February 22, 2024

Honorable Chairman Carthy and
Members of the Planning Board
Town of North Castle
15 Bedford Road
Armonk, New York 10504

RE: JMC Project 20044
4 Tripp Lane Zoning Compliance
4 Tripp Lane
Town of North Castle, New York

<u>Response to KSCJ, HydroEnvironmental Solutions, Inc., and Town of North Castle Planning Department Comments</u>

Chairman Carthy and Members of the Planning Board:

This letter has been prepared to address comments and correspondence received from KSCJ, dated November 10, 2023, the Town's Planning Department staff report dated November 13, 2023, and HydroEnvironmental Solutions, Inc., dated September 22, 2023.

To assist in your review of the revised documents, we are pleased to provide the following, which restates the comments from the above referenced memorandums, followed by our responses:

KSCJ Memorandum to the Town of North Castle Planning Board, dated November 10, 2023:

<u>Comment No. 1</u>

The applicant has acknowledged the need to provide confirmation from the Westchester County Health Department (WCHD) that the improvements and expansions to the residence and cabana, as well as the expansion of the driveway and proposed removal of a portion located above the septic fields, do not require upgrades or modifications to the on-site wastewater treatment system. The applicant shall continue discussions with the WCHD and provide any correspondence to the Planning Board and this office for review.

The applicant has provided Westchester County Department of Health documents approving a new septic system located on the central to eastern portion of the site. Additionally, a new septic pump chamber, new septic tank, and new force main are also proposed and approved.

Comment addressed.

Response No. 1

Comment Addressed.

Comment No. 2

As previously noted, the plan has been revised as requested to illustrate and dimension all minimum required yard setbacks and includes a Bulk Zoning Table. It appears that area variances and/or waivers will be required for the location of the driveway gate, curb cut width and gate pier height. The plan should be referred to the Building Inspector for confirmation.

Response No. 2

So noted.

Comment No. 3

As previously noted, the applicant will be required to provide a Wetland Mitigation Plan in accordance with Chapter 340, Wetlands and Watercourse Protection of the Town Code, demonstrating a 2:1 ratio for mitigation of wetland and wetland buffer disturbance as a result of the project. The plan will require referral to the Conservation Board for recommendation of approval. Before an appropriate mitigation plan can be prepared for consideration, the limits of the existing wetland areas and associated buffers within and adjacent to the site must be established. Understanding that this is not possible for the subject property due to the fill placement, we note that as part of an ongoing application with the adjacent property to the east (2 Tripp Ln), this office verified that a locally regulated wetland exists at the rear of the site and is accurately depicted on the Tree Mitigation Plan. However, based on review of available Westchester County aerial mapping and topography, it appears that (prior to placement of fill) this easterly system was likely connected to a system on the west side of the property at 6 Tripp Lane through the subject property. The applicant will need to investigate this westerly off-site wetland system to identify the boundary and associated 100-foot wetland buffer. Additionally, a reasonable assumption based on historical mapping must be made to define previously existing wetland areas on the subject property. These areas should be included in the wetland/wetland buffer disturbance and required mitigation calculations. The off-site wetland boundary shall be field located and established with sequentially number flags for confirmation by the Town Wetland Consultant. Please notify this office once the wetland boundary has been established in the field.

Response No. 3

JMC submitted and presented Drawing C-130, titled “Tree & Wetland Mitigation Plan” to the Conservation Board following two separate site walks, one including a representative from the Conservation Board the other including a representative from KSCJ, that now shows the updated wetland location as determined following these site walks and additional soil testing. The Conservation Board unanimously voted to provide their positive recommendation to the Planning Board.

<u>*Comment No. 4*</u>

As noted above, there appears to have been a wetland or drainage course that ran through the rear of 4 Tripp Lane. Parts of this wetland/drainage course were filled on 2 Tripp Lane and 4 Tripp Lane, but the original elevations and wetland areas are still located on 6 Tripp Lane. The fill placed on 4 Tripp Lane likely interrupted the flow of water and could have affected any wetland or drainage areas on 6 Tripp Lane. As part of the required wetland mitigation, we would recommend, at a minimum, that a portion of the fill be removed from the rear of 4 Tripp Lane to help restore the natural hydrologic connection between the source of the drainage and the wetlands located on 6 Tripp Lane. Removing the fill would be recommended as only a partial solution to the commitment to mitigate the effects of the fill and construction within the wetland buffers. To determine where the fill removal would be most effective, we recommend that the applicant seek a professional wetlands consultant to determine the location of wetlands on 6 Tripp Lane.

<u>Response No. 4</u>

JMC submitted and presented Drawing C-130, titled "Tree & Wetland Mitigation Plan" to the Conservation Board following two separate site walks, one including a representative from the Conservation Board the other including a representative from KSCJ, that now shows the updated wetland location as determined following these site walks and additional soil testing. The Conservation Board unanimously voted to provide their positive recommendation to the Planning Board.

<u>*Comment No. 5*</u>

As previously requested, the Wetland Mitigation Plan shall illustrate and quantify the previous disturbance areas to the wetland and/or wetland buffer. The plan shall include a summary table that quantifies the total wetland and wetland buffer area on site, total disturbance areas within each, and total pervious and impervious cover pre and post development. Mitigation shall be provided at a ratio of 2:1 minimum. The plan currently indicates approximately 7,775 s.f. of disturbance within the wetland buffer. However, the applicant shall provide an updated wetland/wetland buffer disturbance area and required 2:1 mitigation based on the updated wetland delineation and available aerial mapping noted above. The plan shall include a detailed mitigation table quantifying disturbances and land cover (pervious/impervious) within the wetland and wetland buffer and the mitigation provided.

<u>Response No. 5</u>

JMC submitted and presented Drawing C-130, titled "Tree & Wetland Mitigation Plan" to the Conservation Board following two separate site walks, one including a representative from the Conservation Board the other including a representative from KSCJ, that now shows the updated wetland location as determined following these site walks and additional soil testing. The Conservation Board unanimously voted to provide their positive recommendation to the Planning

Board. JMC Drawing C-130 depicts the tree removal mitigation, which includes a total of 816 inches of proposed tree caliper and 31,200 sf of new meadow area.

<u>*Comment No. 6*</u>

As previously noted, the applicant has cleared a significant number of trees on the property. The quantity, size and species are not known. As required by Chapter 308, Trees of the Town Code, Section 308-25, the applicant will be required to provide a tree restoration plan to mitigate the unapproved removal of existing vegetation. The Planning Board will need to determine whether the restoration plan is ultimately appropriate for the level of disturbance and removals.

Because the actual level of Town-regulated tree removal is unknown, the applicant has used the adjacent property to establish a tree sample area to establish a baseline for the tree mitigation calculations. This office is amenable to this approach. The applicant has identified all trees greater than eight (8) inches in diameter and all trees greater than 24 inches in diameter from the 5,000 s.f. tree sample area. A total of 17 trees were sampled; 13 @ 8 inch dbh or greater and 4 @ 24 inch dbh or greater, which equates to 76% and 24% of the sample area, respectively. Applying this sample area over the ±1.15 acres of tree removal results in a total of 171 trees removed; 130 @ 8 inch dbh or greater and 41 @ 24 inch dbh or greater (not 139 and 32 as presented in the calculations). This results in a minimum total tree caliper of 2,024 inches to mitigate. The applicant is proposing a total of ±146 caliper inches of plantings. The applicant shall update the mitigation requirements, proposed tree planting notes and planting plan accordingly. It appears additional mitigation will be required. The planting notes were also cut off on the plan and should be corrected.

<u>Response No. 6</u>

JMC submitted and presented Drawing C-130, titled "Tree & Wetland Mitigation Plan" to the Conservation Board following two separate site walks, one including a representative from the Conservation Board the other including a representative from KSCJ, that now shows the updated wetland location and subsequent tree and wetland mitigation plan as determined following these site walks and additional soil testing. JMC received a positive recommendation from the Conservation Board on this plan to the Planning Board on February 20, 2024.

<u>*Comment No. 7*</u>

As previously requested, the cut and fill plan should overlay the surveyed topography onto the pre-developed GIS topography to illustrate the cut and fill volumes established between pre-existing conditions and existing conditions. The fill sampling and testing was reviewed by the Town's Environmental Consultant. It was agreed that the fill remain in place with a 24-inch soil cap and a demarcation layer (orange fence or geotextile membrane) placed above the existing fill section. The soil cap shall include a minimum six (6) inch layer of topsoil. This has been noted and detailed on the plan. However, the applicant shall prepare a proposed grading plan to illustrate how the add fill will be accommodated on the site and what, if any, added modifications to walls, walks, drives, etc., may be needed as a result. The applicant must also prepare an erosion and sediment control plan to illustrate and detail temporary access to the site and protection of the septic field for the import of clean fill, as well as all temporary sediment and erosion control measures that will be required.

The applicant has revised the scope of the project to propose the removal of approximately 704 cubic yards of imported fill, which appears after extensive testing on the site, concentrated in an area located along the western property boundary. The applicant has stated, during a meeting on August 6, 2023, held at Town Hall, between the Applicant, The Planning Department, and our office, that test pits have revealed that the imported fill did not extend to the rest of the site as originally assumed. We defer to the Board on the acceptance and limits of the new imported fill removals.

Response No. 7

The client awaits a final decision on the matter from the Planning Board.

Comment No. 8

As previously noted, the property is served by an on-site wastewater treatment system. The plan has been revised to illustrate the location of the existing septic field and tanks based on available WCHD as-builts and record data. It appears that the imported fill material and regarding activities that occurred at the rear of the property also occurred above the existing septic field, potentially compromising its function. The applicant has acknowledged the need to provide a determination, confirmed by the WCHD, that the septic system continues to operate as intended. Any upgrades or modifications that may become necessary will need to be illustrated on the plan and approved by the Westchester County Health Department. If the existing septic field trenches are able to remain, a plan shall be provided to protect measures for the existing septic fields during the removal of the portion of existing asphalt driveway.

The applicant has provided WCHD documents approving a new septic system located on the central to eastern portion of the site. Additionally, a new septic pump chamber, new septic tank, and new force main are also proposed and approved.

Comment addressed.

Response No. 8

Comment Addressed.

Comment No. 9

As previously noted, the applicant has revised the Stormwater Management Report, as requested, to demonstrate adequate mitigation of the 100-year storm event. Please note the following:

> *a. The plan shall illustrate the connection of the existing 6-inch pool patio drains to the infiltration system.*
>
> ***Comment Addressed.***
>
> *b. As a result of the wetland mitigation and required soil removal, total disturbance will exceed one (1) acre. As such, the applicant will be required to obtain coverage under the NYSDEC SPDES General Permit (GP-0-20-001) for Stormwater Discharges from*

Construction Activity and the submission of a Notice of Intent (NOI). Provide draft copies for review.

Comment Addressed.

Response No. 9

Comments Addressed.

Comment No. 10

As previously noted, the plans illustrate existing six (6) foot high black vinyl coated chain link fence and aluminum fence and a proposed four (4) foot high black vinyl coated chain link pool fence; however, fence details No. 10 and 11 are for proposed fences of 5 feet 3 inches and 5 feet 2 inches in height. Please coordinate between the plan and details.

Comment Addressed.

Response No. 10

Comment Addressed.

Comment No. 11

The stormwater treatment system's overflow pipe should not be installed discharging towards the neighboring property. We recommend proposing pop-up emitters on the system or relocating the overflow to an area that will not affect the neighbors.

Response No. 11

The outlet structure has been removed and a grate is now being proposed on the 18" Nyloplast cleanout. The system will now act as bubbler system, meaning water will slowly bubble out of the inlet when the underground system becomes inundated with water during heavy rainfall events. Detail #7 has been added to JMC Drawing C-901.

Town of North Castle Planning Department Staff Report, dated November 13, 2023:

Comment No. 1

The Planning Board should direct the Applicant to address the comments contained in this memo and resubmit to the Planning Board for further discussion.

Response No. 1

So noted.

Comment No. 2

The Proposed Action would be classified as a Type II Action pursuant to the State Environmental Quality Review Act (SEQRA).

Response No. 2

The applicant has included a NYSDEC Notice of Intent with this submission.

Comment No. 3

A neighbor notification meeting regarding the proposed site plan and wetlands permit will need to be scheduled.

Response No. 3

So noted.

Comment No. 4

Pursuant to Section 12-18.A of the Town Code, all site development plans submitted to the Planning Board are required to be referred to the Architectural Review Board (ARB) for review and comment.

Response No. 4

The applicant looks forward to presenting in front of the Town's Architectural Review Board and addressing any comments and/or concerns.

Comment No. 5

Pursuant to Section 340-5.B of the Town Code, the Conservation Board is required to review the proposed wetland application and, within 45 days of receipt thereof, file a written report and its recommendation concerning the application with the Planning Board. Such report is required to evaluate the proposed regulated activity in terms of the findings, intent and standards of Chapter 340.

Response No. 5

JMC submitted and presented Drawing C-130, titled "Tree & Wetland Mitigation Plan" to the Conservation Board following two separate site walks, one including a representative from the Conservation Board the other including a representative from KSCJ, that now shows the updated wetland location as determined following these site walks and additional soil testing. The Conservation Board unanimously voted to provide their positive recommendation to the Planning Board.

Comment No. 6

At the September 28, 2023 Planning Board meeting, the Applicant and Planning Board agreed that the best course of action would be for the Applicant to remove the fill from property.

Response No. 6

The applicant has agreed to remove all fill and at the last Planning Board meeting presented an updated cut and fill plan. It seemed that the applicant, the Board, HydroEnvironmental Solutions, Inc., and KSCJ are all in agreement on the amount of fill to be removed. The amount presented is only as an estimate and may increase or decrease during the actual removal.

Comment No. 7

The Applicant has determined that approximately 171 trees were removed from the site. The plans have been revised to depict an approximately 16,000 square foot wetland buffer mitigation area; however, it is recommended that the site plan be revised to further replant new trees in the 1.15 acre area of previous tree removal.

Response No. 7

JMC submitted and presented Drawing C-130, titled "Tree & Wetland Mitigation Plan" to the Conservation Board following two separate site walks, one including a representative from the Conservation Board the other including a representative from KSCJ, that depicts the tree removal mitigation, which includes a total of 816 inches of proposed tree caliper and 31,200 sf of new meadow area.

Comment No. 8

The site plan has been revised to depict the location of the Town-regulated wetland buffer. The plans depict 7,775 square feet of Town-regulated wetland buffer disturbance. The Applicant has prepared a 15,550 square foot mitigation plan for review.

Response No. 8

JMC submitted and presented Drawing C-130, titled "Tree & Wetland Mitigation Plan" to the Conservation Board following two separate site walks, one including a representative from the Conservation Board the other including a representative from KSCJ, that now shows the updated wetland location as determined following these site walks and additional soil testing. The Conservation Board unanimously voted to provide their positive recommendation to the Planning Board.

Comment No. 9

The 9-foot driveway piers with light fixture exceeds the maximum permitted height of 8 feet. The Applicant will need to seek a variance from the Zoning Board of Appeals.

Response No. 9

The applicant awaits the Zoning Board of Appeals decision on the requested driveway pier variance.

Comment No. 10

The proposed (legalization) driveway gates are located on the property line. Driveway gates should be located a minimum of 20 feet from the front property line to permit adequate vehicular pull off from the right-of-way should Tripp Lane ever be expanded to the edge of the right-of-way.

Response No. 10

The applicant awaits the Zoning Board of Appeals decision on the requested driveway pier variance.

Comment No. 11

The submitted gross floor area calculations worksheet does not include the floor area of the garage or basement. Garage space is required to be counted as part of gross floor area. The Applicant shall also provide an exhibit demonstrating that the basement level would be excluded pursuant to the definition of gross floor area.

Response No. 11

It is the Architect's opinion that the basement and garage should not be included in the gross floor area calculations as shown on the average grade diagram on drawing A1 that has been included with this submission.

HydroEnvironmental Solutions Memorandum, dated September 22, 2023:

Comment No. 1

The imported fill material should be disposed of properly at a NYSDEC approved disposal facility. All removed material should be properly documented and manifested from the subject property to the disposal facility.

Response No. 1

All removed material will be properly documented and manifested from the subject property to the end point.

Comment No. 2

Following fill removal, end-point soil samples should be collected to confirm that all the imported material has been removed to the extent practical. The endpoint soil samples should be sent to a New York State certified laboratory to be analyzed for the following parameters:

-Volatile organic compounds (VOCs) using EPA Method 8260
-Semi-VOCs using EPA Method 8270 (full list)

-Target Analyte List (TAL) Metals
-Poly Chlorinated Biphenyls (PCBs) using EPA Method 8080
-Herbicides and Pesticides using EPA Method 8081.

Response No. 2

The exported fill will be taken to a place or site that can accept this type of material based on what this fill will be used for, and the homeowner will provide confirmation to the Town stating that such material was properly transported and was then accepted by the recipient, who was informed of the limitations of said material.

Comment No. 3

A Fill Removal and End-point Soil Sampling Plan (Excavation Work Plan) should be submitted to the Town by the Applicant for approval prior to fill removal. Based on the areal extent of the fill area, a minimum of two (2) five-part composite soil samples (for all listed parameters above, excluding VOCs) and six (6) discrete grab samples for VOCs should be collected in accordance with NYCRR Part 360 Regulations.

Response No. 3

It was discussed at the last Planning Board meeting that the true extent of imported fill won't be known until the actual removal takes place. Would additional testing still be required after a visual inspection confirms that all fill material has been removed? The applicant is hesitant about performing any more soil testing as we were informed that the levels found in the soil were close to, if not at background levels and could be found even in virgin soil.

Comment No. 4

A fill removal summary report should be compiled and submitted to the Town after all imported material is removed.

Response No. 4

A fill removal summary report will be compiled and submitted to the Town after all imported material is removed.

We trust that the above, along with the enclosed documents and drawings, address comments from Kellard Sessions, dated November 10, 2023, the Town's Planning Department staff report dated November 13, 2023, and HydroEnvironmental Solutions, Inc., dated September 22, 2023. We look forward to your continued review throughout the Site Plan approval process and discussing this matter with you further. Should you have any questions or require additional information regarding the information provided above, please do not hesitate to contact our office at 914-273-5225.

