTIVITY SHALL BE PERMITTED WITHIN THE INFILTRATION BASIN AREA UNLESS RELATED TO THE CONSTRUCTION OF THE INFILTRATION BASIN. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY ALL SUBCONTRACTORS OF BASIN AREA RESTRICTIONS.
2. THE CONTRACTOR SHALL MAKE EVERY EFFORT, WHERE PRACTICAL, TO AVOID SUBGRADE SOIL COMPACTION IN THE AREAS DESIGNATED TO BE USED FOR AN INFILTRATION BMP.
3. ALL EXCAVATION WITHIN THE LIMITS OF ANY INFILTRATION BMP SHALL BE PERFORMED WITH THE LIGHTEST PRACTICAL EXCAVATION EQUIPMENT. ALL EXCAVATION EQUIPMENT SHALL BE PLACED OUTSIDE THE LIMITS OF THE BASIN WHERE FEASIBLE. THE USE OF LIGHT-WEIGHT, RUBBER-TIRED EQUIPMENT (LESS THAN 8 PSI APPLIED TO THE GROUND SURFACE) IS RECOMMENDED WITHIN THE BASIN LIMITS.
4. THE SEQUENCE OF SITE CONSTRUCTION SHALL BE COORDINATED WITH BASIN CONSTRUCTION TO ADHERE TO SEQUENCING LIMITATIONS.
5. DURING THE FINAL GRADING OF AN INFILTRATION BASIN, THE BOTTOM OF THE BASIN SHALL BE DEEPLY TILLED WITH A ROTARY TILLER OR DISC HARROW AND THEN SMOOTHED OUT WITH A LEVELING DRAW OR EQUIVALENT GRADING EQUIPMENT. ALL GRADING EQUIPMENT SHALL BE LOCATED OUTSIDE OF THE BASIN BOTTOM WHERE FEASIBLE.
6. FOLLOWING CONSTRUCTION OF AN INFILTRATION BASIN, SOIL INFILTRATION TESTING BY A LICENSED GEOTECHNICAL ENGINEER IS REQUIRED TO CERTIFY COMPLIANCE WITH THE DESIGN INFILTRATION RATES IN ACCORDANCE WITH APPENDIX E OF THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION'S BEST MANAGEMENT PRACTICES MANUAL, LATEST EDITION. IF THE FIELD INFILTRATION RATES ARE LOWER THAN THE RATE USED DURING DESIGN, THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. IN WRITING IMMEDIATELY TO DETERMINE THE APPROPRIATE COURSE OF ACTION.
7. THE CONTRACTOR SHALL NOTIFY THE MUNICIPALITY TO DETERMINE IF WITNESS TESTING IS REQUIRED DURING INFILTRATION BASIN EXCAVATION AND/OR SOIL INFILTRATION TESTING.

STORMWATER UNDERGROUND BMP CONSTRUCTION NOTES

1. THE CONTRACTOR SHALL INSTALL AND BACKFILL THE UNDERGROUND BMP IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
2. UNDERGROUND BASINS SHALL UTILIZE A STONE BACKFILL WITH A MINIMUM VOID RATIO OF 40%.
3. NO CONSTRUCTION LOADING OVER UNDERGROUND BASINS IS PERMITTED UNTIL BACKFILL IS COMPLETE PER THE MANUFACTURER'S SPECIFICATIONS. NO VEHICLES SHALL BE STAGED OR OPERATE FROM A FIXED POSITION OVER THE BASIN.

40' 0' 40' 80'
GRAPHIC SCALE IN FEET
1" = 40'

ISSUE	DATE	BY	DESCRIPTION
1	12/29/20	PC	FIRST SUBMISSION

NOT APPROVED FOR CONSTRUCTION

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Rutherford, NJ · New York, NY · Boston, MA
Princeton, NJ · Tampa, FL · Detroit, MI
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PRELIMINARY & FINAL MAJOR SITE PLANS

M&M NEPTUNE, LLC

PROP IMPROVEMENTS

BLOCK 701, LOT 1 (TAX MAP SHEET 7)
704 N.J. ROUTE 35
NEPTUNE TOWNSHIP
MONMOUTH COUNTY, NEW JERSEY

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LICENSED PROFESSIONAL ENGINEER

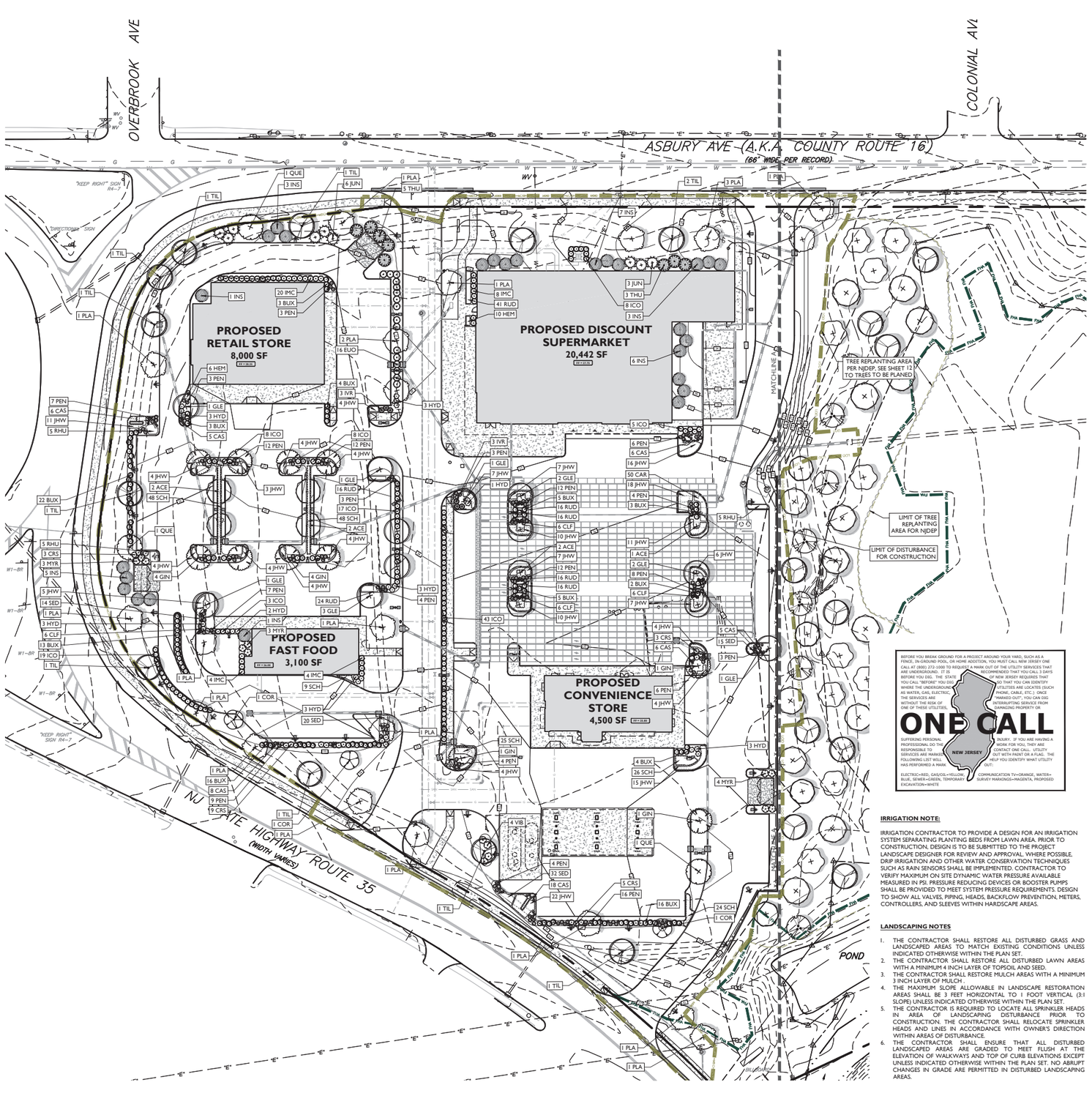
STONEFIELD engineering & design

SCALE: 1" = 40' | PROJECT ID: PRI-200142

TITLE:
STORMWATER MANAGEMENT PLAN

DRAWING:
C-7

APPENDIX A-3:
LANDSCAPING PLAN



BEFORE YOU BREAK GROUND FOR A PROJECT AROUND YOUR YARD, SUCH AS A FENCE, IN-GROUND POOL, OR HOME ADDITION, YOU MUST CALL NEW JERSEY ONE CALL AT (800) 272-1000 TO REQUEST A MARK OUT OF THE UTILITY SERVICES THAT ARE UNDERGROUND. IT IS RECOMMENDED THAT YOU CALL 3 DAYS BEFORE YOU DIG. THE STATE OF NEW JERSEY REQUIRES THAT YOU CALL "BEFORE" YOU DIG TO IDENTIFY WHERE THE UNDERGROUND UTILITIES ARE LOCATES (SUCH AS WATER, GAS, ELECTRIC) SO THAT YOU CAN IDENTIFY THE SERVICES ARE "MARKED OUT", YOU CAN DIG WITHOUT THE RISK OF INTERRUPTING SERVICE FROM ONE OF THESE UTILITIES, DAMAGING PROPERTY OR