Sincerely,

JMC Planning Engineering Landscape Architecture & Land Surveying, PLLC

Rick Bohlander

Rick Bohlander, PE
Project Manager

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SITE DEVELOPMENT PLAN APPROVAL DRAWINGS

PEREIRA RESIDENCE

4 TRIPP LANE

TAX MAP SECTION 108.02| BLOCK 1| LOT 10

WESTCHESTER COUNTY

NORTH CASTLE, NY

JMC Drawing List:

Applicant / Owner:
MR. & MRS. PEREIRA
4 TRIPP LANE
TOWN OF NORTH CASTLE, NY
APPLICANT PHONE: (914) 391-6979

Architect:
GET MY C.O.
57 WHEELER AVENUE, SUITE 203
PLEASANTVILLE, NY 10570
(914) 727-0980

Surveyor:
SUMMIT LAND SURVEYING P.C.
21 DRAKE LANE
WHITE PLAINS, NY 10607
(914) 629-7758

Site Planner, Civil Engineer and Landscape Architect:
JMC
120 BEDFORD ROAD
ARMONK, NY 10504
(914) 273-5225

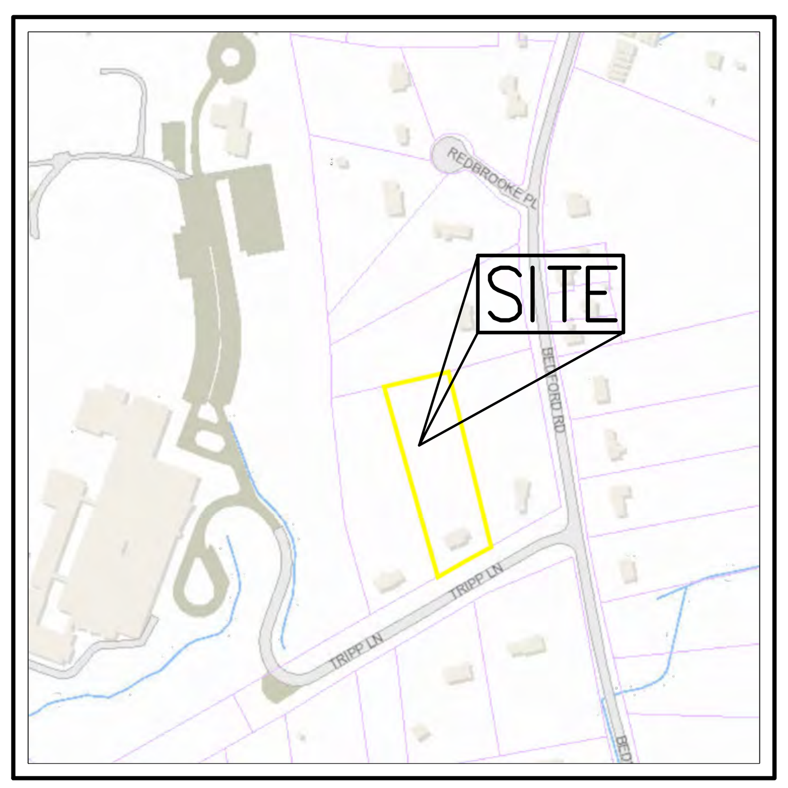
AREA MAP
SCALE: N.T.S.

TABLE OF LAND USE

TOWN OF NORTH CASTLE, N.Y. SECTION 108.02, BLOCK 1, LOT 10
ZONE "R-2A." – "ONE FAMILY RESIDENTIAL DISTRICT" (2 ACRES)

DESCRIPTION		REQUIRED	PROVIDED
MINIMUM LOT AREA	(ACRES / S.F.)	2	±2.06/±89,820
MINIMUM LOT FRONTAGE	(FEET)	150	±183.6
MINIMUM LOT WIDTH	(FEET)	150	±175
MINIMUM LOT DEPTH	(FEET)	150	±513.3
MINIMUM YARDS			
FRONT	(FEET)	50	±55.13
SIDE	(FEET)	30	±35.17
REAR	(FEET)	50	±402.19
ACCESSORY BUILDING SIDE YARD SETBACK	(FEET)	10	15
MAXIMUM BUILDING HEIGHT	(FEET)	30	<30
MAXIMUM BUILDING COVERAGE	(PERCENT)	8	3.92
MINIMUM DWELLING UNIT SIZE (§355-70)	(S.F.)	1,400	2,786
MINIMUM DRIVEWAY PIER/GATE SETBACK FROM RIGHT-OF-WAY	(FEET)	20	±0.65 (1)
MAXIMUM DRIVEWAY CURB CUT	(FEET)	18	±24.6 (1)
MAXIMUM DRIVEWAY PIER HEIGHT	(FEET)	8	9 (1)

(1) WILL REQUIRE A VARIANCE.



ZONING / VICINITY MAP
SCALE: 1" = 400'

GENERAL CONSTRUCTION NOTES APPLY TO ALL WORK HEREIN:

1. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL CALL 811 "DIG SAFELY" (1-800-962-7962) TO HAVE UNDERGROUND UTILITIES LOCATED. EXPLORATORY EXCAVATIONS SHALL COMPLY WITH CODE 753 REQUIREMENTS. NO WORK SHALL COMMENCE UNTIL ALL THE OPERATORS HAVE NOTIFIED THE CONTRACTOR THAT THEIR UTILITIES HAVE BEEN LOCATED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PRESERVATION OF ALL PUBLIC AND PRIVATE UNDERGROUND AND SURFACE UTILITIES AND STRUCTURES AT OR ADJACENT TO THE SITE OF CONSTRUCTION, INSOFAR AS THEY MAY BE ENDANGERED BY THE CONTRACTOR'S OPERATIONS. THIS SHALL HOLD TRUE WHETHER OR NOT THEY ARE SHOWN ON THE CONTRACT DRAWINGS. IF THEY ARE SHOWN ON THE DRAWINGS, THEIR LOCATIONS ARE NOT GUARANTEED EVEN THOUGH THE INFORMATION WAS OBTAINED FROM THE BEST AVAILABLE SOURCES, AND IN ANY EVENT, OTHER UTILITIES ON THESE PLANS MAY BE ENCOUNTERED IN THE FIELD. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, IMMEDIATELY REPAIR OR REPLACE ANY STRUCTURES OR UTILITIES THAT HE DAMAGES, AND SHALL CONSTANTLY PROCEED WITH CAUTION TO PREVENT UNDUE INTERRUPTION OF UTILITY SERVICE.
2. CONTRACTOR SHALL HAND DIG TEST PITS TO VERIFY THE LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO THE START OF CONSTRUCTION. CONTRACTOR SHALL VERIFY EXISTING UTILITIES DEPTHS AND ADVISE OF ANY CONFLICTS WITH PROPOSED UTILITIES. IF CONFLICTS ARE PRESENT. THE OWNER'S FIELD REPRESENTATIVE, JMC, PLLC AND THE APPLICABLE MUNICIPALITY OR AGENCY SHALL BE NOTIFIED IN WRITING. THE EXISTING/PROPOSED UTILITIES RELOCATION SHALL BE DESIGNED BY JMC, PLLC.
3. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ANY AND ALL LOCAL PERMITS REQUIRED.
4. ALL WORK SHALL BE DONE IN STRICT COMPLIANCE WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES, STANDARDS, ORDINANCES, RULES, AND REGULATIONS. ALL CONSTRUCTION WORK SHALL BE PERFORMED IN ACCORDANCE WITH ALL SAFETY CODES. APPLICABLE SAFETY CODES MEAN THE LATEST EDITION INCLUDING ANY AND ALL AMENDMENTS, REVISIONS, AND ADDITIONS THERETO, TO THE FEDERAL DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION'S OCCUPATIONAL SAFETY AND HEALTH STANDARDS (OSHA); AND APPLICABLE SAFETY, HEALTH REGULATIONS AND BUILDING CODES FOR CONSTRUCTION IN THE STATE OF NEW YORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR GUARDING AND PROTECTING ALL OPEN EXCAVATIONS IN ACCORDANCE WITH THE PROVISION OF SECTION 107-05 (SAFETY AND HEALTH REQUIREMENTS) OF THE NYSDOT STANDARD SPECIFICATIONS. IF THE CONTRACTOR PERFORMS ANY HAZARDOUS CONSTRUCTION PRACTICES, ALL OPERATIONS IN THE AFFECTED AREA SHALL BE DISCONTINUED AND IMMEDIATE ACTION SHALL BE TAKEN TO CORRECT THE SITUATION TO THE SATISFACTION OF THE APPROVAL AUTHORITY HAVING JURISDICTION.
5. CONTRACTOR SHALL MAINTAIN ACCESS TO ALL PROPERTIES AFFECTED BY THE SCOPE OF WORK SHOWN HEREON AT ALL TIMES TO THE SATISFACTION OF THE OWNERS REPRESENTATIVE. RAMPING CONSTRUCTION TO PROVIDE ACCESS MAY BE CONSTRUCTED WITH SUBBASE MATERIAL EXCEPT THAT TEMPORARY ASPHALT CONCRETE SHALL BE PLACED AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING SAFE PEDESTRIAN ACCESS AT ALL TIMES.
6. CONTRACTOR SHALL MAINTAIN THE INTEGRITY OF EXISTING PAVEMENT TO REMAIN.

SUBSURFACE UTILITY LOCATIONS ARE BASED ON A COMPILATION OF FIELD EVIDENCE, AVAILABLE RECORD PLANS AND/OR UTILITY MARK-OUTS. THE LOCATION OR COMPLETENESS OF UNDERGROUND INFORMATION CANNOT BE GUARANTEED. VERIFY THE ACTUAL LOCATION OF ALL UTILITIES PRIOR TO EXCAVATION OR CONSTRUCTION.

811 Know what's below. Call before you dig.

APPROVED BY TOWN OF NORTH CASTLE PLANNING BOARD:
RESOLUTION, DATED: ____________

______________________________ DATE: ____________
CHRISTOPHER CARTHY, CHAIRMAN
TOWN OF NORTH CASTLE PLANNING BOARD

ENGINEERING PLANS REVIEWED FOR CONFORMANCE TO RESOLUTION:

______________________________ DATE: ____________
JOSEPH M. CERMELE, P.E.
KELLARD SESSIONS CONSULTING
CONSULTING TOWN ENGINEERS

ANY ALTERATION OF PLANS, SPECIFICATIONS, PLATS AND REPORTS BEARING THE SEAL OF A LICENSED PROFESSIONAL ENGINEER OR LICENSED LAND SURVEYOR IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW, EXCEPT AS PROVIDED FOR BY SECTION 7209, SUBSECTION 2.

STATE OF NEW YORK • FREDERICK BOHLANDER • 100532-1 • LICENSED PROFESSIONAL ENGINEER

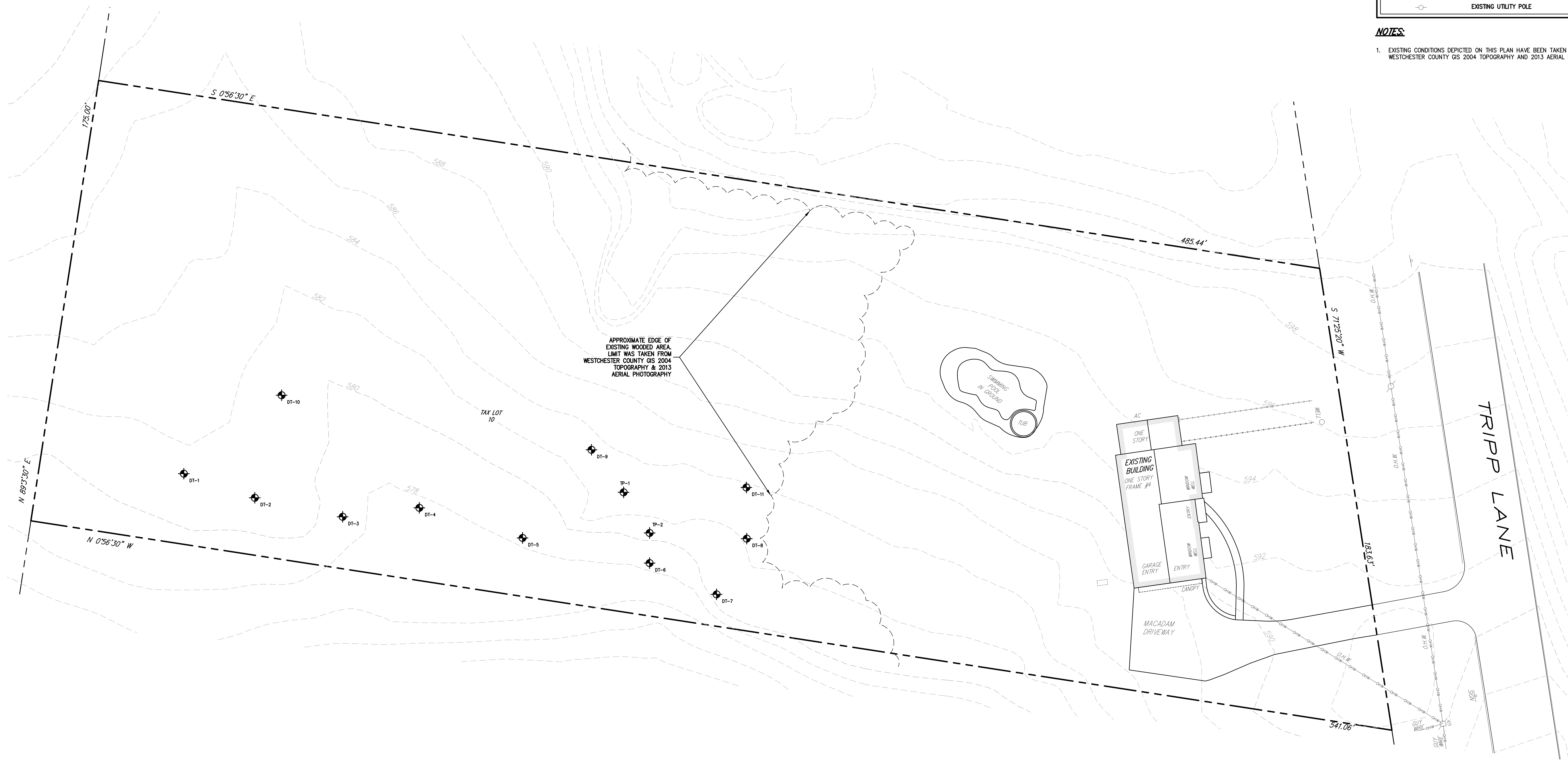
No.	Revision	Date	By
1.	REVISED PER TOWN ENGINEER'S COMMENTS	07/12/2022	RB
2.	PLANNING BOARD SUBMISSION	01/09/2023	RB
3.	PLANNING BOARD SUBMISSION	09/11/2023	RB
4.	PLANNING BOARD SUBMISSION	10/23/2023	RB
5.	PLANNING BOARD SUBMISSION	02/22/2024	RB

Previous Editions Obsolete

JMC
JMC Planning, Engineering, Landscape Architecture & Land Surveying, PLLC
JMC Site Development Consultants, LLC
John Meyer Consulting, Inc.
120 BEDFORD ROAD • ARMONK, NY 10504
voice 914.273.5225 • fax 914.273.2102
www.jmcpllc.com

Drawn: DK		Approved: AN	
Scale:	NOT TO SCALE		
Date:	03/01/2021		
Project No:	20044		
20044-SITE	COVER	COVER.scr	
Drawing No:	C-000		

NOT FOR CONSTRUCTION



LEGEND

- EXISTING PROPERTY LINE
- ADJACENT PROPERTY LINE
- EXISTING BUILDING OVERHANG
- EXISTING BUILDING LINE
- EXISTING PAVEMENT EDGE
- EXISTING CURB LINE
- EXISTING GIS CONTOUR
- EXISTING GIS INDEX CONTOUR
- EXISTING FENCE
- EXISTING TREE LINE
- EXISTING UTILITY POLE

NOTES:

1. EXISTING CONDITIONS DEPICTED ON THIS PLAN HAVE BEEN TAKEN FROM WESTCHESTER COUNTY GIS 2004 TOPOGRAPHY AND 2013 AERIAL PHOTOGRAPHY.

APPLICANT/OWNER:
MR. & MRS. PEREIRA
4 TRIPP LANE
TOWN OF NORTH CASTLE, NY

ARCHITECT:
GET MY CO
57 WHEELER AVENUE, SUITE 203
PLEASANTVILLE, NY

JMC Planning, Engineering, Landscape Architecture & Land Surveying, PLLC
JMC Site Development Consultants, LLC
John Meyer Consulting, Inc.
120 BEDFORD ROAD • ARMONK, NY 10504
voice 914.273.5225 • fax 914.273.2102
www.jmcpllc.com

PRE-EXISTING CONDITIONS MAP

PEREIRA RESIDENCE
4 TRIPP LANE
NORTH CASTLE, NY

GIS GEOGRAPHIC INFORMATION SYSTEMS

THE 2-FOOT CONTOURS DEPICTED ON THIS PLAN ARE INTENDED TO BE USED FOR PLANNING & PRELIMINARY ENGINEERING APPLICATIONS. THEY ARE NOT INTENDED TO BE USED IN ENGINEERING DESIGN AND DO NOT NEGATE THE NEED FOR A FIELD SURVEY. THE WESTCHESTER COUNTY GIS DATASET CONTAINS CONTOUR LINES MODELED AT A TWO FOOT INTERVAL. THE SOURCE INFORMATION USED IN THE COLLECTION OF THE DATASET WAS PART OF THE NEW YORK STATE DIGITAL ORTHOIMAGERY PROGRAM; PHOTOS TAKEN IN APRIL 2004. VERTICAL DATUM IS NAVD88.
THE COUNTY OF WESTCHESTER MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE COMPLETENESS OR ACCURACY OF THE DATA AND ASSUMES NO LIABILITY WHATSOEVER FOR ANY PRODUCT OR ANALYSIS DERIVED FROM OR BASED ON THE DATA.