ONE CALL

NEW JERSEY

SUFFERING PERSONAL INJURY. IF YOU ARE HAVING A PROFESSIONAL DO THE WORK FOR YOU, THEY ARE RESPONSIBLE TO CONTACT ONE CALL. UTILITY SERVICES ARE MARKED OUT WITH PAINT OR A FLAG. THE FOLLOWING LIST WILL HELP YOU IDENTIFY WHAT UTILITY HAS PERFORMED A MARK OUT:

ELECTRIC=RED, GAS/OIL=YELLOW, COMMUNICATION TV=ORANGE, WATER=BLUE, SEWER=GREEN, TEMPORARY SURVEY MARKINGS=MAGENTA, PROPOSED EXCAVATION=WHITE

IRRIGATION NOTE:

IRRIGATION CONTRACTOR TO PROVIDE A DESIGN FOR AN IRRIGATION SYSTEM SEPARATING PLANTING BEDS FROM LAWN AREA. PRIOR TO CONSTRUCTION, DESIGN IS TO BE SUBMITTED TO THE PROJECT LANDSCAPE DESIGNER FOR REVIEW AND APPROVAL. WHERE POSSIBLE, DRIP IRRIGATION AND OTHER WATER CONSERVATION TECHNIQUES SUCH AS RAIN SENSORS SHALL BE IMPLEMENTED. CONTRACTOR TO VERIFY MAXIMUM ON SITE DYNAMIC WATER PRESSURE AVAILABLE MEASURED IN PSI. PRESSURE REDUCING DEVICES OR BOOSTER PUMPS SHALL BE PROVIDED TO MEET SYSTEM PRESSURE REQUIREMENTS. DESIGN TO SHOW ALL VALVES, PIPING, HEADS, BACKFLOW PREVENTION, METERS, CONTROLLERS, AND SLEEVES WITHIN HARDSCAPE AREAS.

LANDSCAPING NOTES

1. THE CONTRACTOR SHALL RESTORE ALL DISTURBED GRASS AND LANDSCAPED AREAS TO MATCH EXISTING CONDITIONS UNLESS INDICATED OTHERWISE WITHIN THE PLAN SET.
2. THE CONTRACTOR SHALL RESTORE ALL DISTURBED LAWN AREAS WITH A MINIMUM 4 INCH LAYER OF TOPSOIL AND SEED.
3. THE CONTRACTOR SHALL RESTORE MULCH AREAS WITH A MINIMUM 3 INCH LAYER OF MULCH .
4. THE MAXIMUM SLOPE ALLOWABLE IN LANDSCAPE RESTORATION AREAS SHALL BE 3 FEET HORIZONTAL TO 1 FOOT VERTICAL (3:1 SLOPE) UNLESS INDICATED OTHERWISE WITHIN THE PLAN SET.
5. THE CONTRACTOR IS REQUIRED TO LOCATE ALL SPRINKLER HEADS IN AREA OF LANDSCAPING DISTURBANCE PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL RELOCATE SPRINKLER HEADS AND LINES IN ACCORDANCE WITH OWNER'S DIRECTION WITHIN AREAS OF DISTURBANCE.
6. THE CONTRACTOR SHALL ENSURE THAT ALL DISTURBED LANDSCAPED AREAS ARE GRADED TO MEET FLUSH AT THE ELEVATION OF WALKWAYS AND TOP OF CURB ELEVATIONS EXCEPT UNLESS INDICATED OTHERWISE WITHIN THE PLAN SET. NO ABRUPT CHANGES IN GRADE ARE PERMITTED IN DISTURBED LANDSCAPING AREAS.

PLANT SCHEDULE

DECIDUOUS TREES	CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONTAINER	SPACING
	ACE	7	ACER CAMPESTRE	HEDGE MAPLE	3" - 3.5" CAL	B&B	AS SHOWN
	COR	3	CORNUS FLORIDA `CHEROKEE CHIEF`	CHEROKEE CHIEF DOGWOOD	3" - 3.5" CAL	B&B	AS SHOWN
	GIN	11	GINKGO BILOBA	MAIDENHAIR TREE	3" - 3.5" CAL	B&B	AS SHOWN
	GLE	12	GLEDITSIA TRIACANTHOS	HONEY LOCUST	3" - 3.5" CAL	B&B	AS SHOWN
	PLA	20	PLATANUS X ACERIFOLIA	LONDON PLANE TREE	3" - 3.5" CAL	B&B	AS SHOWN
	QUE	3	QUERCUS ACUTISSIMA	SAWTOOTH OAK	3" - 3.5" CAL	B&B	AS SHOWN
	TIL	11	TILIA CORDATA `GREENSPIRE`	GREENSPIRE LINDEN	3" - 3.5" CAL	B&B	AS SHOWN
EVERGREEN TREES	CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONTAINER	SPACING
	INS	26	ILEX X `NELLIE R. STEVENS`	NELLIE R. STEVENS HOLLY	8' - 10' HT	B&B	AS SHOWN
	JUN	9	JUNIPERUS VIRGINIANA	EASTERN RED CEDAR	8' - 10' HT	B&B	AS SHOWN
	THU	8	THUJA X `GREEN GIANT`	GREEN GIANT ARBORVITAE	8' - 10' HT	B&B	AS SHOWN
SHRUBS	CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONTAINER	SPACING
	CRS	20	CLETHRA ALNIFOLIA `RUBY SPICE`	RUBY SPICE CLETHRA	18" - 24"	POT	AS SHOWN
	EUO	16	EUONYMUS ALATUS	WINGED EUONYMUS	36" - 42"	B&B	AS SHOWN
	HYD	21	HYDRANGEA MACROPHYLLA `ENDLESS SUMMER`	BAILMER HYDRANGEA	24" - 30"	POT	AS SHOWN
	IVR	6	ILEX VERTICILLATA `RED SPRITE`	RED SPRITE WINTERBERRY	18" - 24"	POT	AS SHOWN
	VIB	4	VIBURNUM DENTATUM	VIBURNUM	36" - 42"	POT	AS SHOWN
EVERGREEN SHRUBS	CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONTAINER	SPACING
	BUX	96	BUXUS MICROPHYLLA `WINTER GEM`	GLOBE WINTER GEM BOXWOOD	36" HT	B&B	AS SHOWN
	ICO	111	ILEX GLABRA `COMPACTA`	COMPACT INKBERRY	36" HT	B&B	AS SHOWN
	IMC	36	ILEX X MESERVEAE `CHINA GIRL`	CHINA GIRL HOLLY	36" HT	B&B	AS SHOWN
	MYR	10	MYRICA PENSYLVANICA	NORTHERN BAYBERRY	36" HT	B&B	AS SHOWN
GRASSES	CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONTAINER	SPACING
	CLF	24	CALAMAGROSTIS X ACUTIFLORA `KARL FOERSTER`	KARL FOERSTER FEATHER REED GRASS	1 GAL.	POT	AS SHOWN
	CAS	54	CAREX STRICTA	TUSSOCK SEDGE	1 GAL.	POT	AS SHOWN
	PEN	138	PENNISETUM ALOPECUROIDES `HAMELN`	HAMELN FOUNTAIN GRASS	1 GAL.	POT	AS SHOWN
SHRUB AREAS	CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONTAINER	SPACING
	JHW	199	JUNIPERUS HORIZONTALIS `WILTONII`	BLUE RUG JUNIPER	1 GAL.	POT	36" o.c.
	RHU	15	RHUS AROMATICA `GRO-LOW`	GRO-LOW FRAGRANT SUMAC	1 GAL.	POT	42" o.c.
PERENNIALS	CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONTAINER	SPACING
	HEM	16	HEMEROCALLIS X `PURPLE DE ORO`	PURPLE DE ORO DAYLILY	1 GAL.	POT	18" o.c.
	RUD	145	RUDBECKIA FULGIDA	CONEFLOWER	1 GAL.	POT	18" o.c.
	SED	81	SEDUM SPECTABILE `AUTUMN FIRE`	SHOWY STONECROP	1 GAL.	POT	18" o.c.
GROUND COVERS	CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONTAINER	SPACING
	CAR	50	CAREX X `ICE DANCE`	ICE DANCE SEDGE	1 GAL.	POT	18" o.c.
	SCH	180	SCHIZACHYRIUM SCOPARIUM	LITTLE BLUESTEM	1 GAL.	POT	24" o.c.

NOTE: IF ANY DISCREPANCIES OCCUR BETWEEN AMOUNTS SHOWN ON THE LANDSCAPE PLAN AND WITHIN THE PLANT LIST, THE PLAN SHALL DICTATE.

PAUL DEVITTO, L.L.A.
NEW JERSEY LICENSE No. 21AS00123500
LICENSED LANDSCAPE ARCHITECT

40' 0' 40' 80'
GRAPHIC SCALE IN FEET
1" = 40'

ISSUE	DATE	BY	DESCRIPTION
1	12/29/20	PC	FIRST SUBMISSION

NOT APPROVED FOR CONSTRUCTION

STONEFIELD engineering & design
Rutherford, NJ • New York, NY • Boston, MA
Princeton, NJ • Tampa, FL • Detroit, MI
www.stonefieldeng.com
15 Spring Street, Princeton, NJ 08542
Phone 609 362.6900

PRELIMINARY & FINAL MAJOR SITE PLANS

M&M NEPTUNE, LLC

PROP IMPROVEMENTS

BLOCK 701, LOT 1 (TAX MAP SHEET 7)
704 N.J. ROUTE 35
TOWNSHIP OF NEPTUNE
MONMOUTH COUNTY, NEW JERSEY

JEFFREY A. MARTELL, P.E.
NEW JERSEY LICENSE No. 47290
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 40' | PROJECT ID: PRI-200142

TITLE: LANDSCAPING PLAN

DRAWING: C-12

Z:\PROJECTS\PRI\200\PRI-200143 EDGEWOOD PROPERTIES - 704 ROUTE 35, NEPTUNE, NJ\C-ADD\PLOT\LDN-12-1 LANDSCAPE.DWG

APPENDIX B:
MASER CONSULTING GEOTECHNICAL REPORT

Engineers Planners Surveyors Landscape Architects Environmental Scientists

MASER CONSULTING P. A.

Report of Infiltration Evaluation

M & M at Neptune, LLC

Block 701, Lot 1
Township of Neptune, Monmouth County, New Jersey

May 20, 2019

Prepared For

Mr. Devon McDonough, PE, LSIT
EP Design Services, LLC
2901 Hamilton Boulevard
South Plainfield, NJ 07080

Prepared By

Maser Consulting P.A.
Corporate Headquarters
331 Newman Springs Road, Suite 203
Red Bank, NJ 07701
732.383.1950

Michael Carnivale, III, P.E.
Senior Project Manager, Geotechnical Services
Professional Engineer
New Jersey License No. 45357

MC Project No. 19000475A

TABLE OF CONTENTS

FIGURES

APPENDICES

1.0 INTRODUCTION

This report presents the results of our geotechnical evaluation performed at the project site with respect to the proposed stormwater management areas and infiltration rates for use in design. A multi-use facility is planned within the currently abandoned property between NJ Route 35 and Asbury Avenue in the Township of Neptune, Monmouth County, New Jersey (Block 701, Lot 1 on the Township of Neptune Tax Maps).

Infiltration rate recommendations provided in this report are based on review of published data, accepted engineering practice, and field observations. Maser Consulting P.A. has evaluated the subsurface conditions at the site, and provides an evaluation of potential infiltration rates for soils encountered at depth within the area of the proposed stormwater management systems and design seasonal high water levels.

2.0 SITE DESCRIPTION

The project site is located on NJ Route 35 at the intersection with Asbury Avenue in Neptune, New Jersey (Figure No. 1) and referred to as Block 701, Lot 1 on the Township of Neptune Tax Maps. The subject site currently holds an abandoned building and associated parking lot at its center, a landscaped lawn on the west end, and an overgrown section that borders wetlands on the eastern end. The site is bounded by residential properties to the north, wetlands to the east, and commercial properties to the west and south. The proposed development consists of a proposed restaurant, retail and convenience store with gasoline service.

3.0 SCOPE OF SERVICES

To evaluate the subsurface soil and groundwater conditions within the influence of the proposed stormwater management areas and to subsequently provide consultation regarding anticipated subsurface infiltration rates and estimated seasonal high-water levels (ESHWL) for design, we performed the following scope of services:

a) Provided full-time technical observation of the excavation contractor, provided by the Client, to excavate test pits for exploration of subsurface soil and groundwater conditions within the proposed stormwater management areas;
b) Obtained representative soil samples encountered within the zone of influence of the proposed stormwater basin construction;
c) Evaluated the field data and prepared test pit logs showing the types of soils observed, depths to encountered groundwater, and depths to estimated seasonal high groundwater;
d) Performed Tube Permeameter tests to evaluate infiltration rates for the subgrade soils in accordance with BMP-E methods; and
e) Provided this *Report of Infiltration Evaluation* that reviews potential soil infiltration rates for design and groundwater considerations for the proposed basin requirements.

4.0 SUBSURFACE EXPLORATION

The subsurface conditions, for the purpose of infiltration evaluation, were explored on April 14, 2019 through the excavation of a total of 7 test pits, labeled TP-1 through TP-7. The test pits were advanced to termination depths between 11 and 12.5 feet below ground surface (bgs) by Edgewood Properties using a CAT 322C trackhoe.

Representatives from Maser Consulting's Geotechnical Department observed the test pit excavations. Soils encountered in the test pits were classified in the field in accordance with N.J.A.C. 7:9A, Subchapter 5.3, Terminology Required for Soil Logs. Representative soil samples of strata encountered were collected and returned to Maser Consulting's Red Bank laboratory facilities for further evaluation and analyses. Details pertaining to the subsurface conditions encountered are presented on the Test Pit Logs in Appendix A.

The depth of groundwater was measured from the ground surface to the point of observed seepage or consistent soil moisture. Groundwater was encountered within all test pits at depths that ranged from approximately 4.5 feet to 11.5 feet bgs. It should be noted that fluctuation in groundwater levels can occur due to several factors, including variations in precipitation, seasonal changes, and site development activities, which can alter surface water drainage paths. It should also be noted

that test pits TP-1 through TP-4 were located near a wetlands boundary on the eastern side of the property.

The subsurface strata were also evaluated with respect to mottling and soil staining to determine if seasonal high groundwater levels extended into the test pit depths. Staining and mottling within a soil stratum can indicate seasonal high-water level fluctuations, but is also found along wormholes, as a result of prior farming practices, or as an indication of geologic depositional factors. Please refer to Table 1 for a summary of depths to the groundwater table and to the estimated seasonal high-water level (ESHWL).

TABLE 1
DEPTH TO GWT AND ESHWL SUMMARY

Test Pit Test Boring ID	Approx. Ground Surface Elev. (ft)	Depth to Groundwater Water Table, GWT (in)	Depth to Estimated Seasonal High-Water Level, ESHWL (in)
TP-1	22.33	138	6 (Perched)
TP-2	20.72	102	8 (Perched)
TP-3	21.05	54	47
TP-4	17.50	132	16 (Perched)
TP-5	21.54	132	20 (Perched)
TP-6	21.82	132	6 (Perched)
TP-7	23.25	126	16 (Perched)

5.0 SUBSURFACE CONDITIONS

The surface cover in the test pits was a brown to dark brown sandy loam layer of topsoil that ranged from 2 to 19 inches in thickness. Test pits TP-1 through TP-4 had layers of varying topsoil thickness and inconsistent boundaries indicating that potential fill exists at the surface layer.

Underlying the surface cover was primarily a brownish yellow to light gray sandy loam to loam that extended to depths ranging from 24 to 108 inches bgs. Under this stratum was a gray clay loam layer in all test pits, except for test pit TP-4 which terminated in a gray sand. This gray sand stratum was encountered under the clay loam layer in the remaining test pits and was very moist to wet in all cases.

As indicated on the test pit logs and in Table 1 on the previous page, indicators of seasonal high water levels (SHWL), in particular, mottling, and light to moderate seepage was encountered at shallow depths within the test pits. Based on our observations in the field, it appears that this is a result of perched conditions due to the gray clay loam layer underlying the soil layers where the mottling and seepage was encountered and not indicative of the true groundwater table which was encountered at depths ranging from 102 to 132 inches below the existing grade. The noted exception was test pit TP-3, where the soil was saturated at a depth of 54 inches below existing grade and may be the result of its proximately to the wetland boundary.