APPROVED BY TOWN OF NORTH CASTLE PLANNING BOARD:
RESOLUTION, DATED: ____________

____________________ DATE: ____________
CHRISTOPHER CARTHY, CHAIRMAN
TOWN OF NORTH CASTLE PLANNING BOARD

ENGINEERING PLANS REVIEWED FOR CONFORMANCE TO RESOLUTION:

____________________ DATE: ____________
JOSEPH M. CERMELE, P.E.
KELLARD SESSIONS CONSULTING
CONSULTING TOWN ENGINEERS

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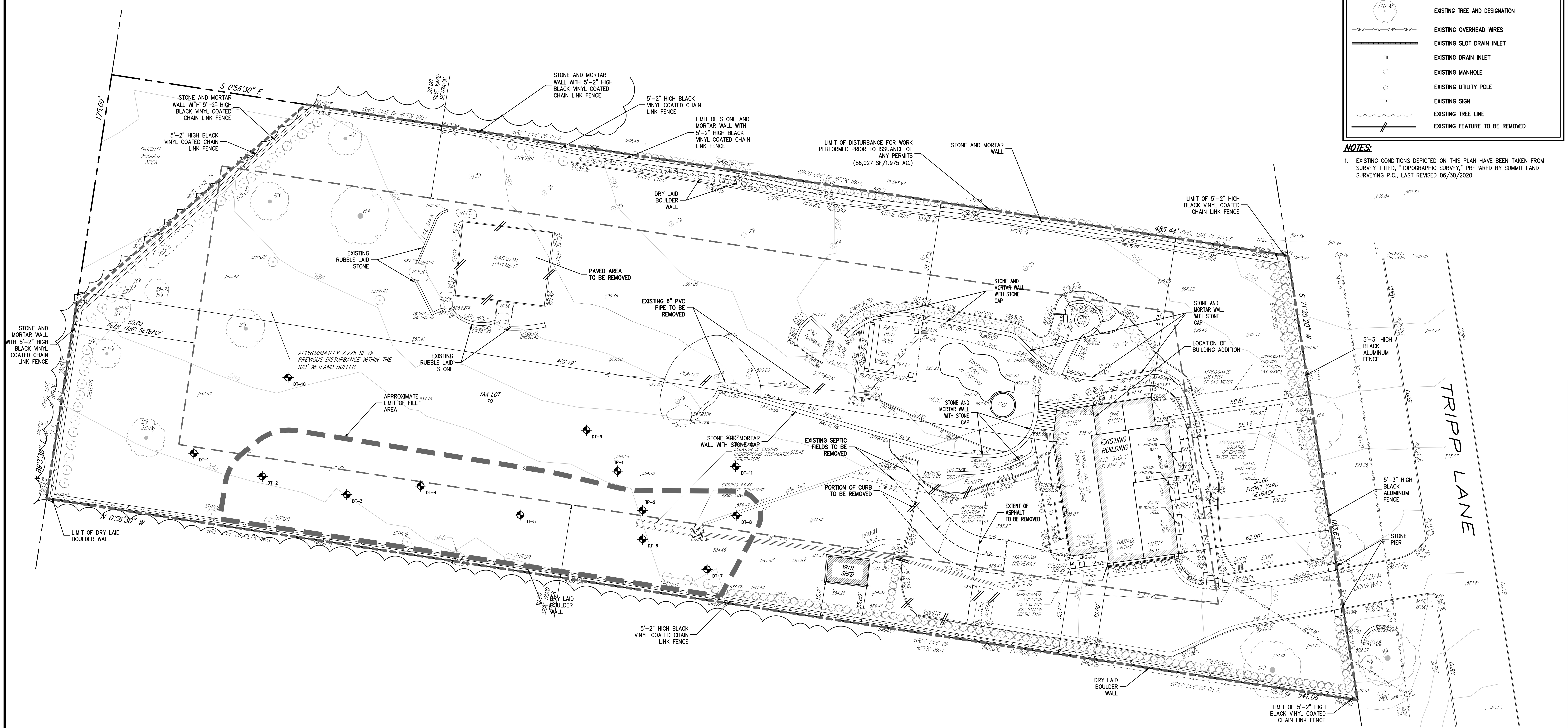
STATE OF NEW YORK
FREDERICK BOHLANDER
100532-1
LICENSED PROFESSIONAL ENGINEER

No.	Revision	Date	By
1.	REVISED PER TOWN ENGINEER'S COMMENTS	07/12/2022	RB
2.	PLANNING BOARD SUBMISSION	01/09/2023	RB
3.	PLANNING BOARD SUBMISSION	09/11/2023	RB
4.	PLANNING BOARD SUBMISSION	10/23/2023	RB
5.	CONSERVATION BOARD SUBMISSION	12/21/2023	RB
6.	PLANNING BOARD SUBMISSION	02/22/2024	RB
	Previous Editions Obsolete		

Drawn: DK	Approved: AN
Scale:	1" = 20'
Date:	03/01/2021
Project No:	20044
20044-SITE	PRE-EXIST / PRE EX COND L.S.
Drawing No:	C-100



LEGEND

	EXISTING PROPERTY LINE
	ADJACENT PROPERTY LINE
	EXISTING BUILDING OVERHANG
	EXISTING BUILDING LINE
	EXISTING PAVEMENT EDGE
	EXISTING CURB LINE
590	EXISTING CONTOUR
592	EXISTING INDEX CONTOUR
	EXISTING DRY LAID RETAINING WALL
	EXISTING RETAINING WALL
—x—x—x—x—	EXISTING FENCE
T10 M	EXISTING TREE AND DESIGNATION
—OHW—OHW—OHW—OHW—	EXISTING OVERHEAD WIRES
	EXISTING SLOT DRAIN INLET
	EXISTING DRAIN INLET
	EXISTING MANHOLE
	EXISTING UTILITY POLE
	EXISTING SIGN
	EXISTING TREE LINE
	EXISTING FEATURE TO BE REMOVED

NOTES:

1. EXISTING CONDITIONS DEPICTED ON THIS PLAN HAVE BEEN TAKEN FROM SURVEY TITLED, "TOPOGRAPHIC SURVEY," PREPARED BY SUMMIT LAND SURVEYING P.C., LAST REVISED 06/30/2020.

APPLICANT/OWNER:
MR. & MRS. PEREIRA
4 TRIPP LANE
TOWN OF NORTH CASTLE, NY

ARCHITECT:
GET MY CO
57 WHEELER AVENUE, SUITE 203
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JMC

EXISTING CONDITIONS MAP AND DEMOLITION PLAN

PEREIRA RESIDENCE
4 TRIPP LANE
NORTH CASTLE, NY

APPROVED BY TOWN OF NORTH CASTLE PLANNING BOARD:
RESOLUTION, DATED: ____________

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STATE OF NEW YORK * FREDERICK BOHLANDER * LICENSED PROFESSIONAL ENGINEER 100532-1

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Project No:	20044		
20044-SITE	EXIST	EXIST.scr	
Drawing No:	C-110		

PLANT_SCHEDULE

SHADE TREES	QTY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT COND.	REMARKS
AR	7	Acer rubrum 'Red Sunset'	Red Maple	3" – 3 1/2" Cal.	B & B	
LT	3	Liriodendron tulipifera	Tulip Poplar	3" – 3 1/2" CAL.	B & B	
NS	7	Nyssa sylvatica	Tupelo	3" – 3 1/2" Cal.	B & B	
PO	6	Platanus occidentalis	American Sycamore	3" – 3 1/2" Cal.	B & B	
QA	4	Quercus alba	White Oak	3" – 3 1/2" Cal.	B & B	
QV	2	Quercus velutina	Black Oak	3" – 3 1/2" Cal.	B & B	
UNDERSTORY & FLOWERING TREES	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**SIZE**	**ROOT COND.**	**REMARKS**
AC	5	Amelanchier canadensis	Canadian Serviceberry	8' –10' HT.	B & B	
CA	11	Carpinus caroliniana	American Hornbeam	8' –10' HT.	B & B	
CF	2	Cornus florida	Flowering Dogwood	8' –10' HT.	B & B	
PW	5	Prunus serotina	Black Cherry	8 gal	CONT.	
SEED MIX	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**SIZE**	**ROOT COND.**	**REMARKS**
SN	31,200 sf	Native Upland Wildlife Forage & Cover Meadow Mix ERNMX-123	ERNMX-123	seed		

ERNST SEEDS

Ernst Conservation Seeds
8884 Mercer Pike
Meadville, PA 16335
(800) 873-3321 Fax (814) 336-5191
www.ernstseed.com

Date: February 22, 2024

Native Upland Wildlife Forage & Cover Meadow Mix - ERNMX-123

	Botanical Name	Common Name	Price/Lb
34.50 %	*Andropogon gerardii, 'Southlow'-MI Ecotype*	Big Bluestem, 'Southlow'-MI Ecotype	10.81
27.00 %	*Panicum virgatum, 'Shawnee'*	Switchgrass, 'Shawnee'	12.10
21.00 %	*Elymus virginicus, Madison-NY Ecotype*	Virginia Wildrye, Madison-NY Ecotype	10.45
11.40 %	*Sorghastrum nutans, PA Ecotype*	Indiangrass, PA Ecotype	15.22
2.80 %	*Rudbeckia hirta*	Blackeyed Susan	31.20
1.30 %	*Heliopsis helianthoides, PA Ecotype*	Oxeye Sunflower, PA Ecotype	33.60
1.00 %	*Chamaecrista fasciculata, PA Ecotype*	Partridge Pea, PA Ecotype	12.00
0.50 %	*Coreopsis tinctoria*	Plains Coreopsis	26.40
0.30 %	*Desmodium canadense, PA Ecotype*	Showy Ticktrefoil, PA Ecotype	48.00
0.10 %	*Asclepias syriaca, PA Ecotype*	Common Milkweed, PA Ecotype	96.00
0.10 %	*Monarda fistulosa, Fort Indiantown Gap-PA Ecotype*	Wild Bergamot, Fort Indiantown Gap-PA Ecotype	96.00
100.00 %		**Mix Price/Lb Bulk:**	**$12.82**

Seeding Rate: 20 lbs/acre with 30 lbs/acre of a cover crop. For a cover crop use either grain oats (1 Jan to 31 Jul) or grain rye (1 Aug to 31 Dec).

Uplands & Meadows; Wildlife Habitat & Food Plots; Wildlife Habitat & Food Plots - Herbaceous Perennial

This perennial grass mix with re-seeding annual forbs creates attractive first-year color and perennial cover when planted in full sun or partially shaded areas. Seed from October-May in rich well-drained soils. Mix formulations are subject to change without notice depending on the availability of existing and new products. While the formula may change, the guiding philosophy and function of the mix will not.

APPROVED BY TOWN OF NORTH CASTLE PLANNING BOARD:
RESOLUTION, DATED: ____________

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CHRISTOPHER CARTHY, CHAIRMAN
TOWN OF NORTH CASTLE PLANNING BOARD

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JOSEPH M. CERMELE, P.E.
KELLARD SESSIONS CONSULTING
CONSULTING TOWN ENGINEERS

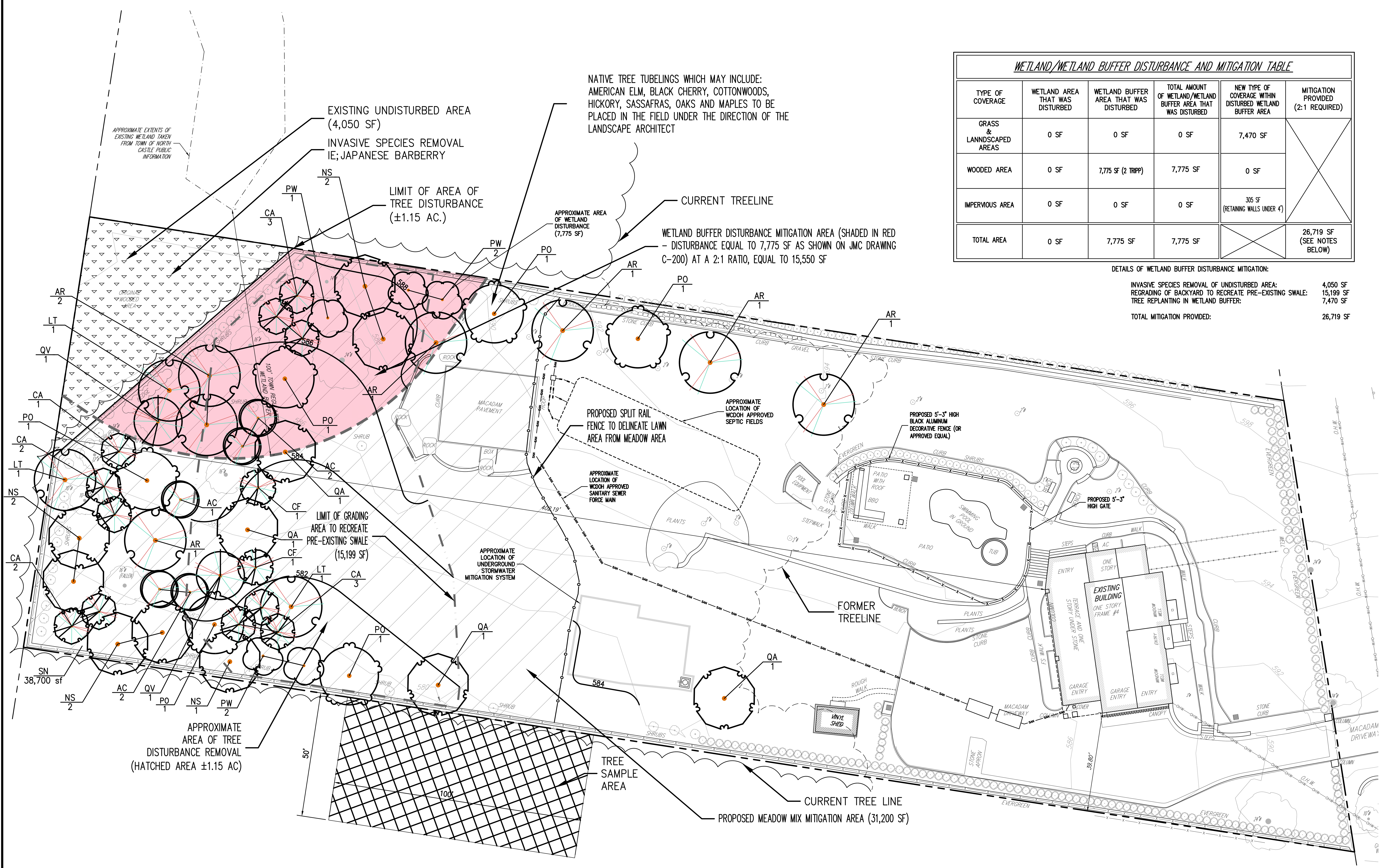
LEGEND

- EXISTING PROPERTY LINE
- ADJACENT PROPERTY LINE
- EXISTING BUILDING LINE
- EXISTING PAVEMENT EDGE
- EXISTING CURB LINE
- EXISTING DRY LAID RETAINING WALL
- EXISTING RETAINING WALL
- EXISTING FENCE
- EXISTING TREE AND DESIGNATION
- EXISTING WETLAND
- UNDISTURBED WOODED AREA
- PREVIOUSLY DISTURBED WOODED AREA
- SAMPLE AREA OF TREES
- PRE-EXISTING TREE LINE
- CURRENT TREE LINE
- EXISTING CONTOUR
- EXISTING INDEX CONTOUR
- PROPOSED FINISHED GRADE
- PROPOSED SEEDED AREA
- PROPOSED DECIDUOUS TREE
- PROPOSED FLOWERING TREE
- 100' WETLAND BUFFER AREA
- LIMIT OF GRADING AREA TO RECREATE PRE-EXISTING SWALE

WETLAND/WETLAND BUFFER DISTURBANCE AND MITIGATION TABLE					
TYPE OF COVERAGE	WETLAND AREA THAT WAS DISTURBED	WETLAND BUFFER AREA THAT WAS DISTURBED	TOTAL AMOUNT OF WETLAND/WETLAND BUFFER AREA THAT WAS DISTURBED	NEW TYPE OF COVERAGE WITHIN DISTURBED WETLAND BUFFER AREA	MITIGATION PROVIDED (2:1 REQUIRED)
GRASS & LANNDSCAPED AREAS	0 SF	0 SF	0 SF	7,470 SF	
WOODED AREA	0 SF	7,775 SF (2 TRIPP)	7,775 SF	0 SF	
IMPERVIOUS AREA	0 SF	0 SF	0 SF	305 SF (RETAINING WALLS UNDER 4')	
TOTAL AREA	0 SF	7,775 SF	7,775 SF		26,719 SF (SEE NOTES BELOW)

DETAILS OF WETLAND BUFFER DISTURBANCE MITIGATION:

INVASIVE SPECIES REMOVAL OF UNDISTURBED AREA:	4,050 SF
REGRADING OF BACKYARD TO RECREATE PRE-EXISTING SWALE:	15,199 SF
TREE REPLANTING IN WETLAND BUFFER:	7,470 SF
TOTAL MITIGATION PROVIDED:	26,719 SF



NOTES:

1. EXISTING CONDITIONS DEPICTED ON THIS PLAN HAVE BEEN TAKEN FROM WESTCHESTER COUNTY GIS 2004 TOPOGRAPHY AND WESTCHESTER COUNTY GIS TIME LAPSED AERIAL PHOTOGRAPHY FROM 2013.

TREE MITIGATION NOTES:

EXISTING TREES REMOVED:

1. REGULATED TREES ARE TREES THAT HAVE A DBH (DIAMETER AT BREAST HEIGHT) OF 8" OR GREATER.
2. BASED UPON RECORD GIS AERIAL PHOTOGRAPHY AND CURRENT FIELD OBSERVATIONS, THE AREA THAT WAS CLEARED OF EXISTING TREES TOTAL ±1.15 ACRES (±50,094 SQ.FT.)
3. TO DETERMINE THE NUMBER OF TREES THAT WERE REMOVED WITHIN THE ±1.15 AC. AREA, A SAMPLE AREA WITHIN THE ADJOINING EXISTING WOODED AREA TO THE WEST WAS UTILIZED (SEE LOCATION IDENTIFIED ON PLAN). THE AREA ANALYZED IS 50 FEET WIDE BY 100 FEET LONG (5,000 SQ.FT.) BASED UPON FIELD MEASUREMENTS PERFORMED BY REPRESENTATIVES OF JMC PLLC. ON 04/02/2021. 17 TREES 8" DBH OR GREATER WERE NOTED WITHIN THE SAMPLE AREA. OUT OF THE 17 TREES, 4 TREES WERE 24" DBH OR GREATER.
4. ±1.15 ACRES X 43,560 SQ.FT.= ±50,094 SQ.FT.
   17 REGULATED TREES WITHIN A 5,000 SQ.FT. AREA =1 REGULATED TREE PER 294 SQ.FT. OF AREA. THEREFORE, ±50,094 SQ.FT. / 294 SQ.FT. = 170.39, SAY 171 REGULATED TREES WITHIN THE ±1.15 AC. DISTURBANCE AREA.