6.0 SOIL INFILTRATION EVALUATION

Selected soil samples were tested by the Maser Consulting Geotechnical Laboratory in Red Bank, New Jersey. The testing consisted of 10 Tube Permeameter Tests performed to estimate the infiltration rate of groundwater through the soils at depth. Tube Permeameter testing was performed in accordance with N.J.A.C. 7:9A-6.2 and New Jersey Stormwater Best Management Practices Manual, Appendix E (BMP-E) requirements. The soil samples were selected based on review of test pit logs by design personnel, the proposed infiltration depths, and comparison to other strata encountered at each test pit location. The tube samples were collected from the soils directly by inserting the sample tube into the ground and retrieving the tube by excavating the soils surrounding it.

Infiltration test results are summarized in Table 2 and Tube Permeameter test results are presented in Appendix B.

TABLE 2 TUBE PERMEAMETER TEST SUMMARY			
Test Pit ID	**Approx. Ground Surface Elev. (ft)**	**Depth below Existing Grade (in)**	**Infiltration Rate (in/hr)**
TP-1	22.33	21	0.12 / 0.00
TP-2	20.72	8	0.00 / 0.00
		24	0.00 / 0.00
TP-3	21.05	19	0.00 / 0.10
		47	0.00 / 0.13
TP-4	17.50	20	0.00 / 0.00
TP-5	21.54	15	0.00 / 0.00
		53	0.79 / 1.25
TP-6	21.82	18	0.00 / 0.00
TP-7	23.25	24	0.00 / 0.00

7.0 DISCUSSION

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey, the soils at the project site are classified as *Elkton loam, (EkaAr),* classified as Hydrologic Soil Group C/D, and *Evesboro-Urban land complex (EvuB),* classified as Hydrologic Soil Group A. Based on the findings of our field exploration, the project site is underlain by several layers of fine-grained soils (loam, sandy loam, and clay loam) with low infiltration characteristics which also result in perched conditions at shallow depths. In accordance with the Addendum to Appendix E of the NJ Stormwater BMP Manual, areas where the SHWL is encountered within the upper 24 inches of the soil profile should be classified as Hydrologic Soil Group (HSG) D. For the purposes of subject property's HSG classification, our professional opinion is that perched water conditions can be considered a restrictive horizon similar to the SHWL, as both of these features will restrict the vertical movement of water. Based on this criteria, we recommend that consideration be given to classifying the property as having HSG D which can result in not having the requirement for groundwater recharge. Additional test pits may be required to meet the NJDEP requirements for HSG reclassification and would be subject to agency review and approval.

In lieu of HSG reclassification, a limited soil exchange program where the fine-grained soils can be removed and replaced with coarse-grained soils (K3 or better soil) which ties into the granular layer encountered near the groundwater level, can be performed.

Excavated soils with high silt and clay contents are unsuitable for use as structural fill throughout the site. Soils containing significant quantities of organic materials may need to be removed from the site and disposed in a manner consistent with local, state, and federal regulations. Stripped topsoil and any cohesive materials may be used to raise site grades in lawn areas but may be difficult to re-handle and place in a manner that will minimize post-construction subsidence. During periods of inclement weather, placing and compaction difficulties will also occur since the materials, in general, will be moisture sensitive. Granular materials encountered during site earthwork operations should be segregated for reuse as general fills for this project.

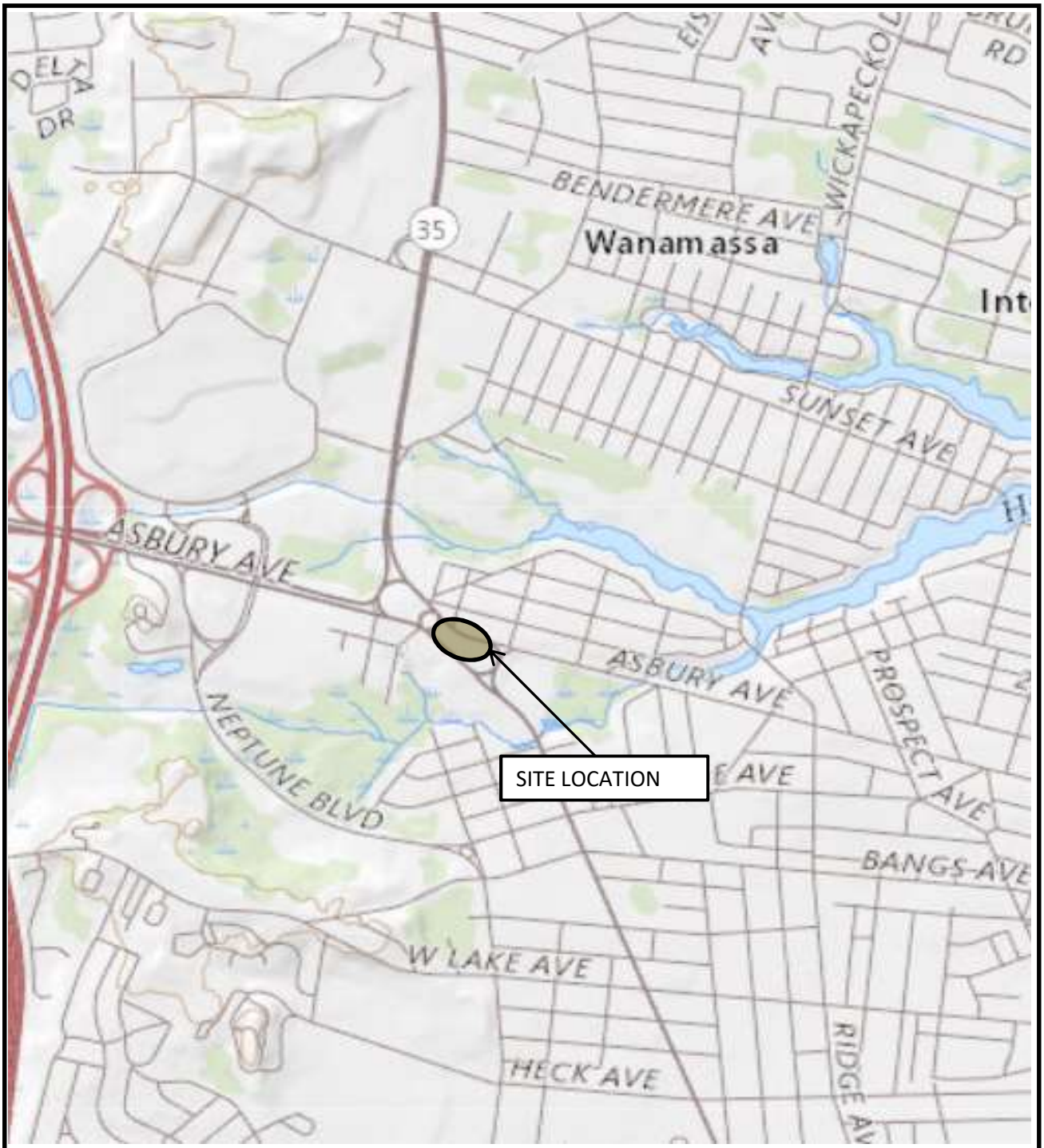
8.0 CLOSING

Successful construction of the project will require competent field observation of the construction operations. Earthwork, including clearing and grubbing, subgrade identification, grading, and fill placement should be observed by a competent individual familiar with the recommendations contained herein. We are available to perform construction observation services, if requested.

The recommendations contained herein are contingent upon the actual field conditions being consistent with those encountered during our field exploration. Should any variation in the anticipated conditions be encountered or site regrading be proposed, Maser Consulting P.A. should be notified immediately to determine what impact the changed conditions may have upon the presented recommendations.

9.0 LIMITATIONS

Services performed by Maser Consulting P.A. during this project have been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, expressed or implied, and no warranty or guarantee is included or intended in the services provided. This is not an Environmental Assessment.



NOTES:

1.) *SITE MAP OBTAINED FROM USGS TOPOGRAPHIC MAP, ASBURY PARK, NEW JERSEY QUADRANGLE, DATED 2016.

MASER CONSULTING P.A.

Consulting, Municipal & Environmental Engineers
Planners ▪ Surveyors ▪ Landscape Architects

New Jersey New York Pennsylvania Virginia
Customer Loyalty *through* Client Satisfaction

Title: SITE LOCATION MAP

Project:

M & M AT NEPTUNE, LLC
TOWNSHIP OF NEPTUNE
MONMOUTH COUNTY, NEW JERSEY

Drawn	MN	Checked By:	MC	Project	19000475A
Scale	N.T.S.	Date	5/7/19	Figure No.:	1

ASBURY AVE (A.K.A. COUNTY ROUTE 16)
(66' WIDE PER RECORD)

OVERBROOK RD

NJ STATE HIGHWAY ROUTE 35
(WIDTH VARIES)

PROPOSED RESTAURANT
4,536 S.F.
(50 SEATS)

PROP. RETAIL
CANOPY: 733 S.F.
BUILDING: 22,245 S.F.
TOTAL: 22,978 S.F.

PROP. CONVENIENCE STORE W/GAS
5,486 S.F.
(13 SEATS)

POND

TP #1
EL. 22.33

TP #2
EL. 20.72

TP #3
EL. 21.05

TP #4
EL. 17.50

TP #5
EL. 21.54

TP #6
EL. 21.82

TP #7
EL. 23.25

FIRE LANE

STOP

20' 0 20' 40' 80'

SCALE: 1" = 40'

NO.	REVISIONS	DATE	BY

THIS WORK PREPARED UNDER MY IMMEDIATE SUPERVISION
BRADFORD J. ALLER
PROFESSIONAL ENGINEER
5/22/19
N.J.P.E. LIC. NO. GE 43435 DATE

DRAWN BY: DM	CHECKED BY: BJA
DATE: 5/22/19	SCALE: 1"=40'
APPROVED BY: RCA	ACAD NO.: 201-SB
FIELD BOOK: --- PAGE: ---	PROJECT NO.:
SHEET: 1 OF 2	DRAWING NO.: SB-1
REVISION:	

EP DESIGN SERVICES, LLC
State of New Jersey Certificate of Authorization #: 24GA28126500
2901 Hamilton Boulevard
South Plainfield, New Jersey 07080
(908) 205-0443 Fax: (908) 755-3272

SOIL BORING LOCATIONS (PROP. OVERLAY)
M & M AT NEPTUNE, LLC
FOR
BLOCK 701, LOT 1
TOWNSHIP OF NEPTUNE
MONMOUTH COUNTY NEW JERSEY

APPENDIX A

TEST PIT LOGS

MASER CONSULTING P.A.
Consulting, Municipal & Environmental Engineers
Planners ■ Surveyors ■ Landscape Architects

RED BANK OFFICE
331 Newman Springs Road
Suite 203
Red Bank, N.J. 07701
Phone (732) 383-1950
Fax (732) 383-1990
E-mail - geotech@maserconsulting.com

TEST PIT No. TP-1

DATE EXCAVATED: 4/17/19
SURFACE ELEVATION: 22.33

Project: M & M At Neptune, LLC
Location: Neptune, Monmouth, NJ
Job Number: 19000475A

EXCAVATED BY: Edgewood Properties
EQUIPMENT USED: CAT 322C
INSPECTED BY: Megan Nugent

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3, 6, 9, 12	(10YR 4/3) Brown Sandy Loam. Subangular Blocky, Friable. Frequent Roots. (Topsoil, Moist).	4"
	24	(10YR 6/6) Brownish Yellow Sandy Loam. Subangular Blocky, Friable. (Moist).	6"
	36, 48	(10YR 7/1) Light Gray f Sandy Loam. Subangular Blocky, Friable. (7.5 YR 5/8) Strong Brown Many, Coarse, Distinct Mottles. (Moist, Seepage at 46").	46"
5	60, 72, 84, 96, 108	(10YR 3/2) Very Dark Grayish Brown Clay Loam. Massive, Firm. Micaceous. (Moist to Very Moist with Depth).	
10	120, 132		138"
	144	(7.5YR 6/1) Gray Sand. (Wet).	
	156, 168	**END OF TEST PIT AT 150 INCHES** **MODERATE SEEPAGE AT 28 INCHES** **SEEPAGE AT 46 INCHES**	
15	180, 192, 204, 216, 228		
20	240		

GROUNDWATER:	DEPTH (ft.)	DATE
First Encountered ▽	11.5	4/17/19
At Completion (0 hrs.) ▼	11.5	4/17/19
After Completion (>24 hrs.) ▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: 6 Inches (Perched)

TEST PIT No. TP-1

MASER CONSULTING P.A.
Consulting, Municipal & Environmental Engineers
Planners ■ Surveyors ■ Landscape Architects

RED BANK OFFICE
331 Newman Springs Road
Suite 203
Red Bank, N.J. 07701
Phone (732) 383-1950
Fax (732) 383-1990
E-mail - geotech@maserconsulting.com

TEST PIT No. TP-2

DATE EXCAVATED: 4/17/19
SURFACE ELEVATION: 20.72

Project: M & M At Neptune, LLC
Location: Neptune, Monmouth, NJ
Job Number: 19000475A

EXCAVATED BY: Edgewood Properties
EQUIPMENT USED: CAT 322C
INSPECTED BY: Megan Nugent

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3, 6, 9, 12	(10YR 3/3) Dark Brown Sandy Loam. 10% Gravel. Subangular Blocky, Friable. Frequent Roots. (Topsoil, Moist).	
		5"	
	24	(10YR 6/4) Light Yellowish Brown Loam. Subangular Blocky, Friable. (Moist).	
		8"	
	36, 48	(10YR 7/2) Light Gray f Sandy Loam. Subangular Blocky, Friable. Micaceous. (7.5YR 5/8) Strong Brown Common, Fine, Distinct Mottles Throughout. (Moist, Seepage at 20").	
		24"	
5	60, 72, 84, 96, 108	(10YR 3/2) Very Dark Grayish Brown Clay Loam. Massive, Firm. Common (10YR 7/2) Light Gray Loamy Sand Seams & Partings. (Moist Becoming Wet at 102").	
10	120		
		126"	
	132	(7.5YR 6/1) Gray Sand. Single Grain, Loose. (Wet).	
	144, 156, 168	**END OF TEST PIT AT 132 INCHES** **LIGHT SEEPAGE AT AT 20 INCHES**	
15	180, 192, 204, 216, 228		
20	240		

GROUNDWATER:	DEPTH (ft.)	DATE
First Encountered ▽	8.5	4/17/19
At Completion (0 hrs.) ▼	8.5	4/17/19
After Completion (>24 hrs.) ▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: 8 Inches (Perched)

TEST PIT No. TP-2

MASER CONSULTING P.A.
Consulting, Municipal & Environmental Engineers
Planners ▪ Surveyors ▪ Landscape Architects

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E-mail - geotech@maserconsulting.com

TEST PIT No. TP-3

DATE EXCAVATED: 4/17/19
SURFACE ELEVATION: 21.05

Project: M & M At Neptune, LLC
Location: Neptune, Monmouth, NJ
Job Number: 19000475A

EXCAVATED BY: Edgewood Properties
EQUIPMENT USED: CAT 322C
INSPECTED BY: Megan Nugent

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3, 6, 9, 12	(10YR 4/3) Brown Sandy Loam. 10% Gravel. Subangular Blocky, Friable. (Possible Fill, Moist).	
	19"		
	24	(10YR 5/6) Yellowish Brown Sandy Loam. 10% Gravel. Subangular Blocky, Friable. (Possible Fill, Moist).	
	29"		
	36	(10YR 2/2) Very Dark Brown Loam. Subangular Blocky, Friable. (10YR 7/1) Light Gray f Loamy Sand Partings. Many Roots. (Possible Fill, Moist, Seepage at 47").	
	47"		
5	60		
	72	(10YR 7/1) Light Gray f Sandy Loam. Subangular Blocky, Friable. (7.5YR 5/8) Strong Brown Common, Medium to Fine, Distinct Mottles. (Moist Becoming Wet at 54").	
	84, 96		
	108"		
10	120	(10YR 7/1) Light Gray Clay Loam. Massive, Firm. (Wet).	
	132, 144		
		END OF TEST PIT AT 144 INCHES SEEPAGE AT 47 INCHES	
	156, 168		
15	180		
	192, 204, 216, 228		
20	240		

GROUNDWATER:	DEPTH (ft.)	DATE
First Encountered ▽	4.5	4/17/19
At Completion (0 hrs.) ▼	4.5	4/17/19
After Completion (>24 hrs.) ▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: 47 Inches

TEST PIT No. TP-3

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TEST PIT No. TP-4

DATE EXCAVATED: 4/17/19
SURFACE ELEVATION: 17.5

Project: M & M At Neptune, LLC
Location: Neptune, Monmouth, NJ
Job Number: 19000475A

EXCAVATED BY: Edgewood Properties
EQUIPMENT USED: CAT 322C
INSPECTED BY: Megan Nugent

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3, 6, 9, 12	(10YR 3/3) Dark Brown Sandy Loam. Subangular Blocky, Friable. 5% Gravel. (Topsoil, Moist). 19"	
	24	(10YR 5/6) Yellowish Brown Loamy Sand. Subangular Blocky, Friable. (Fill, Moist). 16"	
	36, 48	(10YR 7/1) Light Gray f Sandy Loam. Subangular Blocky, Friable. (7.5YR 5/6) Strong Brown Many, Coarse, Distinct Mottles Throughout. (Moist, Seepage at 47").	
5	60	66"	
	72, 84, 96, 108	(10YR 5/1) Gray f Sandy Loam. Subangular Blocky, Friable. (Very Moist).	
10	120	132"	
	132, 144	(7.5YR 6/1) Gray Sand. Single Grain, Loose. (Wet).	
	156, 168	**END OF TEST PIT AT 150 INCHES** **SEEPAGE AT 47 INCHES**	
15	180, 192, 204, 216, 228		
20	240		