MITIGATION REQUIREMENTS

1. THE TOWN HAS REQUESTED THE APPLICANT MITIGATE THE REMOVAL OF TREES AT A 1:1 RATIO BASED ON THE CALIPER OF THE TRESS THAT WERE REMOVED AND THE CALIPER OF THE TREES TO BE PLANTED.
2. ESTIMATED CALIPER OF TREES THAT WERE REMOVED:
   130 TREES @ 8" DBH & 41 TREES @ 24" DBH
   = 2,024 INCHES OF TREES THAT WERE REMOVED.

PROPOSED TREES PLANTED:

1. 8 EXISTING TREES WERE SAVED WITHIN THE ±1.15 AC. DISTURBANCE AREA.
   (8–18" DBH TREES = 144 INCHES)
2. 238 ARBORVITAES (GREEN GIANTS) WERE PLANTED ALONG THE EAST, WEST AND SOUTH PROPERTY LINES. AN ADDITIONAL 9 PLUM TREES WERE PLANTED ALONG THE WESTERN SIDE OF THE PROPERTY.
   (238–2" DBH TREES = 476 INCHES)
   (9–8" DBH TREES = 72 INCHES)
3. BASED UPON THE TREES REMOVED CALCULATIONS ABOVE OF 171 TREES, A TOTAL OF 255 TREES WERE PLANTED IN THEIR PLACE.
   (FOR A TOTAL OF 692 INCHES)
4. A TOTAL OF 52 TREES ARE BEING PROPOSED AS SHOWN ON THIS PLAN.
   (29–3.5" DBH TREES = 101 INCHES)
   (23–1" DBH TREES = 23 INCHES)
   (FOR A TOTAL OF 124 INCHES)

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STATE OF NEW YORK — FREDERICK BOHLANDER — 100532-1 — LICENSED PROFESSIONAL ENGINEER

APPLICANT/OWNER:
MR. & MRS. PEREIRA
4 TRIPP LANE
TOWN OF NORTH CASTLE, NY

ARCHITECT:
GET MY CO
57 WHEELER AVENUE, SUITE 203
PLEASANTVILLE, NY

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TREE & WETLAND MITIGATION PLAN

PEREIRA RESIDENCE
4 TRIPP LANE
NORTH CASTLE, NY

No.	Revision	Date	By
1.	REVISED PER TOWN ENGINEER'S COMMENTS	07/12/2022	RB
2.	PLANNING BOARD SUBMISSION	01/09/2023	RB
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6.	UPDATED WETLANDS	02/12/2024	RB
7.	PLANNING BOARD SUBMISSION	02/22/2024	RB

Previous Editions Obsolete

Drawn: DK Approved: AN
Scale: 1" = 20'
Date: 03/01/2021
Project No: 20044
20044-SITE TREE TREE.LS
Drawing No: C–130

7. PRIOR TO BEGINNING ANY CLEARING, GRUBBING OR EXCAVATION, ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH ALL THE PLANS AND SPECIFICATIONS. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED UNTIL THE SITE IS STABILIZED. FINAL STABILIZATION OF LANDSCAPED AREAS SHALL BE IN ACCORDANCE WITH THE LANDSCAPE PLAN.

8. THE CONTRACTOR SHALL INSPECT AND MAINTAIN ON-SITE EROSION AND SEDIMENT CONTROL MEASURES ON A DAILY BASIS. ALL COLLECTED SEDIMENT WITHIN SEDIMENT BARRIERS SHALL BE REMOVED PERIODICALLY AS REQUIRED TO MAINTAIN THE FUNCTION OF THE SEDIMENT BARRIERS. ALL SEDIMENT COLLECTED SHALL BE RESPREAD ON-SITE WITHIN STABILIZED AREAS AS DIRECTED BY THE OWNERS REPRESENTATIVE.

9. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED BY THE CONTRACTOR AS REQUIRED/WARRANTED BY FIELD CONDITIONS AND AS DIRECTED BY THE OWNERS REPRESENTATIVE, JMC, AND/OR ANY AUTHORITY HAVING JURISDICTION.

10. DUST SHALL BE CONTROLLED BY SPRINKLING OR OTHER APPROVED METHODS AS NECESSARY, OR AS DIRECTED BY THE OWNERS REPRESENTATIVE.

NOTES:

1. EXISTING CONDITIONS DEPICTED ON THIS PLAN HAVE BEEN TAKEN FROM SURVEY TITLED, "TOPOGRAPHIC SURVEY," PREPARED BY SUMMIT LAND SURVEYING P.C., LAST REVISED 06/30/2020.

2. ALL STORMWATER MANAGEMENT PRACTICES SHALL REMAIN UNDISTURBED AND BE PROTECTED FROM HEAVY MACHINERY TRAFFIC DURING CONSTRUCTION. HOWEVER DURING CONSTRUCTION OF THE PRACTICE THE CONTRACTOR SHALL MINIMIZE AND AVOID HEAVY MACHINERY TRAFFIC TO THE MAXIMUM EXTENT PRACTICABLE. THERE SHALL BE NO STORAGE OF MATERIALS WITHIN AREAS TO BE USED FOR STORMWATER MANAGEMENT PRACTICES. THE CONTRACTOR SHALL INSTALL CONSTRUCTION FENCE AROUND THE PRACTICE TO DISCOURAGE VEHICLE TRAFFIC.

3. ALL FILLS SHALL BE COMPACTED TO PROVIDE STABILITY OF MATERIAL AND TO PREVENT SETTLEMENT.

4. EXCAVATIONS AND FILLS SHALL NOT ENDANGER ADJOINING PROPERTIES, NOR DIVERT WATER ONTO THE PROPERTY OF OTHERS AT ANY TIME DURING THE COURSE OF CONSTRUCTION.

5. CONTRACTOR SHALL REFER TO EROSION AND SEDIMENT CONTROL PLAN FOR FURTHER DIRECTION REGARDING SITE STABILIZATION THROUGHOUT THE COURSE OF CONSTRUCTION.

6. UNLESS OTHERWISE SPECIFIED, PIPE FOR STORM DRAINS SHALL BE HIGH DENSITY POLYETHYLENE PIPE (HDPE) WITH A SMOOTH INTERIOR AND ANNULAR EXTERIOR CORRUGATIONS IN ACCORDANCE WITH ASTM F-2648. JOINTS SHALL BE WATERTIGHT IN ACCORDANCE WITH ASTM D-3212.

LEGEND

- EXISTING PROPERTY LINE
- ADJACENT PROPERTY LINE
- EXISTING SETBACK LINE
- EXISTING BUILDING OVERHANG
- EXISTING BUILDING LINE
- EXISTING PAVEMENT EDGE
- EXISTING CURB LINE
- EXISTING DRY LAID RETAINING WALL
- EXISTING RETAINING WALL
- EXISTING FENCE
- T10 M — EXISTING TREE AND DESIGNATION
- EXISTING FEATURE TO BE REMOVED
- PROPOSED SAWCUT LINE
- 590 — EXISTING GIS CONTOUR
- 592 — EXISTING GIS INDEX CONTOUR
- EXISTING TREE LINE
- EXISTING UTILITY POLE
- 590 — PROPOSED FINISHED GRADE
- 592.00 — PROPOSED SPOT GRADE
- DP-2 — BORING LOCATION AND DESIGNATION
- PROPOSED LIMIT OF DISTURBANCE
- PROPOSED RIP-RAP
- PROPOSED INLET PROTECTION
- PROPOSED SILT FENCE
- PROPOSED FENCE
- 6" HDPE — PROPOSED STORM DRAIN LINE & SIZE
- PROPOSED SPLIT RAIL FENCE

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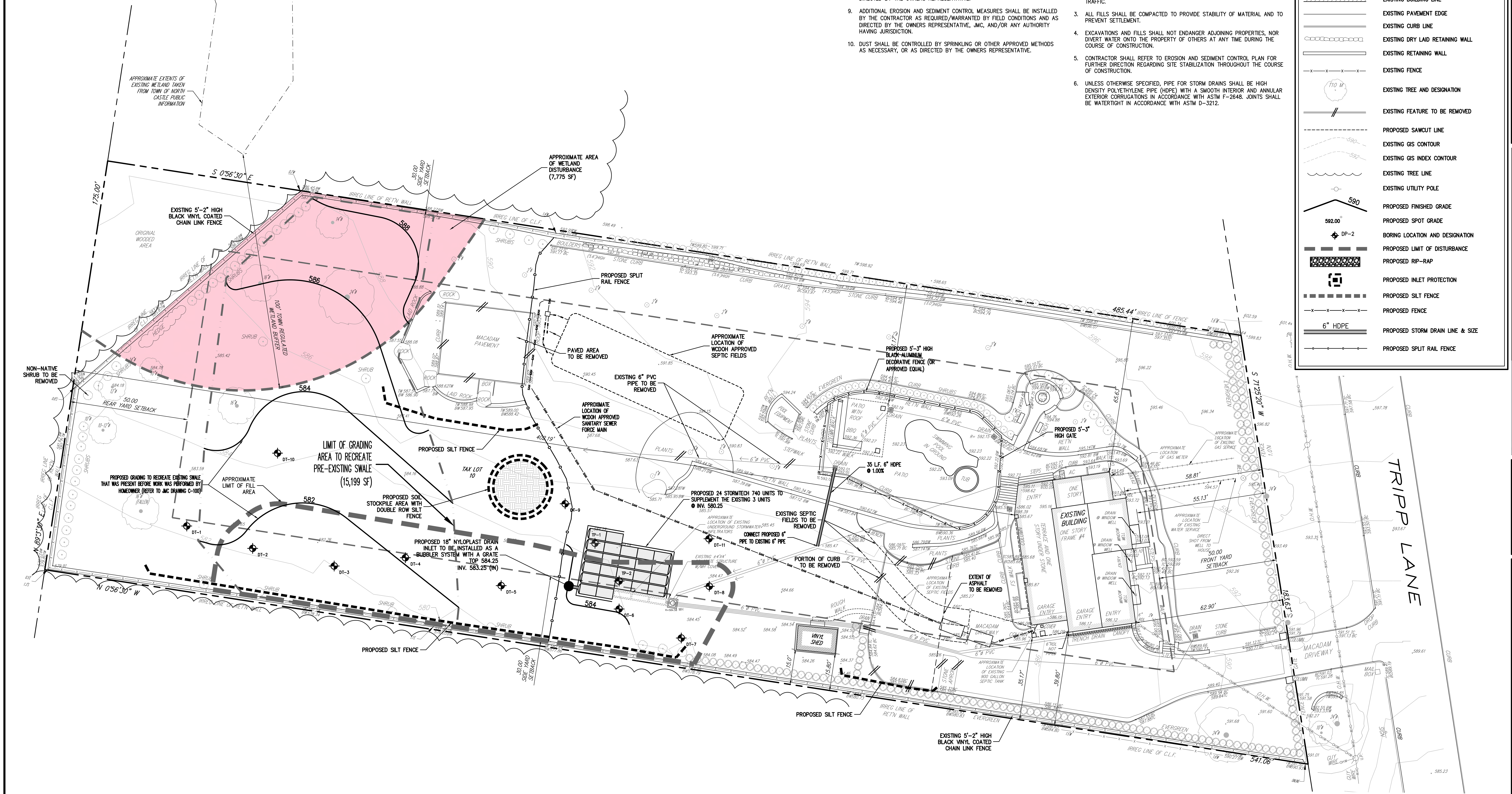

APPROVED BY TOWN OF NORTH CASTLE PLANNING BOARD:
RESOLUTION, DATED: ____________

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SITE PLAN

PEREIRA RESIDENCE
4 TRIPP LANE
NORTH CASTLE, NY

Drawn: DK Approved: AN
Scale: 1" = 20'
Date: 03/01/2021
Project No: 20044
20044-SITE | SITE | SITE.scr
Drawing No:
C-200

AREA SHOWING CONCRETE PATIO NORTH OF SHED THAT HAD PREVIOUSLY BEEN REMOVED BY HOMEOWNER

LEGEND

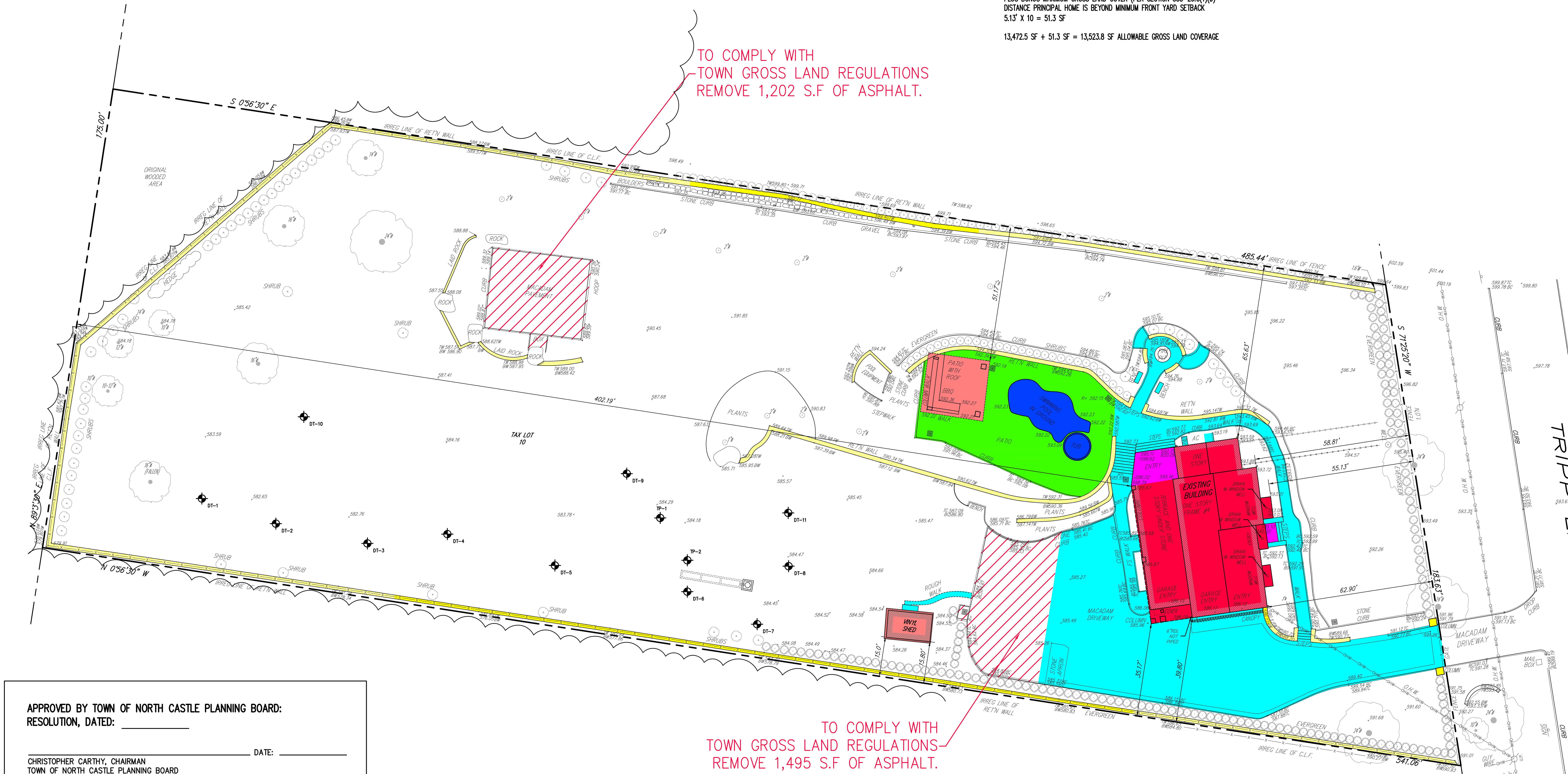
PRINCIPAL BUILDING = 2,786 S.F.	
ACCESSORY BUILDINGS = 739 S.F.	
PORCHES = 228 S.F.	
DRIVEWAY, PARKING AREAS AND WALKWAYS = 6,686 S.F.	
TERRACES = 1,964 S.F.	
POOL = 485 S.F.	
STRUCTURES, WALLS (ABOVE 4') = 584 S.F.	
WALLS (BELOW 4') NOT TO BE INCLUDED = 1,914 S.F.	

*PER TOWN OF NORTH CASTLE CODE, SECTION 355-26(C):
LOT SIZE OF 2.0 ACRES OR MORE
MAXIMUM PERMITTED GROSS FLOOR AREA FOR ONE-FAMILY DWELLINGS = 13,270 SF PLUS 7.5% OF THE LOT AREA IN EXCESS OF 2.0 ACRES

LOT AREA = 2.062 AC., THEREFORE 0.062 AC. OR 2,700 SF GREATER THAN 2 ACRES
7.5% OF 2,700 SF = 202.5 SF + 13,270 SF = 13,472.5 SF ALLOWABLE GROSS LAND COVERAGE

PLUS BONUS MAXIMUM GROSS LAND COVER (PER SECTION 355-26.C(1)(b)
DISTANCE PRINCIPAL HOME IS BEYOND MINIMUM FRONT YARD SETBACK
5.13' X 10 = 51.3 SF

13,472.5 SF + 51.3 SF = 13,523.8 SF ALLOWABLE GROSS LAND COVERAGE



APPROVED BY TOWN OF NORTH CASTLE PLANNING BOARD:
RESOLUTION, DATED: ____________

CHRISTOPHER CARTHY, CHAIRMAN
TOWN OF NORTH CASTLE PLANNING BOARD
DATE: ____________

ENGINEERING PLANS REVIEWED FOR CONFORMANCE TO RESOLUTION:

JOSEPH M. CERMELE, P.E.
KELLARD SESSIONS CONSULTING
CONSULTING TOWN ENGINEERS
DATE: ____________

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20044-SITE GROSSLAND COV

Drawing No:
C-310

APPLICANT/OWNER:
MR. & MRS. PEREIRA
4 TRIPP LANE
TOWN OF NORTH CASTLE, NY

ARCHITECT:
GET MY CO
57 WHEELER AVENUE, SUITE 203
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120 BEDFORD ROAD • ARMONK, NY 10504
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GROSS LAND COVERAGE PLAN

PEREIRA RESIDENCE
4 TRIPP LANE
NORTH CASTLE, NY

SOILS OBSERVATION SUMMARY CHART

TEST PIT	SOIL DESCRIPTION
DT-1	TOP SOIL 0"-9" APPARENT VIRGIN SOIL 9"- (NO FILL OBSERVED)
DT-2	TOP SOIL 0"-9" FILL 9"-30" APPARENT VIRGIN SOIL 30"-
DT-3	TOP SOIL 0"-24" FILL 24"-42" APPARENT VIRGIN SOIL 42"-
DT-4	TOP SOIL 0"-15" FILL 15"-36" APPARENT VIRGIN SOIL 36"-
DT-5	TOP SOIL 0"-18" FILL 18"-60" APPARENT VIRGIN SOIL 60"-
DT-6	TOP SOIL 0"-9" FILL 9"-36" APPARENT VIRGIN SOIL 36"-
DT-7	TOP SOIL 0"-24" FILL 24"-60" APPARENT VIRGIN SOIL 60"-
DT-8	TOP SOIL 0"-18" FILL 18"-42" APPARENT VIRGIN SOIL 42"-
DT-9	TOP SOIL 0"-9" APPARENT VIRGIN SOIL 9"- (NO FILL OBSERVED)
DT-10	TOP SOIL 0"-15" APPARENT VIRGIN SOIL 15"- (NO FILL OBSERVED)
DT-11	TOP SOIL 0"-15" APPARENT VIRGIN SOIL 15"- (NO FILL OBSERVED)

*NO SOILS TESTING OR ANALYSIS WAS PERFORMED BY JMC. JMC WAS ON SITE TO ONLY MEASURE THE ELEVATIONS OF THE SOIL STRATA LOCATED ON SITE.