GROUNDWATER:	DEPTH (ft.)	DATE
First Encountered ▽	11.0	4/17/19
At Completion (0 hrs.) ▼	11.0	4/17/19
After Completion (>24 hrs.) ▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: 16 Inches (Perched)

TEST PIT No. TP-4

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TEST PIT No. TP-5

DATE EXCAVATED: 4/17/19
SURFACE ELEVATION: 21.54

Project: M & M At Neptune, LLC
Location: Neptune, Monmouth, NJ
Job Number: 19000475A

EXCAVATED BY: Edgewood Properties
EQUIPMENT USED: CAT 322C
INSPECTED BY: Megan Nugent

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3, 6, 9, 12	(10YR 4/3) Brown Loamy Sand. 5% Gravel. (Topsoil, Possible Fill, Moist).	
		2"	
	24	(10YR 4/3) Brown Loam. Subangular Blocky, Friable. (10YR 6/2) Light Brownish Gray Stratified f Loamy Sand Partings. (Possible Fill, Moist).	
		18"	
	36	(10YR 5/1) Gray f Sandy Loam. Subangular Blocky, Friable. (Possible Fill, Moist, Seepage from 20" to 31").	
		31"	
	48		
5	60		
	72		
	84	(10YR 4/2) Dark Grayish Brown Clay Loam. (Moist to Very Moist with Depth).	
	96		
	108		
10	120		
		132"	
	132	(7.5YR 6/1) Gray Sand. Single Grain, Loose. (Wet).	
	144		
		END OF TEST PIT AT 144 INCHES	
		SEEPAGE FROM 20 TO 31 INCHES	
	156		
	168		
15	180		
	192		
	204		
	216		
	228		
20	240		

GROUNDWATER:	DEPTH (ft.)	DATE
First Encountered ▽	11.0	4/17/19
At Completion (0 hrs.) ▼	11.0	4/17/19
After Completion (>24 hrs.) ▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: 20 Inches (Perched)

TEST PIT No. TP-5

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TEST PIT No. TP-6

DATE EXCAVATED: 4/17/19
SURFACE ELEVATION: 21.82

Project: M & M At Neptune, LLC
Location: Neptune, Monmouth, NJ
Job Number: 19000475A

EXCAVATED BY: Edgewood Properties
EQUIPMENT USED: CAT 322C
INSPECTED BY: Megan Nugent

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3, 6, 9, 12	(10YR 4/3) Brown Sandy Loam. Subangular Blocky, Friable. Frequent Roots. (Topsoil, Moist). 6"	
	24, 36	(10YR 7/1) Light Gray f Sandy Loam. Subangular Blocky, Friable. (7.5YR 5/8) Strong Brown Many, Coarse, Distinct Mottles. (Moist, Seepage from 37" to 56"). 42"	
5	48, 60, 72, 84, 96, 108	(10YR 3/2) Very Dark Grayish Brown Clay Loam. Massive, Firm to Cemented. (Moist to Very Moist with Depth).	
10	120, 132	(10YR 3/2) Very Dark Grayish Brown Sand. Single Grain, Loose. (Wet). 132"	
	144, 156, 168	**END OF TEST PIT AT 144 INCHES** **SEEPAGE FROM 37 TO 56 INCHES**	
15	180, 192, 204, 216, 228		
20	240		

GROUNDWATER:	DEPTH (ft.)	DATE
First Encountered ▽	11.0	4/17/19
At Completion (0 hrs.) ▼	11.0	4/17/19
After Completion (>24 hrs.) ▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: 6 Inches (Perched)

TEST PIT No. TP-6

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TEST PIT No. TP-7

DATE EXCAVATED: 4/17/19
SURFACE ELEVATION: 23.25

Project: M & M At Neptune, LLC
Location: Neptune, Monmouth, NJ
Job Number: 19000475A

EXCAVATED BY: Edgewood Properties
EQUIPMENT USED: CAT 322C
INSPECTED BY: Megan Nugent

DEPTH (ft)	DEPTH (in)	DESCRIPTION	REMARKS
0	3, 6, 9, 12	(10YR 4/3) Brown Sandy Loam. Subangular Blocky, Friable. (Topsoil, Fill, Moist).	
		4"	
	24	(10YR 3/3) Dark Brown Loam. Subangular Blocky, Friable. (Possible Fill, Moist).	
		16"	
	36, 48	(10YR 7/1) Light Gray Loam. Subangular Blocky, Friable. (7.5YR 5/8) Strong Brown Many, Coarse, Distinct Mottles. (Moist, Seepage from 28" to 66").	
5	60		
		66"	
	72, 84, 96, 108	(10YR 3/1) Very Dark Gray Clay Loam. Massive, Firm. (Very Moist).	
10	120	(10YR 3/1) Very Dark Gray Sand. Single Grained, Loose. (Wet).	
	132		
	144, 156, 168	**END OF TEST PIT AT 132 INCHES** **SEEPAGE FROM 28 TO 66 INCHES**	
15	180, 192, 204, 216, 228		
20	240		

GROUNDWATER:	DEPTH (ft.)	DATE
First Encountered ▽	10.5	4/17/19
At Completion (0 hrs.) ▼	10.5	4/17/19
After Completion (>24 hrs.) ▼		

ESTIMATED DEPTH TO SEASONAL HIGH GROUNDWATER: 16 Inches (Perched)

TEST PIT No. TP-7

APPENDIX B

TUBE PERMEAMETER TEST RESULTS

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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-1	Replicate:	A
Depth of Sample:	21"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.375 in

2. **Measurements** Tube Weight = 365.85 g
   Total Weight = 672.20 g
   tube #: F-6 Soil Weight = 306.35 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 97.68

   Bulk Density = Soil Weight / Volume
   Bulk Density = 3.14

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 3.625 H_1
   At end of interval: 3.500 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	1:00	60.0	0.125
b.	0:00:00	1:00	60.0	0.125
c.	0:00:00	1:00	60.0	0.125
d.	0:00:00	1:00	60.0	0.125
		av =	60.0	0.125

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 0.12 in/hr = Soil Permeability Class K0

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

Signature of Professional Engineer _____ License #45357
Michael Carnivale, III, P.E.

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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-1	Replicate:	B
Depth of Sample:	21"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.250 in

2. **Measurements** Tube Weight = 354.06 g
   Total Weight = 666.08 g
   tube #: B-100 Soil Weight = 312.02 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 94.07

   Bulk Density = Soil Weight / Volume
   Bulk Density = 3.32

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 3.625 H_1
   At end of interval: 3.625 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	1:00	60.0	0.000
b.	0:00:00	1:00	60.0	0.000
c.	0:00:00	1:00	60.0	0.000
d.	0:00:00	1:00	60.0	0.000
		av =	60.0	0.000

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 0.00 in/hr = Soil Permeability Class K0

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-2	Replicate:	A
Depth of Sample:	8"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.000 in

2. **Measurements** Tube Weight = 357.77 g
   Total Weight = 649.97 g
   tube #: JM-10 Soil Weight = 292.2 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 86.83

   Bulk Density = Soil Weight / Volume
   Bulk Density = 3.37

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 3.625 H_1
   At end of interval: 3.625 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	1:00	60.0	0.000
b.	0:00:00	1:00	60.0	0.000
c.	0:00:00	1:00	60.0	0.000
d.	0:00:00	1:00	60.0	0.000
		av =	60.0	0.000

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 0.00 in/hr = Soil Permeability Class K0

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-2	Replicate:	B
Depth of Sample:	8"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.125 in

2. **Measurements** Tube Weight = 353.09 g
   Total Weight = 677.20 g
   tube #: M-7 Soil Weight = 324.11 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 90.45

   Bulk Density = Soil Weight / Volume
   Bulk Density = 3.58

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 3.750 H_1
   At end of interval: 3.750 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	1:00	60.0	0.000
b.	0:00:00	1:00	60.0	0.000
c.	0:00:00	1:00	60.0	0.000
d.	0:00:00	1:00	60.0	0.000
		av =	60.0	0.000

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 0.00 in/hr = Soil Permeability Class K0

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

Signature of Professional Engineer _____ License #45357
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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-2	Replicate:	A
Depth of Sample:	24"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.250 in

2. **Measurements** Tube Weight = 360.14 g
   Total Weight = 654.94 g
   tube #: M-1 Soil Weight = 294.8 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 94.07

   Bulk Density = Soil Weight / Volume
   Bulk Density = 3.13

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 3.500 H_1
   At end of interval: 3.500 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	1:00	60.0	0.000
b.	0:00:00	1:00	60.0	0.000
c.	0:00:00	1:00	60.0	0.000
d.	0:00:00	1:00	60.0	0.000
		av =	60.0	0.000

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 0.00 in/hr = Soil Permeability Class K0

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-2	Replicate:	B
Depth of Sample:	24"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.250 in

2. **Measurements** Tube Weight = 351.88 g
   Total Weight = 642.78 g
   tube #: BC-6 Soil Weight = 290.9 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 94.07

   Bulk Density = Soil Weight / Volume
   Bulk Density = 3.09

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 3.625 H_1
   At end of interval: 3.625 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	1:00	60.0	0.000
b.	0:00:00	1:00	60.0	0.000
c.	0:00:00	1:00	60.0	0.000
d.	0:00:00	1:00	60.0	0.000
		av =	60.0	0.000

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 0.00 in/hr = Soil Permeability Class K0

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-3	Replicate:	A
Depth of Sample:	19"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.125 in

2. **Measurements** Tube Weight = 366.98 g
   Total Weight = 690.00 g
   tube #: M-3 Soil Weight = 323.02 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 90.45

   Bulk Density = Soil Weight / Volume
   Bulk Density = 3.57

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 3.875 H_1
   At end of interval: 3.875 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	1:00	60.0	0.000
b.	0:00:00	1:00	60.0	0.000
c.	0:00:00	1:00	60.0	0.000
d.	0:00:00	1:00	60.0	0.000
		av =	60.0	0.000

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 0.00 in/hr = Soil Permeability Class K0

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-3	Replicate:	B
Depth of Sample:	19"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.000 in

2. **Measurements** Tube Weight = 356.98 g
   Total Weight = 669.61 g
   tube #: M-4 Soil Weight = 312.63 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 86.83

   Bulk Density = Soil Weight / Volume
   Bulk Density = 3.60

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 3.750 H_1
   At end of interval: 3.625 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	1:00	60.0	0.125
b.	0:00:00	1:00	60.0	0.125
c.	0:00:00	1:00	60.0	0.125
d.	0:00:00	1:00	60.0	0.125
		av =	60.0	0.125

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 0.10 in/hr = Soil Permeability Class K0

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

Signature of Professional Engineer _____ License #45357
Michael Carnivale, III, P.E.

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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-3	Replicate:	A
Depth of Sample:	47"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.250 in

2. **Measurements** Tube Weight = 358.17 g
   Total Weight = 683.15 g
   tube #: BM-69 Soil Weight = 324.98 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 94.07

   Bulk Density = Soil Weight / Volume
   Bulk Density = 3.45

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 3.500 H_1
   At end of interval: 3.500 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	1:00	60.0	0.000
b.	0:00:00	1:00	60.0	0.000
c.	0:00:00	1:00	60.0	0.000
d.	0:00:00	1:00	60.0	0.000
		av =	60.0	0.000

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 0 in/hr = Soil Permeability Class K0

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-3	Replicate:	B
Depth of Sample:	47"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.625 in

2. **Measurements** Tube Weight = 359.14 g
   Total Weight = 682.24 g
   tube #: M-2 Soil Weight = 323.1 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 104.92

   Bulk Density = Soil Weight / Volume
   Bulk Density = 3.08

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 3.625 H_1
   At end of interval: 3.500 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	1:00	60.0	0.125
b.	0:00:00	1:00	60.0	0.125
c.	0:00:00	1:00	60.0	0.125
d.	0:00:00	1:00	60.0	0.125
		av =	60.0	0.125

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 0.13 in/hr = Soil Permeability Class K0

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-4	Replicate:	A
Depth of Sample:	20"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.250 in

2. **Measurements** Tube Weight = 362.51 g
   Total Weight = 697.92 g
   tube #: M-5 Soil Weight = 335.41 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 94.07

   Bulk Density = Soil Weight / Volume
   Bulk Density = 3.57

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 4.000 H_1
   At end of interval: 4.000 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	1:00	60.0	0.000
b.	0:00:00	1:00	60.0	0.000
c.	0:00:00	1:00	60.0	0.000
d.	0:00:00	1:00	60.0	0.000
		av =	60.0	0.000

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 0.00 in/hr = Soil Permeability Class K0

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-4	Replicate:	B
Depth of Sample:	20"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.125 in

2. **Measurements** Tube Weight = 357.94 g
   Total Weight = 687.22 g
   tube #: M-6 Soil Weight = 329.28 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 90.45

   Bulk Density = Soil Weight / Volume
   Bulk Density = 3.64

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 3.875 H_1
   At end of interval: 3.875 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	1:00	60.0	0.000
b.	0:00:00	1:00	60.0	0.000
c.	0:00:00	1:00	60.0	0.000
d.	0:00:00	1:00	60.0	0.000
		av =	60.0	0.000

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 0.00 in/hr = Soil Permeability Class K0

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-5	Replicate:	A
Depth of Sample:	15"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.500 in

2. **Measurements** Tube Weight = 349.96 g
   Total Weight = 666.40 g
   tube #: AC-5 Soil Weight = 316.44 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 101.30

   Bulk Density = Soil Weight / Volume
   Bulk Density = 3.12

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 3.625 H_1
   At end of interval: 3.625 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	1:00	60.0	0.000
b.	0:00:00	1:00	60.0	0.000
c.	0:00:00	1:00	60.0	0.000
d.	0:00:00	1:00	60.0	0.000
		av =	60.0	0.000

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 0.00 in/hr = Soil Permeability Class K0

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-5	Replicate:	B
Depth of Sample:	15"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.375 in

2. **Measurements** Tube Weight = 346.53 g
   Total Weight = 654.51 g
   tube #: M-8 Soil Weight = 307.98 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 97.68

   Bulk Density = Soil Weight / Volume
   Bulk Density = 3.15

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 3.500 H_1
   At end of interval: 3.500 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	1:00	60.0	0.000
b.	0:00:00	1:00	60.0	0.000
c.	0:00:00	1:00	60.0	0.000
d.	0:00:00	1:00	60.0	0.000
		av =	60.0	0.000

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 0.00 in/hr = Soil Permeability Class K0

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-5	Replicate:	A
Depth of Sample:	53"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.000 in

2. **Measurements** Tube Weight = 358.49 g
   Total Weight = 590.88 g
   tube #: M-9 Soil Weight = 232.39 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 86.83

   Bulk Density = Soil Weight / Volume
   Bulk Density = 2.68

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 3.875 H_1
   At end of interval: 3.625 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	15:00	15.0	0.250
b.	0:00:00	15:15	15.3	0.250
c.	0:00:00	15:22	15.4	0.250
d.	0:00:00	15:21	15.4	0.250
		av =	15.3	0.250

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 0.79 in/hr = Soil Permeability Class K2

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-5	Replicate:	B
Depth of Sample:	53"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.000 in

2. **Measurements** Tube Weight = 358.77 g
   Total Weight = 602.71 g
   tube #: M-10 Soil Weight = 243.94 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 86.83

   Bulk Density = Soil Weight / Volume
   Bulk Density = 2.81

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 3.750 H_1
   At end of interval: 3.375 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	15:00	15.0	0.375
b.	0:00:00	15:12	15.2	0.375
c.	0:00:00	15:18	15.3	0.375
d.	0:00:00	15:15	15.3	0.375
		av =	15.2	0.375

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 1.25 in/hr = Soil Permeability Class K2

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-6	Replicate:	A
Depth of Sample:	18"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.375 in

2. **Measurements** Tube Weight = 357.34 g
   Total Weight = 713.85 g
   tube #: BM-65 Soil Weight = 356.51 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 97.68

   Bulk Density = Soil Weight / Volume
   Bulk Density = 3.65

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 3.875 H_1
   At end of interval: 3.875 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	1:00	60.0	0.000
b.	0:00:00	1:00	60.0	0.000
c.	0:00:00	1:00	60.0	0.000
d.	0:00:00	1:00	60.0	0.000
		av =	60.0	0.000

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 0.00 in/hr = Soil Permeability Class K0

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-6	Replicate:	B
Depth of Sample:	18"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.375 in

2. **Measurements** Tube Weight = 355.68 g
   Total Weight = 712.84 g
   tube #: AC-20 Soil Weight = 357.16 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 97.68

   Bulk Density = Soil Weight / Volume
   Bulk Density = 3.66

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 3.625 H_1
   At end of interval: 3.625 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	1:00	60.0	0.000
b.	0:00:00	1:00	60.0	0.000
c.	0:00:00	1:00	60.0	0.000
d.	0:00:00	1:00	60.0	0.000
		av =	60.0	0.000