HOLE #10

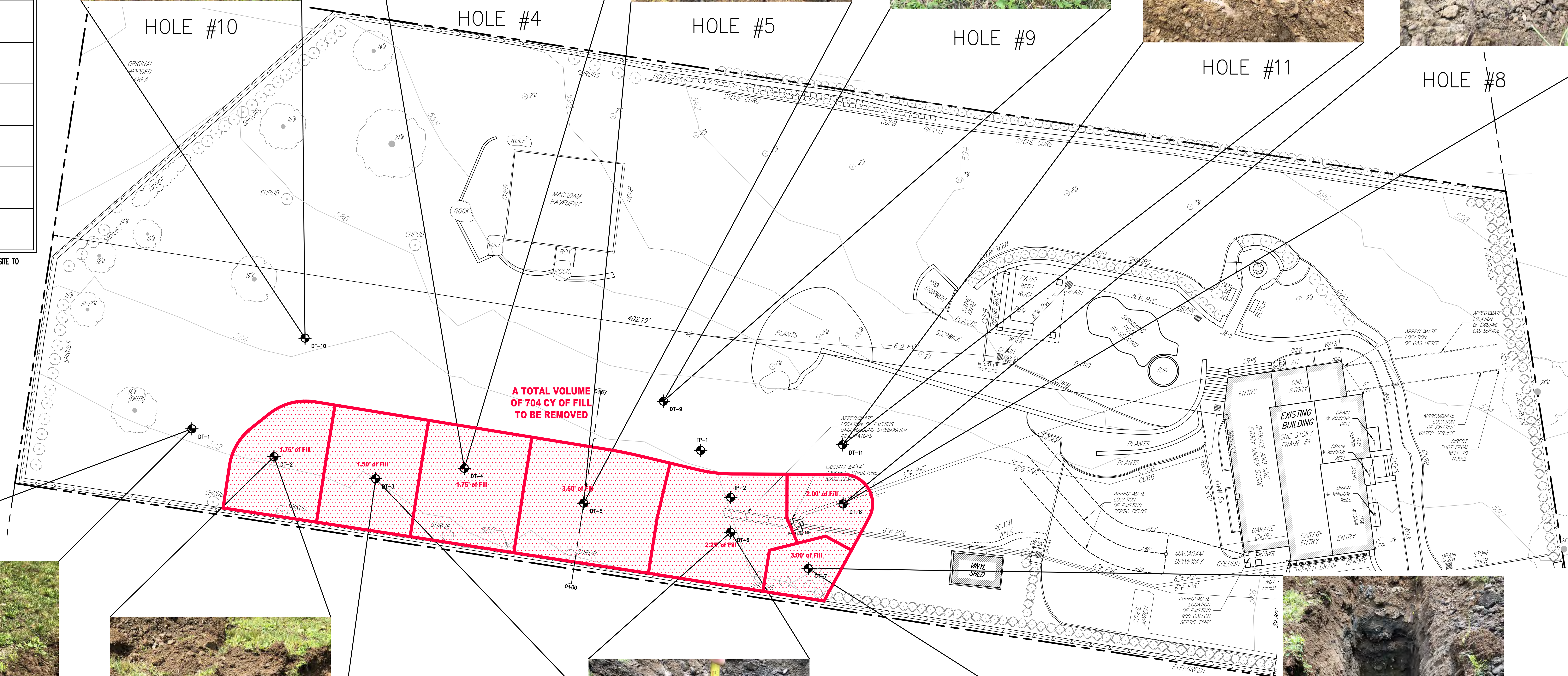
HOLE #4

HOLE #5

HOLE #9

HOLE #11

HOLE #8



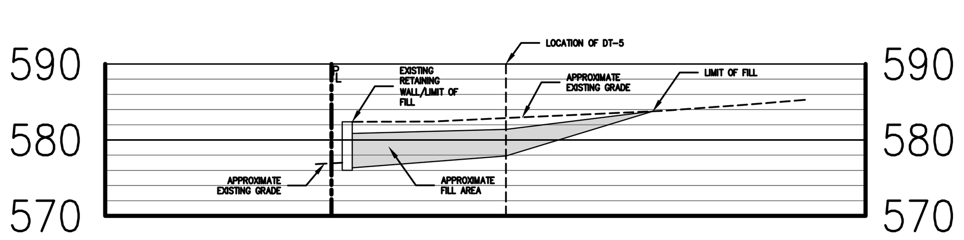
HOLE #1

HOLE #2

HOLE #3

HOLE #6

HOLE #7



TYPICAL FILL SECTION

APPROVED BY TOWN OF NORTH CASTLE PLANNING BOARD:
RESOLUTION, DATED: ____________

______________________________ DATE: __________
CHRISTOPHER CARTHY, CHAIRMAN
TOWN OF NORTH CASTLE PLANNING BOARD

ENGINEERING PLANS REVIEWED FOR CONFORMANCE TO RESOLUTION:

______________________________ DATE: __________
JOSEPH M. CERMELE, P.E.
KELLARD SESSIONS CONSULTING
CONSULTING TOWN ENGINEERS

ANY ALTERATION OF PLANS, SPECIFICATIONS, PLATS AND REPORTS BEARING THE SEAL OF A LICENSED PROFESSIONAL ENGINEER OR LICENSED LAND SURVEYOR IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW, EXCEPT AS PROVIDED FOR BY SECTION 7209, SUBSECTION 2.

STATE OF NEW YORK · FREDERICK BOHLANDER · 100532-1 · LICENSED PROFESSIONAL ENGINEER

No.	Revision	Date	By
1.	REVISED PER TOWN ENGINEER'S COMMENTS	07/12/2022	RB
2.	PLANNING BOARD SUBMISSION	01/09/2023	RB
3.	PLANNING BOARD SUBMISSION	09/11/2023	RB
4.	PLANNING BOARD SUBMISSION	10/23/2023	RB
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	Previous Editions Obsolete		

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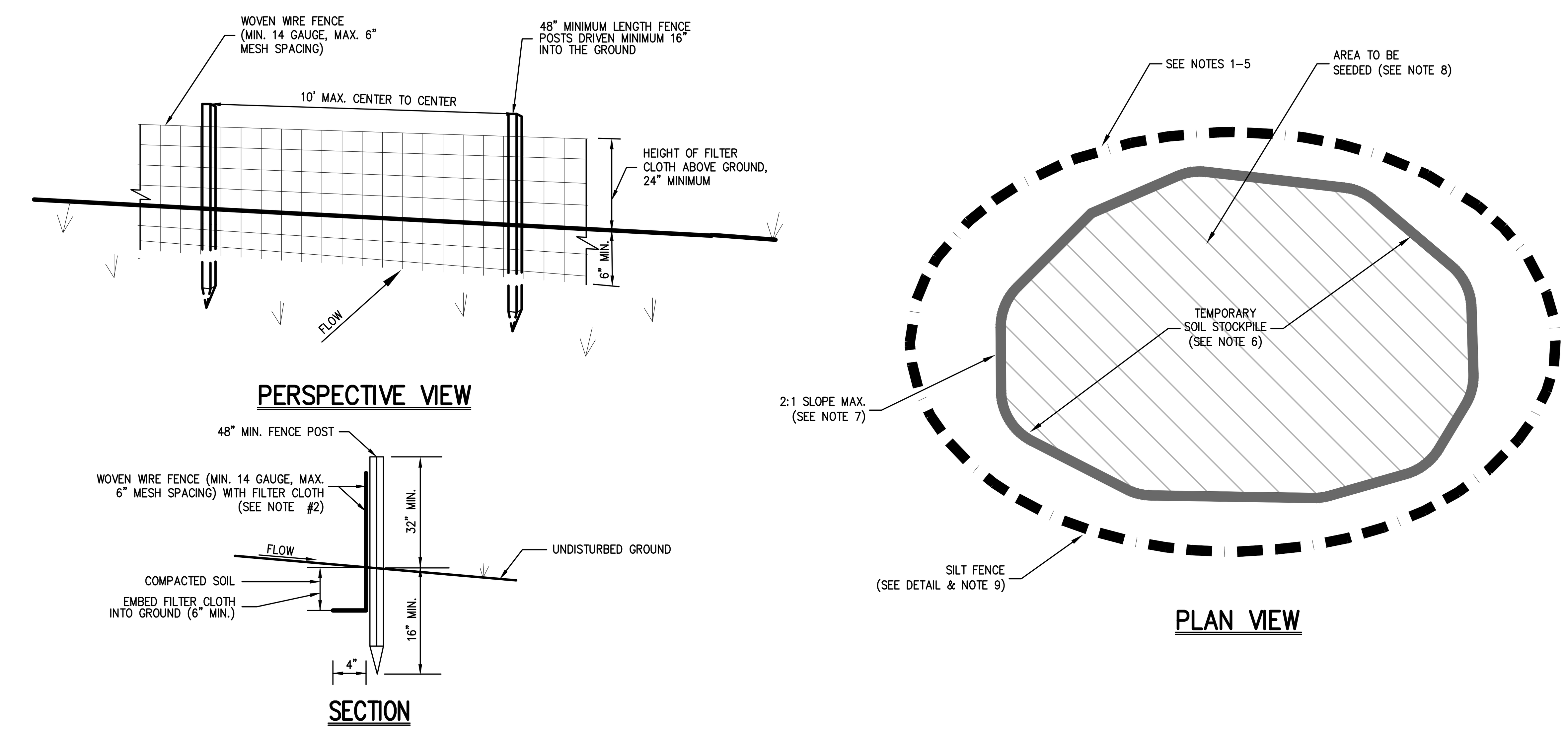
CUT AND FILL PLAN

PEREIRA RESIDENCE
4 TRIPP LANE
NORTH CASTLE, NY

Drawn: DK Approved: AN
Scale: 1" = 20'
Date: 03/01/2021
Project No: 20044
20044-SITE | CUT AND FILL | FILLPLAN.ls
Drawing No: C-410

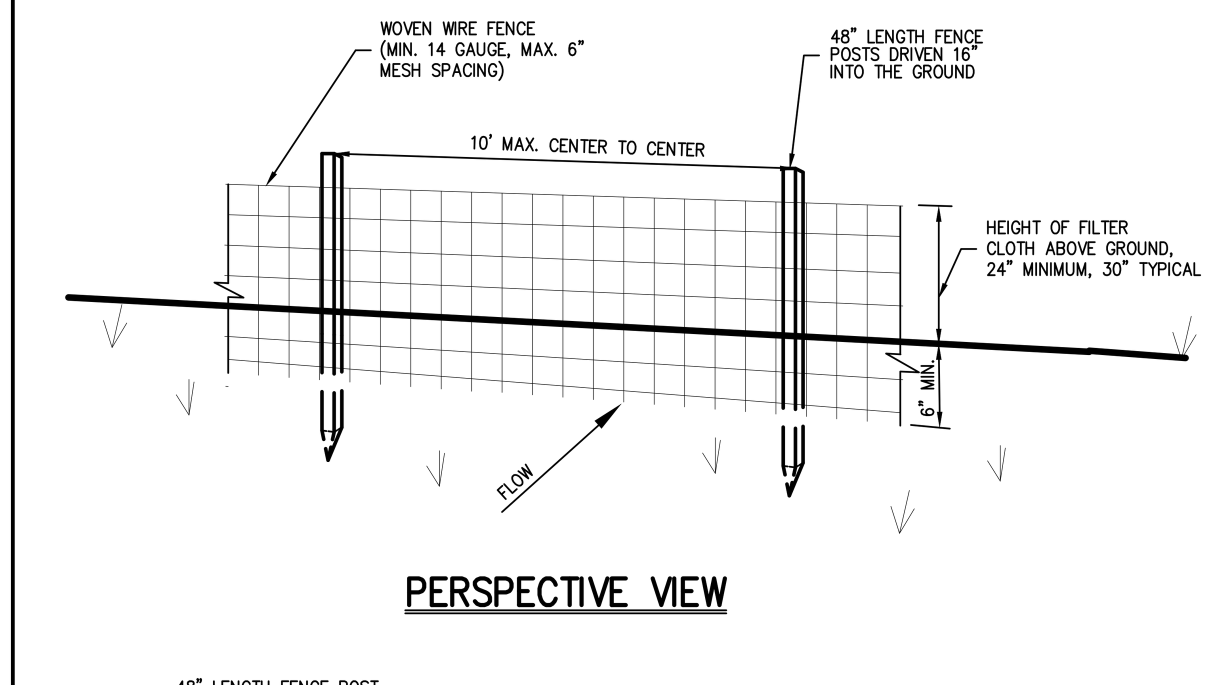
NOT FOR CONSTRUCTION

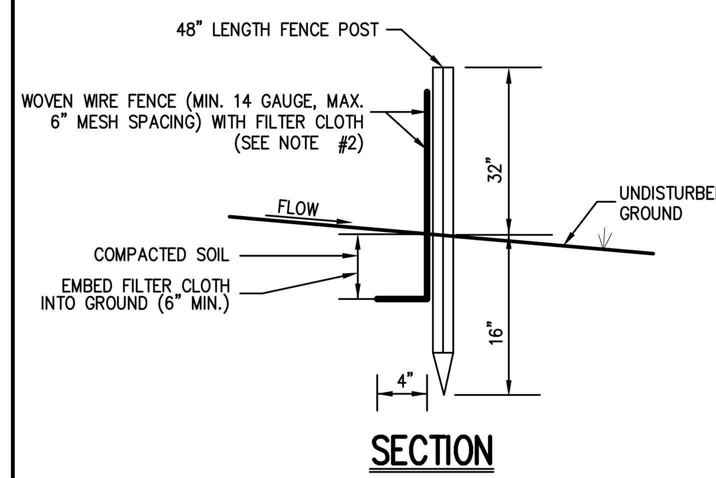


NOTES:

1. WOVEN WIRE FENCE SHALL BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL, EITHER T OR U TYPE OR HARDWOOD.
2. FILTER CLOTH SHALL BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER, THEY SHALL BE OVERLAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABLINKA T140N, OR APPROVED EQUAL.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUAL.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED AND REPLACED WHEN "BULGES" DEVELOP IN THE SILT FENCE.
6. THE AREA CHOSEN FOR ALL TEMPORARY SOIL STOCKPILES SHALL BE DRY AND STABLE.
7. ALL STOCKPILED SOIL SHALL NOT CONTAIN SLOPES GREATER THAN 2:1.
8. UPON COMPLETION OF SOIL STOCKPILING, EACH PILE SHALL BE SEEDED WITHIN 24 HOURS. PERENNIAL OR ANNUAL RYEGRASS SHALL BE PLANTED DURING SPRING, SUMMER OR EARLY FALL. WINTER RYE (CEREAL RYE) SHALL BE PLANTED DURING LATE FALL OR EARLY WINTER.
9. ALL STOCKPILES SHALL BE PROTECTED WITH SILT FENCING INSTALLED AROUND THE PERIMETER.

TEMPORARY SOIL STOCKPILE WITH SILT FENCE 1





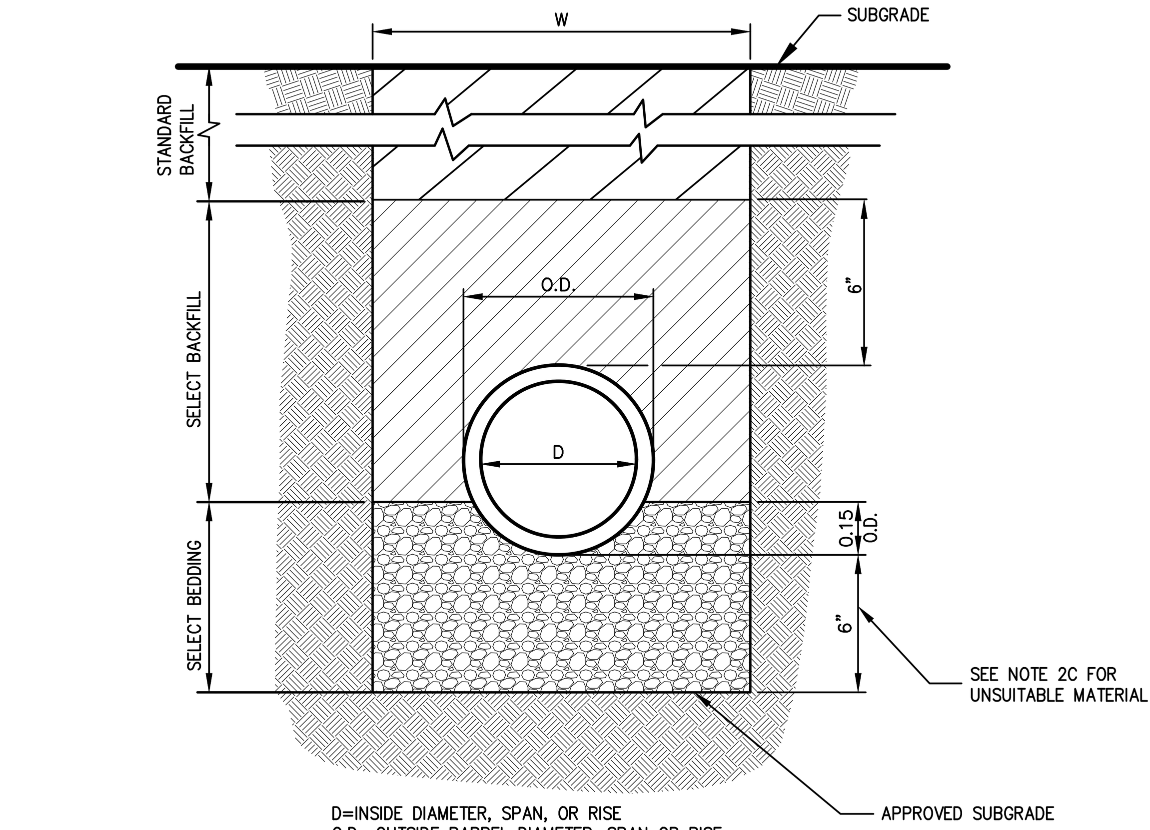
SLOPE	STEEPNESS	SLOPE LENGTH/FENCE LENGTH (FT.)
2–10%	50:1 TO 10:1	250/2000
10–20%	10:1 TO 5:1	150/1000
20–33%	5:1 TO 3:1	80/750
33–50%	3:1 TO 2:1	70/350
>50%	>2:1	30/175

*ALL SILT FENCES SHALL BE PLACED AS CLOSE TO THE DISTURBED AREA AS POSSIBLE, BUT AT LEAST 10 FEET FROM THE TOE OF A SLOPE STEEPER THAN 3H:1V, TO ALLOW FOR MAINTENANCE AND ROLL DOWN. THE AREA BEYOND THE FENCE MUST BE UNDISTURBED OR STABILIZED.