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 0.00 in/hr = Soil Permeability Class K0

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-7	Replicate:	A
Depth of Sample:	24"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.375 in

2. **Measurements** Tube Weight = 368.57 g
   Total Weight = 712.14 g
   tube #: B-8 Soil Weight = 343.57 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 97.68

   Bulk Density = Soil Weight / Volume
   Bulk Density = 3.52

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 3.875 H_1
   At end of interval: 3.875 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	1:00	60.0	0.000
b.	0:00:00	1:00	60.0	0.000
c.	0:00:00	1:00	60.0	0.000
d.	0:00:00	1:00	60.0	0.000
		av =	60.0	0.000

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 0.00 in/hr = Soil Permeability Class K0

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

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TUBE PERMEAMETER TEST DATA

Project Name:	M & M At Neptune	Project Number:	19000475A
Block:	701	Municipality:	Neptune
Lot:	1	County:	Monmouth
Test Number:	1	Date Collected:	4/17/2019
Material Tested:	TP-7	Replicate:	B
Depth of Sample:	24"	Sample Type:	Undisturbed

1. **Sample Dimensions** Radius = 1.905 cm
   Length = 3.125 in

2. **Measurements** Tube Weight = 356.12 g
   Total Weight = 688.36 g
   tube #: M-11 Soil Weight = 332.24 g

   Volume = Length * 2.54 cm/inch * π * Radius²
   Volume = 90.45

   Bulk Density = Soil Weight / Volume
   Bulk Density = 3.67

   Height of Water Level above Rim of Test Basin (inches)

   At beginning of interval: 3.750 H_1
   At end of interval: 3.750 H_2

3. **Test Data**

	Time Begin, T_1	Time End, T_2	Test Length (min)	Δ Height (in)
a.	0:00:00	1:00	60.0	0.000
b.	0:00:00	1:00	60.0	0.000
c.	0:00:00	1:00	60.0	0.000
d.	0:00:00	1:00	60.0	0.000
		av =	60.0	0.000

4. **Permeability Calculation** K (in/hr) = 60 min/hr * r^2/R^2 * L (in)/T (min) * ln (H_1/H_2)

   K = 0.00 in/hr = Soil Permeability Class K0

5. Any **Defects** in Sample: No

6. I hereby certify that the information on Form 3b of this application is true and accurate. I am aware that falsification of data is a violation of the water polution Control Act (NJSA 59:10A-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

Signature of Professional Engineer _____ License #45357
Michael Carnivale, III, P.E.

APPENDIX C:
INSPECTION CHECKLISTS

APPENDIX C-1:
GENERAL INSPECTION CHECKLIST LOG

INSPECTION CHECKLIST LOG

1. **The responsible party shall report issues to the local authority and mosquito commission as required by local ordinances and regulatory authorities.**
2. **The maintenance crew should fill out the checklist in the field manual when performing each inspection/maintenance task.**
3. **After the maintenance task is performed, the checklist should be filed in the Maintenance Plan and recorded in the log below.**

Cycle of Inspection	***Stormwater Management Measure No.***	***Checklist No.***	***Date(s) of Inspection***
(1st Quarter)			
(2nd Quarter)			
(3rd Quarter)			
(4th Quarter)			
(Unscheduled Inspection; e.g., after 1" rain)			
(1st Quarter)			
(2nd Quarter)			
(3rd Quarter)			
(4th Quarter)			
(Unscheduled Inspection; e.g., after 1" rain)			
(1st Quarter)			
(2nd Quarter)			
(3rd Quarter)			
(4^{th} Quarter)			
(Unscheduled Inspection; e.g., after 1" rain)			

Cycle of Inspection	***Stormwater Management Measure No.***	***Checklist No.***	***Date(s) of Inspection***
(1st Quarter)			
(2nd Quarter)			
(3rd Quarter)			
(4th Quarter)			
(Unscheduled Inspection; e.g., after 1" rain)			
(1st Quarter)			
(2nd Quarter)			
(3rd Quarter)			
(4th Quarter)			
(Unscheduled Inspection; e.g., after 1" rain)			

APPENDIX C-2:
GENERAL PREVENTATIVE MAINTENANCE LOG

PREVENTATIVE MAINTENANCE LOG

MAINTENANCE SCHEDULE	STORMWATER MANAGEMENT MEASURE NO.	PREVENTATIVE MAINTENANCE RECORD NO.	DATE(S) OF MAINTENANCE
(1st Quarter)			
(2nd Quarter)			
(3rd Quarter)			
(4th Quarter)			
(Unscheduled Maintenance work; e.g., after 1" rain)			
(1st Quarter)			
(2nd Quarter)			
(3rd Quarter)			
(4th Quarter)			
(Unscheduled Inspection; e.g., after 1" rain)			

APPENDIX C-3: GENERAL CORRECTIVE MAINTENANCE LOG

CORRECTIVE MAINTENANCE LOG

Maintenance Schedule	*Stormwater Management Measure No.*	*Corrective Maintenance Record No.*	*Date(s) of Maintenance*
(1st Quarter)			
(2nd Quarter)			
(3rd Quarter)			
(4th Quarter)			
(Unscheduled Maintenance work; e.g., after 1" rain)			
(1st Quarter)			
(2nd Quarter)			
(3rd Quarter)			
(4th Quarter)			
(Unscheduled Inspection; e.g., after 1" rain)			

APPENDIX C-4:
MANUFACTURED TREATMENT DEVICE FIELD MANUAL

CONTECH®
ENGINEERED SOLUTIONS

StormFilter Inspection and Maintenance Procedures

The Stormwater Management StormFilter®

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:

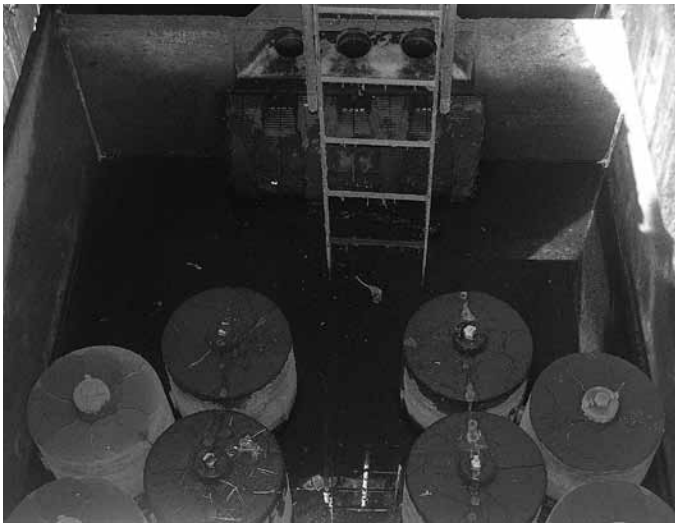
Important: Inspection should be performed by a person who is familiar with the operation and configuration of the StormFilter treatment unit.

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 weather 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 ≥ 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.

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.

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.

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Support

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

800.338.1122
www.conteches.com

APPENDIX C-5:
MANUFACTURED TREATMENT DEVICE INSPECTION AND MAINTENANCE CHECKLIST

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:

_____

_____

_____

_____

_____

_____

_____

APPENDIX C-6: *ANNUAL EVALUATION RECORD*

ANNUAL EVALUATION RECORD

As per N.J.A.C. 7:8-5.8(g), the person responsible for maintenance shall evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed.

The responsible party should evaluate the effectiveness of the maintenance plan by comparing the maintenance plan with the actual performance of the maintenance. The items to evaluate may include, but not limited to,

- Whether the inspections have been performed as scheduled;
- Whether the preventive maintenance has been performed as scheduled;
- Whether the frequency of preventative maintenance needs to increase or decrease;
- Whether the planned resources were enough to perform the maintenance;
- Whether the repairs were completed on time;
- Whether the actual cost was consistent with the estimated cost;
- Whether the inspection, maintenance, and repair records have been kept.

If actual performance of those items has been deviated from the maintenance plan, the responsible party should find the causes and implement solutions in a revised maintenance plan.

Evaluator(s)	***Date of Evaluation***	***Decision***
		__Maintain current version OR __Revise current version Revision date _____ (also update the last revision date on the cover page) __Requires a new deed recording (also update the last recording information on the cover page)
		__Maintain current version OR __Revise current version Revision date _____ (also update the last revision date on the cover page) __Requires a new deed recording (also update the last recording information on the cover page)
		__Maintain current version OR __Revise current version Revision date _____ (also update the last revision date on the cover page) __Requires a new deed recording (also update the last recording information on the cover page)