NOTES:

1. WOVEN WIRE FENCE SHALL BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL, EITHER T OR U TYPE OR HARDWOOD.
2. FILTER CLOTH SHALL BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER, THEY SHALL BE OVERLAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABLINKA T140N, OR APPROVED EQUAL.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUAL.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED AND REPLACED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

SILT FENCE 2



D=INSIDE DIAMETER, SPAN, OR RISE
O.D.=OUTSIDE BARREL DIAMETER, SPAN OR RISE
H.D.=OUTSIDE DIAMETER, SPAN, OR RISE @ BELL OR BAND
W=H.D. + 2.0' – FOR 48" OR SMALLER DIAMETER, SPAN, OR RISE
W=H.D. + 2.5' – FOR GREATER THAN 48" DIAMETER, SPAN, OR RISE

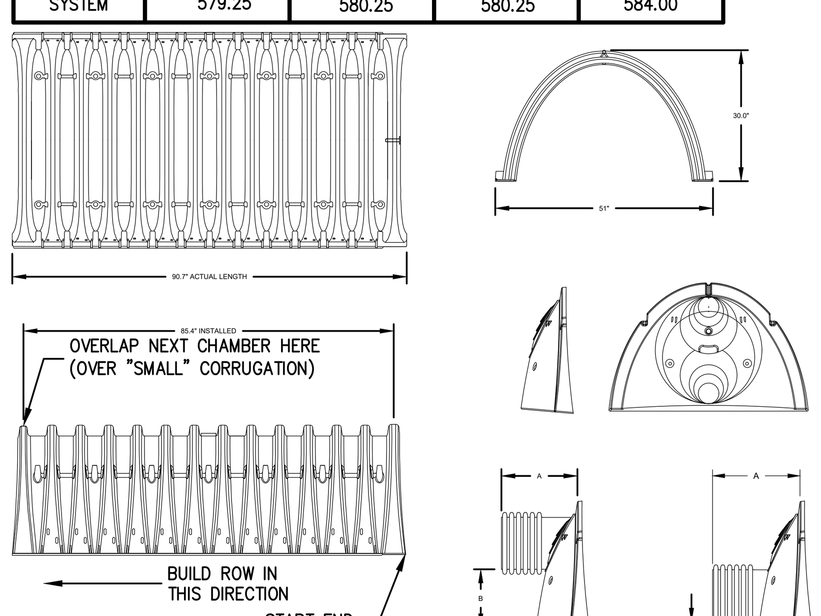
NOTES:

1. FOR TYPE II TRENCH, MATERIAL FOR SELECT BEDDING AND SELECT BACKFILL SHALL BE:
   A. EITHER SAND OR CRUSHED STONE IF NO WATER IS ENCOUNTERED IN TRENCH.
   B. 3/4"CRUSHED STONE IF WATER IS ENCOUNTERED IN TRENCH.
2. TYPE II TRENCH SHALL BE USED IN ALL OF THE FOLLOWING CASES:
   A. FOR ALL CORRUGATED POLYETHYLENE DRAIN PIPE (CPDP) AND PVC PIPE AND CONDUIT INSTALLATION.
   B. WHEN ROCK OR HARDPAN IS ENCOUNTERED IN BOTTOM OF TRENCH.
   C. WHEN UNSUITABLE MATERIAL IS ENCOUNTERED IN BOTTOM OF TRENCH. IN SUCH CASE DEPTH OF UNDERCUTTING SHALL BE AS DIRECTED BY THE ENGINEER WITH 6" MINIMUM.
3. FOR ALL TRENCH EXCAVATION IN FILL AREAS, ALL EMBANKMENTS SHALL BE CONSTRUCTED TO A MINIMUM OF 2 FEET ABOVE THE OUTSIDE TOP (AT THE BELL) OF THE PIPE PRIOR TO BEGINNING ANY TRENCH EXCAVATION.
4. BACKFILL FOR PIPE AND CONDUIT SHALL BE PLACED EVENLY AND CAREFULLY AROUND AND OVER THE PIPE OR CONDUIT IN SIX (6) INCH MAXIMUM LAYERS. EACH LAYER SHALL BE THOROUGHLY AND CAREFULLY COMPACTED UNTIL TWELVE (12) INCHES OF COVER EXISTS OVER THE PIPE OR CONDUIT. THE REMAINDER OF THE BACKFILL MAY THEN BE PLACED AND COMPACTED IN A MAXIMUM OF TWELVE (12) INCH LAYERS. EACH LAYER SHALL BE COMPACTED BY APPROVED MECHANICAL TAMPING MACHINES. UNLESS OTHERWISE SPECIFIED BACKFILL SHALL BE COMPACTED TO NOT LESS THAN 92% MAXIMUM MODIFIED DENSITY IN ACCORDANCE WITH ASTM DESIGNATION D-1557 IN THE MANNER HEREIN DESCRIBED. BACKFILL SHALL PROCEED UP TO THE LINES AND GRADES AS SHOWN ON THE DRAWINGS.

TYPE II TRENCH 3

SCHEDULE OF INVERTS

DESIGNATION	A FOUNDATION BOTTOM	B CHAMBER BOTTOM	C MANIFOLD & INLET STUB INVERT	D GRADE
SYSTEM	579.25	580.25	580.25	584.00



ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION	DESCRIPTION	AASHTO M43 DESIGNATION[1]	COMPACTION/DENSITY REQUIREMENT
d FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISH GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THIS LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
c FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THIS LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, < 35% FINES. MOST PAVEMENT SUB-BASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTION AFTER 12" OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" LIFTS TO A MIN. 95% STANDARD PROCTOR DENSITY. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs. DYNAMIC FORCE NOT TO EXCEED 20,000 lbs.
b EMBEDMENT STONE SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4 – 2 INCH	3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
a FOUNDATION STONE BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4 – 2 INCH	3, 35, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A 95% STANDARD PROCTOR DENSITY[2].

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. AS AN ALTERNATE TO PROCTOR TESTING AND FIELD DENSITY MEASUREMENTS ON OPEN GRADED STONE, STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9"[229 mm] (MAX) LIFTS USING TWO FULL COVERAGES WITH AN APPROPRIATE COMPACTOR.

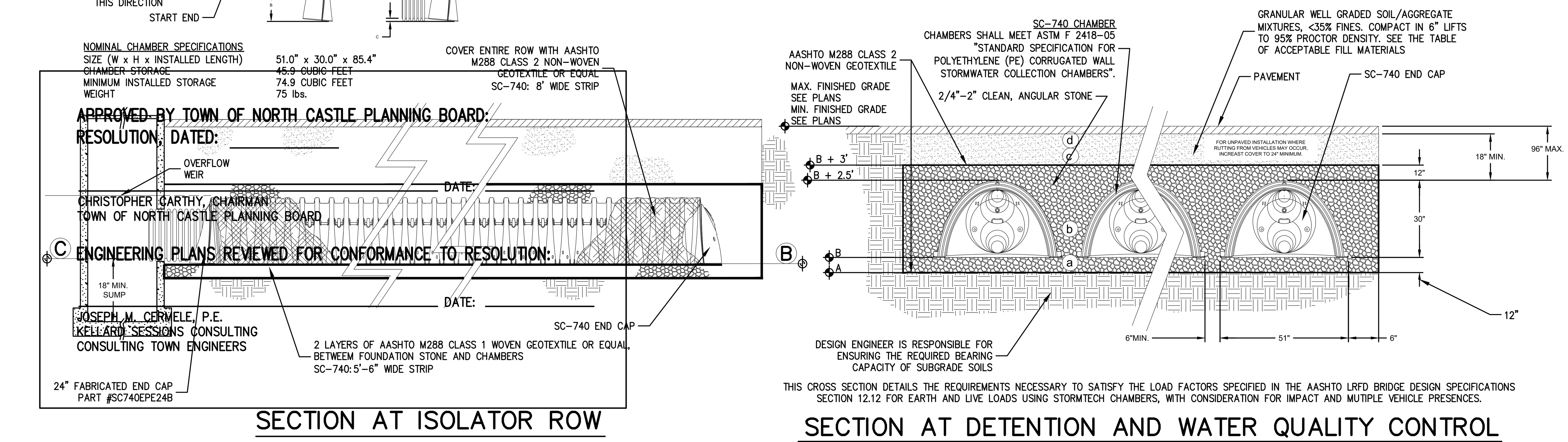
APPROVED BY TOWN OF NORTH CASTLE PLANNING BOARD:
RESOLUTION, DATED: ____________

______________________________ DATE: __________
CHRISTOPHER CARTHY, CHAIRMAN
TOWN OF NORTH CASTLE PLANNING BOARD

ENGINEERING PLANS REVIEWED FOR CONFORMANCE TO RESOLUTION:

______________________________ DATE: __________
JOSEPH M. CERMELE, P.E.
KELLARD SESSIONS CONSULTING
CONSULTING TOWN ENGINEERS

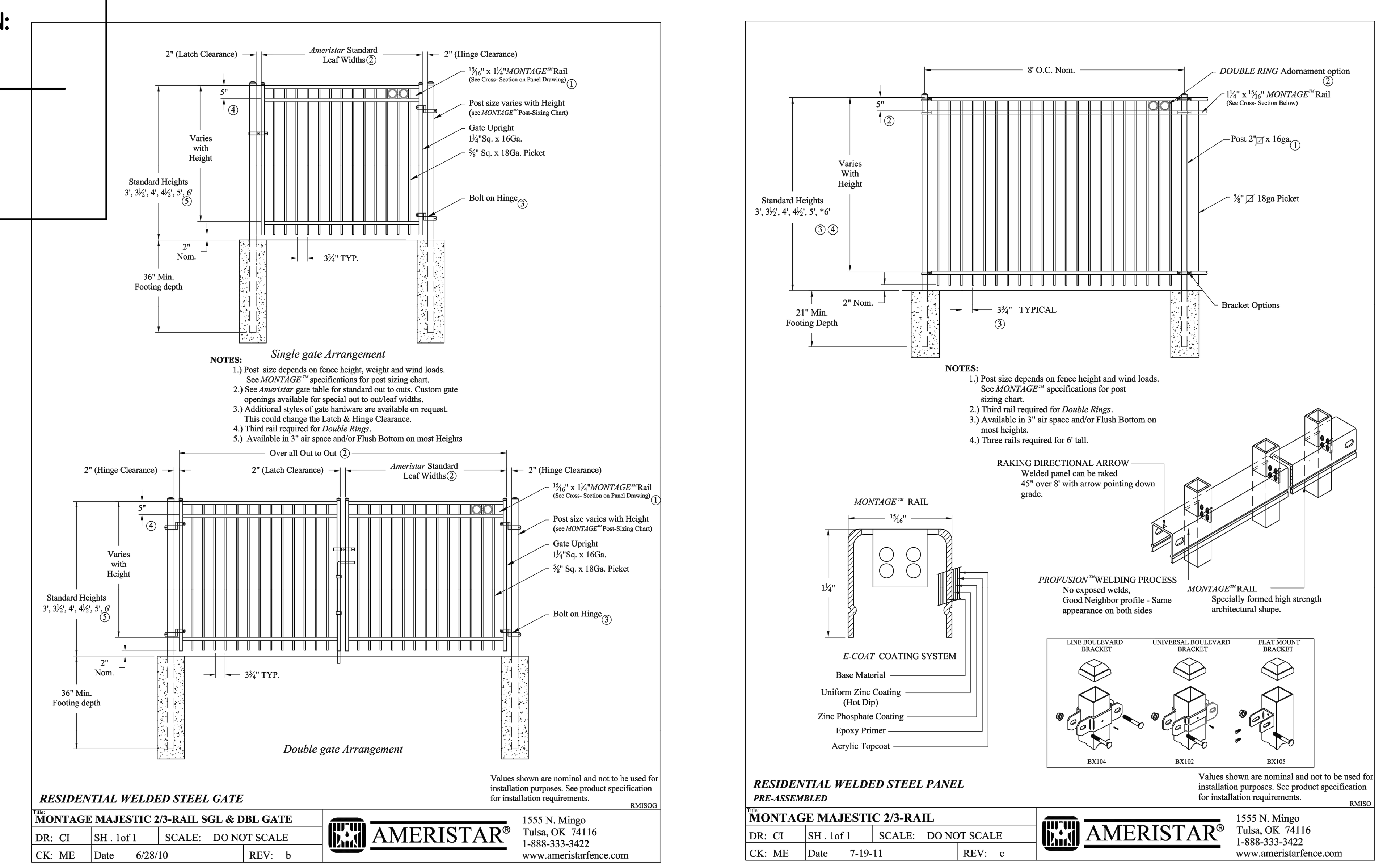
NOMINAL CHAMBER SPECIFICATIONS
SIZE (W x H x INSTALLED LENGTH) 51.0" x 30.0" x 85.4"
CHAMBER STORAGE 45.9 CUBIC FEET
MINIMUM INSTALLED STORAGE 74.9 CUBIC FEET
WEIGHT 75 lbs.



THIS CROSS SECTION DETAILS THE REQUIREMENTS NECESSARY TO SATISFY THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12 FOR EARTH AND LIVE LOADS USING STORMTECH CHAMBERS, WITH CONSIDERATION FOR IMPACT AND MUTIPLE VEHICLE PRESENCES.

SECTION AT DETENTION AND WATER QUALITY CONTROL

STORMTECH CHAMBERS SC-740 4



AMERISTAR MONTAGE MAJESTIC FENCE WITH GATE 5

No.	Revision	Date
1.	REVISED PER TOWN ENGINEER'S COMMENTS	07/12/2022
2.	PLANNING BOARD SUBMISSION	01/09/2023
3.	PLANNING BOARD SUBMISSION	09/11/2023
4.	PLANNING BOARD SUBMISSION	10/23/2023
5.	PLANNING BOARD SUBMISSION	02/22/2024

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CONSTRUCTION DETAILS

PEREIRA RESIDENCE
4 TRIPP LANE
NORTH CASTLE, NY

STATE OF NEW YORK · FREDERICK BOHLANDER · 100532-1 · LICENSED PROFESSIONAL ENGINEER

Drawn: DK	Approved: AN
Scale:	NOT TO SCALE
Date:	03/01/2021
Project No:	20044
20044-DETAILS	-
Drawing No:	C-900

NOTES PERTAINING TO DRAIN INLETS

A-1 STEPS WILL NOT BE REQUIRED IN INLETS LESS THAN FOUR (4) FEET IN DEPTH. STEPS WILL BE REQUIRED IN INLETS FOUR (4) FEET OR GREATER IN DEPTH. DEPTHS FOR DRAIN INLETS SHALL BE MEASURED FROM FINISHED GRADE TO INSIDE BOTTOM OF STRUCTURE (INCLUDING SUMP AS APPLICABLE).

A-2 WHEN STEPS ARE REQUIRED, STEPS SHALL COMPLY WITH THE SAME REQUIREMENTS OF ASTM STANDARD C-478, ARTICLE 13 ENTITLED "MANHOLE STEPS & LADDERS".

A-3 FOR MASONRY STRUCTURES, THE FIRST COURSE OF MASONRY SHALL BE SET IN THE CONCRETE FOUNDATION BEFORE THE CONCRETE HAS SET. CONCRETE FOUNDATION SHALL BE CLASS "A"(4000 psi) CONCRETE, TWELVE (12) INCHES THICK AND SHALL EXTEND SIX (6) INCHES BEYOND THE OUTSIDE FACE THE STRUCTURE.

A-4 IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO FURNISH AND CONSTRUCT THE PROPER SIZE STRUCTURE INCLUDING THE NECESSARY OPENINGS TO ACCOMMODATE THE WORK AS SHOWN ON THE PLANS OR ORDERED BY THE ENGINEER, AT NO ADDITIONAL COST TO THE OWNER.

A-5 ALL NECESSARY PATCHING FOR DRAIN STRUCTURES SHALL BE ACCOMPLISHED WITH NON-SHRINKING CEMENT MORTAR GROUT, APPROVED EQUAL TO SIKA-SET AS MANUFACTURED BY THE SIKA CHEMICAL CORP.

A-6 FOUNDATIONS FOR PRECAST CONCRETE STRUCTURES SHALL BE SET ON A COMPACTED LAYER OF APPROVED CRUSHED STONE HAVING A MINIMUM COMPACTED THICKNESS OF EIGHT (8) INCHES.

A-7 ALL PIPES SHALL BE CUT FLUSH WITH THE INSIDE WALL OF THE STRUCTURE.

A-8 PROVIDE REINFORCED CONCRETE TOP SLAB FOR OVERSIZED DRAIN INLETS WITH PROPER SIZE OPENING TO ACCOMMODATE INSTALLATION OF FRAME & GRATE.

A-9 FOR MASONRY STRUCTURES GREATER THAN TEN (10) FEET IN DEPTH, THICKNESS OF MASONRY WALLS SHALL BE INCREASED TO TWELVE (12) INCHES.

A-10 FOR ALL STRUCTURES GREATER THAN 10 FEET IN DEPTH, STRUCTURES SHALL PROVIDE MINIMUM INSIDE DIMENSIONS OF 4 FEET X 4 FEET.

NOTES PERTAINING TO MANHOLES

B-1 PRECAST CONCRETE MANHOLES SHALL COMPLY WITH ASTM STANDARD C-478. MANHOLE JOINTS SHALL COMPLY WITH ASTM STANDARD C-443.

B-2 FOR PRECAST CONCRETE MANHOLES FIVE (5) FEET OR LESS IN HEIGHT, TOP CONE SECTION SHALL BE REPLACED WITH PRECAST REINFORCED CONCRETE SLAB (6" MIN. THICKNESS) WITH OPENING OF SUFFICIENT SIZE TO ACCOMMODATE MANHOLE CASTING.

B-3 FOR MANHOLES 10 FEET OR MORE IN DEPTH, MANHOLE DIAMETER SHALL BE FIVE (5) FEET.

B-4 TERMINAL MANHOLE FLOORS SHALL BE SLOPED TOWARD OUTFALL PIPE.

B-5 INVERT CHANNELS FOR PRECAST CONCRETE MANHOLES SHALL BE CONSTRUCTED OF CONCRETE.

B-6 NOTES A-1, A-2, A-4, A-5, A-6 & A-7 UNDER "NOTES PERTAINING TO DRAIN INLETS" ABOVE SHALL APPLY TO MANHOLES.

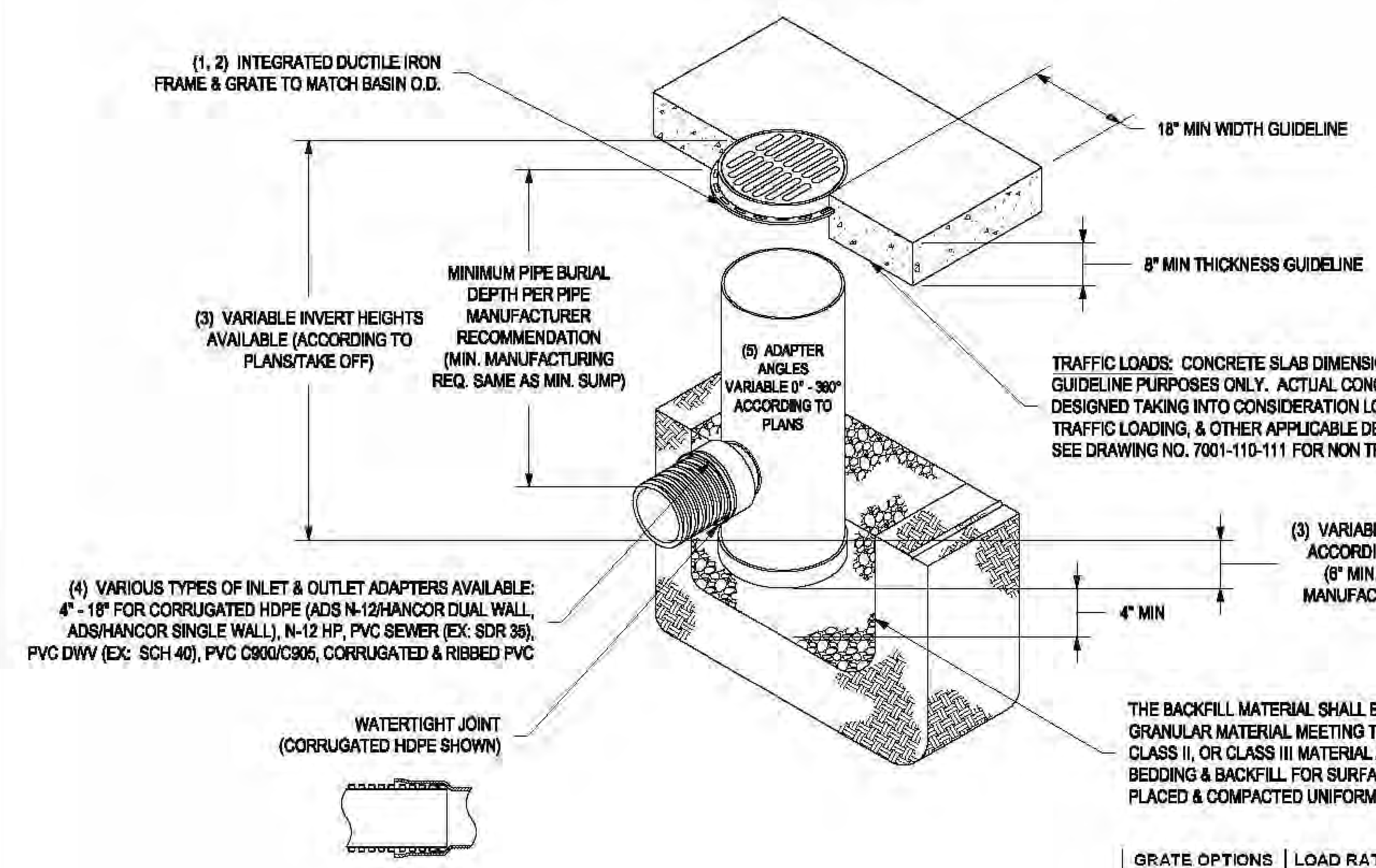
NOTES PERTAINING TO PRECAST CONCRETE STRUCTURES FOR STORM DRAINS, SANITARY SEWERS AND WATER LINES

C-1 ALL PRECAST CONCRETE STRUCTURES SHALL BE DESIGNED TO ACCOMMODATE AN H-20 DESIGN LOAD.

C-2 STEPS SHALL BE LOCATED WITHIN STRUCTURE TO AVOID PLACEMENT OVER PIPES WHEN PRACTICABLE.

UTILITY NOTES | 6

NYLOPLAST 18" DRAIN BASIN: 2818AG _ _ X



TRAFFIC LOADS: CONCRETE SLAB DIMENSIONS ARE FOR GUIDELINE PURPOSES ONLY. ACTUAL CONCRETE SLAB MUST BE DESIGNED TAKING INTO CONSIDERATION LOCAL SOIL CONDITIONS, TRAFFIC LOADING, & OTHER APPLICABLE DESIGN FACTORS. SEE DRAWING NO. 7001-110-111 FOR NON TRAFFIC INSTALLATION.

(3) VARIABLE SUMP DEPTH ACCORDING TO PLANS (6" MIN. BASED ON MANUFACTURING REQ.)

THE BACKFILL MATERIAL SHALL BE CRUSHED STONE OR OTHER GRANULAR MATERIAL MEETING THE REQUIREMENTS OF CLASS I, CLASS II, OR CLASS III MATERIAL AS DEFINED IN ASTM D2321. BEDDING & BACKFILL FOR SURFACE DRAINAGE INLETS SHALL BE PLACED & COMPACTED UNIFORMLY IN ACCORDANCE WITH ASTM D2321.

GRATE OPTIONS	LOAD RATING	PART #	DRAWING #
PEDESTRIAN	MEETS H-10	1899CDP	7001-110-212
STANDARD	MEETS H-20	1899CGS	7001-110-213
SOLID COVER	MEETS H-20	1899CGC	7001-110-214
DOME	N/A	1899CDD	7001-110-215
DROP IN GRATE	LIGHT DUTY	1801DI	7001-110-074

1 - GRATES/SOLID COVER SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
2 - FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
3 - DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS. RISERS ARE NEEDED FOR BASINS OVER 84" DUE TO SHIPPING RESTRICTIONS. SEE DRAWING NO. 7001-110-065.
4 - DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS N-12/HANCOR DUAL WALL), N-12 HP, & PVC SEWER.
5 - ADAPTERS CAN BE MOUNTED ON ANY ANGLE 0° TO 360°. TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS SEE DRAWING NO. 7001-110-012.

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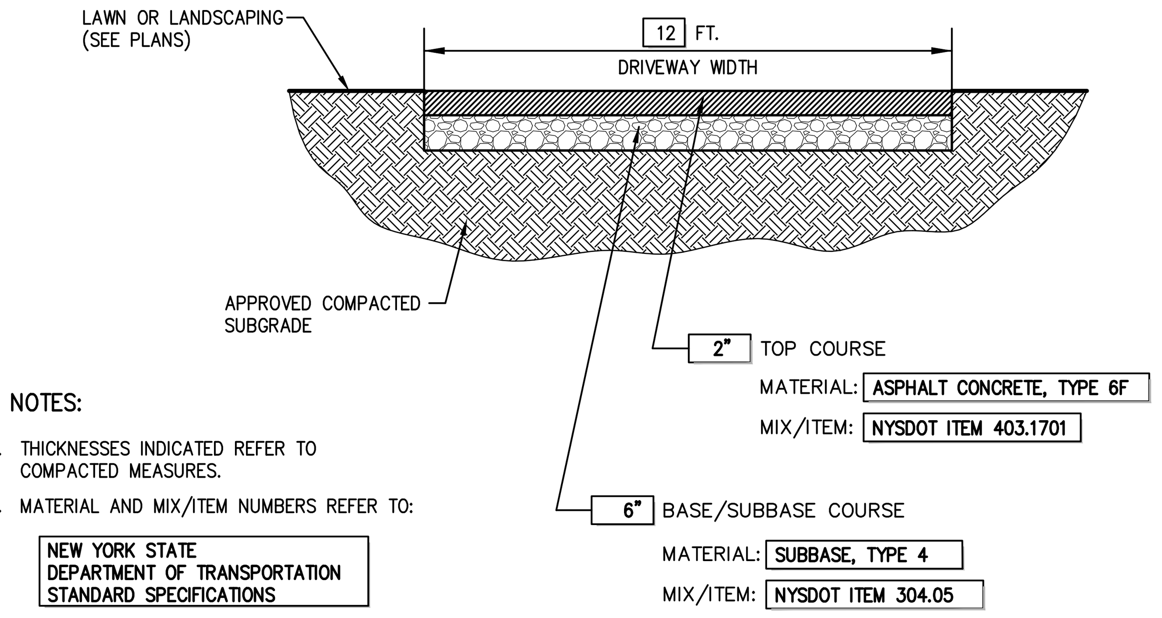
DRAWN BY: EBC | MATERIAL | DATE: 04-05-08 | REVISED BY: NMH | PROJECT NO./NAME | DATE: 03-14-18

ADS Nyloplast — 3130 VERONA AVE, BUFORD, GA 30518, PHN (770) 932-2443, FAX (770) 932-2490, www.nyloplast-us.com

TITLE: 18 IN DRAIN BASIN QUICK SPEC INSTALLATION DETAIL

DWG SIZE: A | SCALE: 1:30 | SHEET 1 OF 1 | DWG NO. 7001-110-191 | REV E

18" NYLOPLAST DRAINAGE STRUCTURE WITH GRATE | 7



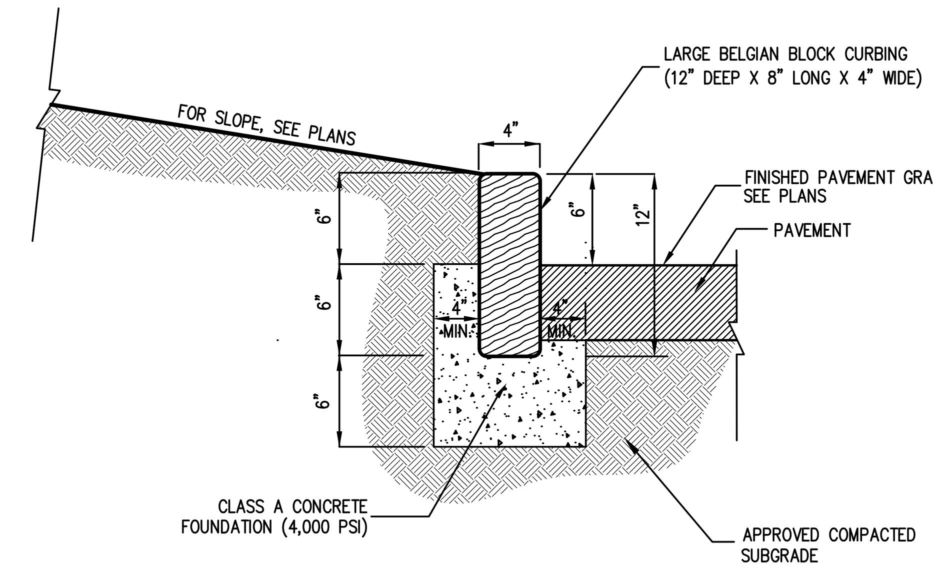
NOTES:
1. THICKNESSES INDICATED REFER TO COMPACTED MEASURES.
2. MATERIAL AND MIX/ITEM NUMBERS REFER TO:

NEW YORK STATE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS

2" TOP COURSE
MATERIAL: ASPHALT CONCRETE, TYPE 6F
MIX/ITEM: NYSDOT ITEM 403.1701

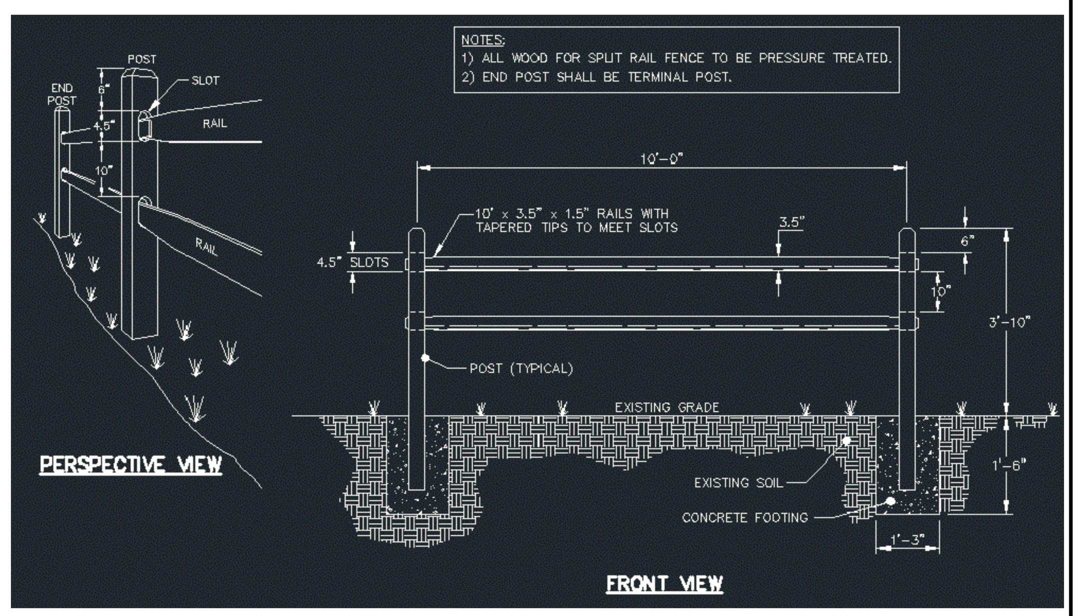
6" BASE/SUBBASE COURSE
MATERIAL: SUBBASE, TYPE 4
MIX/ITEM: NYSDOT ITEM 304.05

SITE DRIVEWAY | 8



NOTES
1. JOINTS SHALL BE NO WIDER THAN 3/4" AND SHALL BE MORTARED. JOINTS SHALL BE FULLY FILLED WITH 1:2 CEMENT MORTAR, NEATLY POINTED AND CLEANED OF EXCESS MORTAR.

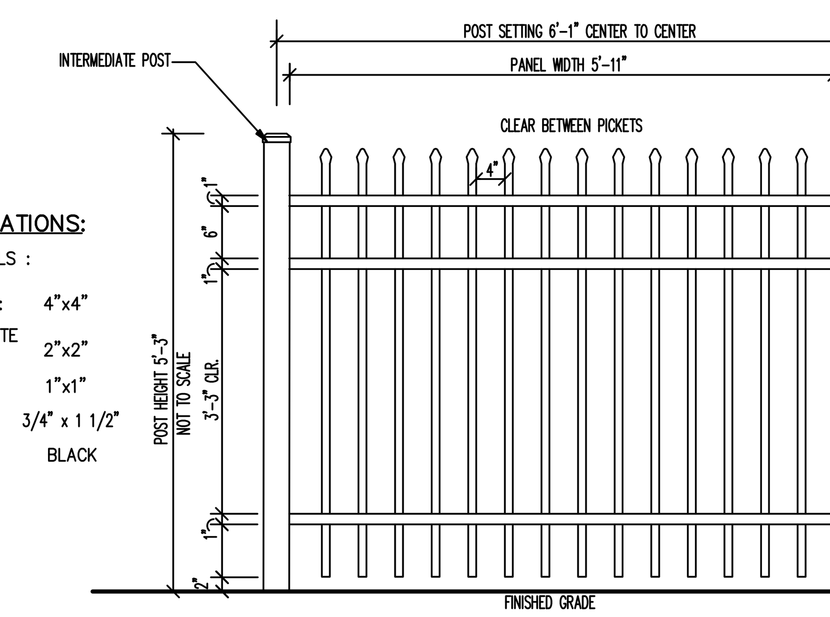
STONE CURB (BELGIAN BLOCK) | 9



SPLIT RAIL FENCE | 10

DRY LAID BOULDER WALL | 12

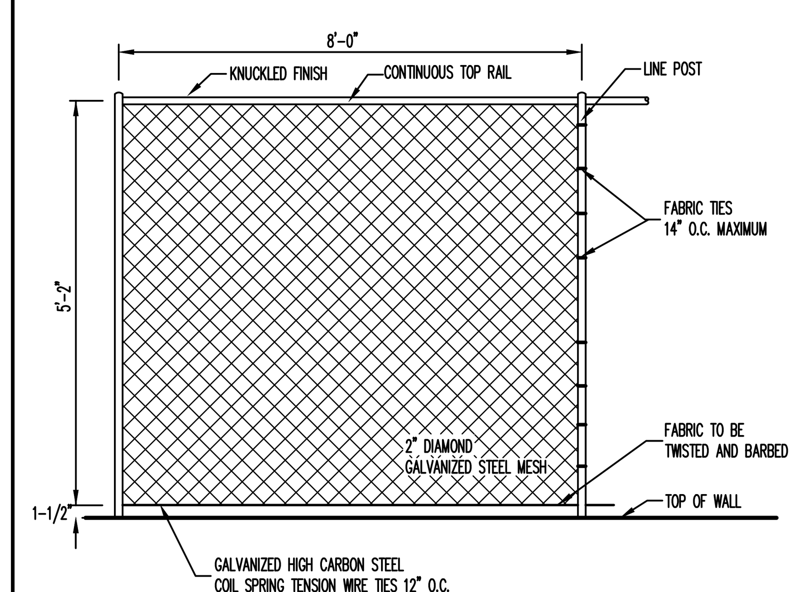
STONE AND MORTAR WALL (WITH CHAIN LINK FENCE ON TOP) | 14



SPECIFICATIONS:

POSTS, RAILS : & PICKETS	
END POSTS:	4"x4"
INTERMEDIATE POSTS:	2"x2"
RAILS:	1"x1"
PICKETS:	3/4" x 1 1/2"
COLOR:	BLACK

BLACK ALUMINUM FENCE | 16



CHAIN LINK FENCE (GALVANIZED) – ALREADY INSTALLED AND WAS MEASURED IN THE FIELD | 17

SPECIFICATIONS:

COLUMN HEIGHT:	6'-6"
CAP:	2'-10" X 3'-1" 6" HEIGHT (INCLUDES UPPER SECTION)
GATE:	8'-0" W (ONE SIDE) 6'-9" HT. @ CENTER 5'-0" HT. @ CONNECTION TO PIER
LIGHT:	2'-0" HT.
	TOTAL HEIGHT: 9'-0"

GATE AND STONE PIER | 11

STONE AND MORTAR WALL (WITH STONE CAP) | 13

SHED (WITH PATIO REMOVED) | 15

APPROVED BY TOWN OF NORTH CASTLE PLANNING BOARD:
RESOLUTION, DATED: ____________

____________________ DATE: ________
CHRISTOPHER CARTHY, CHAIRMAN
TOWN OF NORTH CASTLE PLANNING BOARD

ENGINEERING PLANS REVIEWED FOR CONFORMANCE TO RESOLUTION:

____________________ DATE: ________
JOSEPH M. CERMELE, P.E.
KELLARD SESSIONS CONSULTING
CONSULTING TOWN ENGINEERS

XX

No.	Revision	Date
1.	REVISED PER TOWN ENGINEER'S COMMENTS	07/12/2022
2.	PLANNING BOARD SUBMISSION	01/09/2023
3.	PLANNING BOARD SUBMISSION	09/11/2023
4.	PLANNING BOARD SUBMISSION	10/23/2023
5.	PLANNING BOARD SUBMISSION	02/22/2024

Previous Editions Obsolete

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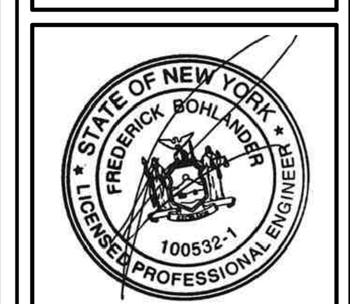
JMC Site Development Consultants, LLC
John Meyer Consulting, Inc.
120 BEDFORD ROAD • ARMONK, NY 10504
voice 914.273.5225 • fax 914.273.2102
www.jmcpllc.com

JMC

CONSTRUCTION DETAILS

PEREIRA RESIDENCE
4 TRIPP LANE
NORTH CASTLE, NY



Drawn: DK	Approved: AN
Scale:	NOT TO SCALE
Date:	03/01/2021
Project No:	20044
20044-DETAILS	–
Drawing No:	C-901

STORMWATER POLLUTION PREVENTION PLAN
JMC Project 20044
Residential Zoning Compliance Analysis
4 Tripp Lane
Town of North Castle, New York
February 22, 2024

I. INTRODUCTION

This report has been prepared to study the stormwater management aspects of the previous improvements performed by the client prior to the Town's approval and subsequent proposed drainage improvements located at the above address.

The previous improvements included the expansion of the residence, the installation of a pool patio, the installation of a separate patio area located in the backyard, the installation of a basketball court in the backyard and driveway improvements. These previous improvements have increased the square footage of impervious surfaces which will now require stormwater runoff mitigation. These improvements also increased the coverage numbers of the Site over the permitted limit. The applicant is proposing to remove approximately 2,750 square feet of impervious area (the basketball court and a large portion of the driveway) to comply with this requirement.

A hydrologic analysis of the overall site and its sub-drainage areas studied herein was prepared using the USDA Soil Conservation Service TR-55 "Urban Hydrology for Small Watersheds" methodology for the following rainfall event shown in Table 1:

Table 1
TR-55 24 Hour Rainfall Depths

Design Storm Recurrence Interval	Inches of Rainfall
100 Year Storm Event	**9.1**

Rainfall depths shown in the table above for the Town of North Castle in Westchester County are taken from the Extreme Precipitation Tables from the Northeast Regional Climate Center 24-hour rainfall frequency data from Cornell University's precip.net.

As detailed below, the previous improvements have caused a net increase in the overall impervious surfaces which will be mitigated by the installation of an additional 24-Stormtech 740 units to supplement the previously installed 3 units. This system will reduce the peak rate of runoff and runoff volume associated with the previous improvements when compared to the pre-existing conditions for the 100-year storm event.

II. EXISTING CONDITIONS

Under pre-existing conditions, the Site, in general drains from north to south towards the adjacent lot and eventually towards Byram Hills High School. Three areas were identified as areas where stormwater runoff exits the project site, all located along the southern property line. To simplify the stormwater study, one single design line was used instead of three separate design points, and peak rates of runoff and runoff volumes were reduced at this design line, which incorporates all runoff from the project site.

Existing Drainage Area 1 (EDA-1) is approximately 2.062 acres and includes the entire project site. Stormwater from this drainage area drains from north to south towards the adjacent lot and eventually towards Byram Hills High School. All runoff leaves the project site along the southern property line which will be designated as Design Line #1, as shown on drawing DA-1. The Curve Number (CN) and Time of Concentration (Tc) for this drainage area are 73 and 9.66 minutes, respectively. Refer to Drawing DA-1 in Appendix C.

III. PROPOSED CONDITIONS

As mentioned above, the previous improvements included the expansion of the residence, the installation of a pool patio, the installation of a separate patio area located in the backyard, the installation of a basketball court in the backyard and driveway improvements. These previous improvements have increased the square footage of impervious surfaces which will now require stormwater runoff mitigation. These improvements also increased the coverage numbers of the Site over the permitted limit. The applicant is proposing to remove approximately 2,750 square feet of impervious area (the basketball court and a large portion of the driveway) to comply with this requirement. The previous improvements have caused a net increase in the overall impervious surfaces which will be mitigated by the installation of an additional 23-Stormtech 740 units to supplement the previously installed 3 units. This system will reduce the peak rate of runoff and runoff volume associated with the previous improvements when compared to the pre-existing conditions for the 100-year storm event.

Proposed Drainage Area 1 (PDA-1) is approximately 1.284 acres, is in the western portion of the site and includes much of the project site. Stormwater from this drainage area drains from north to south towards the adjacent lot and eventually towards Byram Hills High School. All runoff leaves the project site along the southern property line which is designated as Design Line #1, as shown on drawing DA-2. The Curve Number (CN) and Time of Concentration (Tc) for this drainage area are 74 and 9.84 minutes, respectively. Refer to Drawing DA-2 in Appendix C.

Proposed Drainage Area 1A (PDA-1A) is approximately 0.136 acres and is located in the central portion of the project site. This area includes the pool and improved pool patio area. Stormwater from this drainage area is collected in several inlets dispersed throughout the patio area and under current conditions is being daylighted in the backyard but under proposed conditions will be conveyed to the improved underground infiltration system that will consist of 26-Stormtech 740 units. This system will outlet in the backyard near where the previous outlet had been located. Runoff then drains towards the adjacent lot and eventually towards Byram Hills High School. All runoff leaves the project site along the southern property line which will be designated as Design Line #1, as shown on drawing DA-2. The Curve Number (CN) and Time of Concentration (Tc) for this drainage area are 87 and 6.96 minutes, respectively. Refer to Drawing DA-2 in Appendix C.

Proposed Drainage Area 1B (PDA-1B) is approximately 0.642 acres and is located in the eastern portion of the project site. This area includes the residence, driveway, shed, walkways and landscaped areas. Stormwater from this drainage area is collected in several inlets dispersed throughout this drainage area and under current conditions is being conveyed to the existing underground infiltration system in the backyard. Under proposed conditions runoff from this area will continue to be conveyed to this underground infiltration system that will now consist of 27-Stormtech 740 units. This system will outlet in the backyard near where the previous outlet had been located. Runoff then drains towards the adjacent lot and eventually towards Byram Hills High School. All runoff leaves the project site along the southern property line which will be designated as Design Line #1, as shown on drawing DA-2. The Curve Number (CN) and Time of Concentration (Tc) for this drainage area are 82 and 8.94 minutes, respectively. Refer to Drawing DA-2 in Appendix C.

The numbers included in the tables below were obtained from calculations included in Appendix A & B of this report.

Table 2
Percent Reduction in Peak Rate of Runoff (Existing vs. Proposed Conditions)
(Cubic Feet per Second)

Storm Recurrence Frequency (Years)	Existing Peak Runoff Rate (cfs) Design Line 1	Proposed Peak Runoff Rate (cfs) Design Line 1	Percent Reduction (%)
100-year	11.26	11.19	0.6

Table 3
Percent Reduction in Runoff Volume (Existing vs. Proposed Conditions)
(Cubic Feet)

Storm Recurrence Frequency (Years)	Existing Runoff Volume (cf) Design Line 1	Proposed Runoff Volume (cf) Design Line 1	Percent Reduction (%)
100-year	43,587	32,845	24.6

IV. CONCLUSION

Based on the foregoing, it is our professional opinion that the previous improvements will not have an adverse drainage impact to the site, adjacent properties, or downstream areas with the installation of an additional 23-Stormtech 740 units (a total of 26 units).

Respectfully Submitted,

JMC

Rick Bohlander

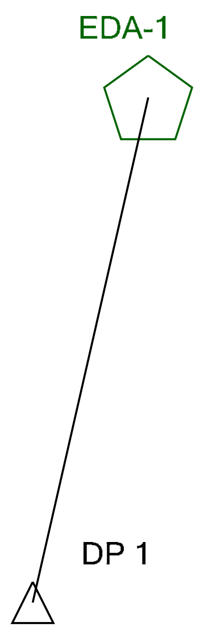
Rick Bohlander, PE
Project Manager

P:\2020\20044\DRAINAGE\REPORTS\2024-02-22_rb\Storm Report 02-22-2024.doc

APPENDIX A

EXISTING HYDROLOGIC CALCULATIONS

Scenario: 4 Tripp Street - Synthetic Curve, 1 yrs



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Watershed

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft^3)	Time to Peak (hours)	Peak Flow (ft^3/s)
EDA-1	4 Tripp Street - Synthetic Curve, 100 yrs	100	43,587.000	12.150	11.26

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft^3)	Time to Peak (hours)	Peak Flow (ft^3/s)
DP 1	4 Tripp Street - Synthetic Curve, 100 yrs	100	43,587.000	12.150	11.26

Watershed

Subsection: Time-Depth Curve | Return Event: 100 years
Label: Armonk | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Time-Depth Curve: 100 Year	
Label	100 Year
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	100 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.1	0.1	0.1	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.2	0.2	0.2
2.000	0.2	0.2	0.2	0.2	0.2
2.500	0.2	0.2	0.2	0.3	0.3
3.000	0.3	0.3	0.3	0.3	0.3
3.500	0.3	0.3	0.4	0.4	0.4
4.000	0.4	0.4	0.4	0.4	0.4
4.500	0.5	0.5	0.5	0.5	0.5
5.000	0.5	0.5	0.5	0.6	0.6
5.500	0.6	0.6	0.6	0.6	0.6
6.000	0.7	0.7	0.7	0.7	0.7
6.500	0.7	0.8	0.8	0.8	0.8
7.000	0.8	0.8	0.9	0.9	0.9
7.500	0.9	0.9	1.0	1.0	1.0
8.000	1.0	1.1	1.1	1.1	1.1
8.500	1.2	1.2	1.2	1.3	1.3
9.000	1.3	1.4	1.4	1.4	1.5
9.500	1.5	1.6	1.6	1.6	1.7
10.000	1.7	1.8	1.8	1.9	1.9
10.500	2.0	2.0	2.1	2.2	2.2
11.000	2.3	2.4	2.4	2.5	2.6
11.500	2.7	2.9	3.1	3.4	3.8
12.000	4.6	5.3	5.7	6.0	6.3
12.500	6.4	6.5	6.6	6.7	6.8
13.000	6.8	6.9	7.0	7.0	7.1
13.500	7.2	7.2	7.3	7.3	7.4
14.000	7.4	7.4	7.5	7.5	7.6
14.500	7.6	7.7	7.7	7.7	7.8
15.000	7.8	7.8	7.9	7.9	7.9
15.500	8.0	8.0	8.0	8.0	8.1
16.000	8.1	8.1	8.1	8.2	8.2
16.500	8.2	8.2	8.2	8.3	8.3

Watershed

Subsection: Time-Depth Curve
Label: Armonk
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Return Event: 100 years
Storm Event: 100 Year

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	8.3	8.3	8.3	8.4	8.4
17.500	8.4	8.4	8.4	8.4	8.5
18.000	8.5	8.5	8.5	8.5	8.5
18.500	8.5	8.6	8.6	8.6	8.6
19.000	8.6	8.6	8.6	8.7	8.7
19.500	8.7	8.7	8.7	8.7	8.7
20.000	8.7	8.7	8.8	8.8	8.8
20.500	8.8	8.8	8.8	8.8	8.8
21.000	8.9	8.9	8.9	8.9	8.9
21.500	8.9	8.9	8.9	8.9	8.9
22.000	9.0	9.0	9.0	9.0	9.0
22.500	9.0	9.0	9.0	9.0	9.0
23.000	9.0	9.1	9.1	9.1	9.1
23.500	9.1	9.1	9.1	9.1	9.1
24.000	9.1	(N/A)	(N/A)	(N/A)	(N/A)

Watershed

Subsection: Time of Concentration Calculations
Label: EDA-1
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Return Event: 100 years
Storm Event: 100 Year

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	60.00 ft
Manning's n	0.400
Slope	0.067 ft/ft
2 Year 24 Hour Depth	3.4 in
Average Velocity	0.12 ft/s
Segment Time of Concentration	0.142 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	200.00 ft
Is Paved?	False
Slope	0.035 ft/ft
Average Velocity	3.02 ft/s
Segment Time of Concentration	0.018 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.161 hours

Watershed

Subsection: Time of Concentration Calculations | Return Event: 100 years
Label: EDA-1 | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

==== SCS Channel Flow

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

Watershed

Subsection: Runoff CN-Area — Return Event: 100 years
Label: EDA-1 — Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Runoff Curve Number Data

Soil/Surface Description	CN	Area (ft²)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	31,144.000	0.0	0.0	74.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil C	98.000	5,160.000	0.0	0.0	98.000
Woods - good - Soil C	70.000	53,516.000	0.0	0.0	70.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	89,820.000	(N/A)	(N/A)	72.996

Watershed

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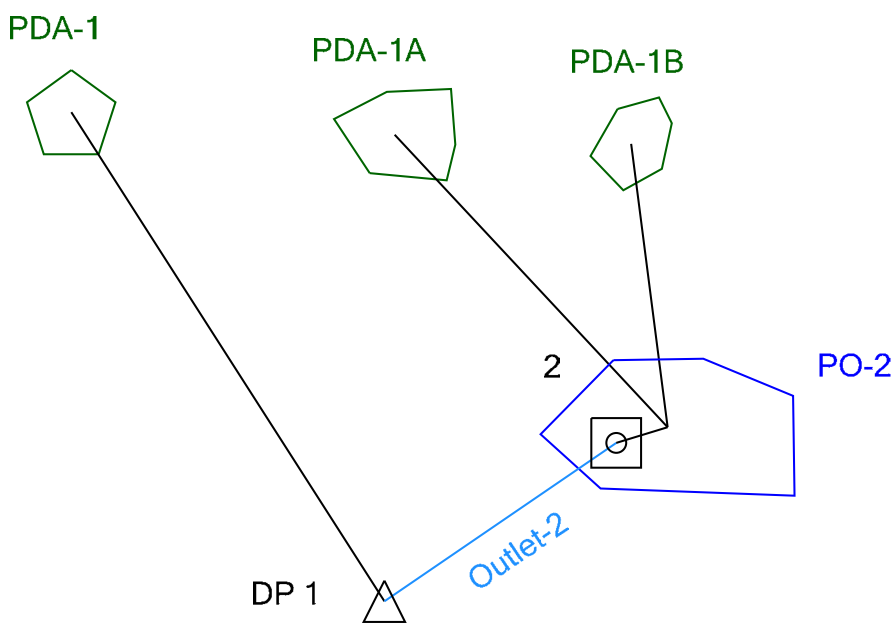
APPENDIX B

PROPOSED HYDROLOGIC CALCULATIONS

Scenario: 4 Tripp Street - Synthetic Curve, 1 yrs



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Watershed

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)
PDA-1	4 Tripp Street - Synthetic Curve, 100 yrs	100	27,720.000	12.150	7.14
PDA-1A	4 Tripp Street - Synthetic Curve, 100 yrs	100	3,728.000	12.100	0.96
PDA-1B	4 Tripp Street - Synthetic Curve, 100 yrs	100	16,176.000	12.100	4.09

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)
DP 1	4 Tripp Street - Synthetic Curve, 100 yrs	100	32,845.000	12.150	11.19

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft³)
PO-2 (IN)	4 Tripp Street - Synthetic Curve, 100 yrs	100	19,903.000	12.100	5.05	(N/A)	(N/A)
PO-2 (OUT)	4 Tripp Street - Synthetic Curve, 100 yrs	100	5,125.000	12.100	4.06	583.75	2,690.000

Watershed

Subsection: Time-Depth Curve
Label: Armonk
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Return Event: 100 years
Storm Event: 100 Year

Time-Depth Curve: 100 Year	
Label	100 Year
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	100 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.1	0.1	0.1	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.2	0.2	0.2
2.000	0.2	0.2	0.2	0.2	0.2
2.500	0.2	0.2	0.2	0.3	0.3
3.000	0.3	0.3	0.3	0.3	0.3
3.500	0.3	0.3	0.4	0.4	0.4
4.000	0.4	0.4	0.4	0.4	0.4
4.500	0.5	0.5	0.5	0.5	0.5
5.000	0.5	0.5	0.5	0.6	0.6
5.500	0.6	0.6	0.6	0.6	0.6
6.000	0.7	0.7	0.7	0.7	0.7
6.500	0.7	0.8	0.8	0.8	0.8
7.000	0.8	0.8	0.9	0.9	0.9
7.500	0.9	0.9	1.0	1.0	1.0
8.000	1.0	1.1	1.1	1.1	1.1
8.500	1.2	1.2	1.2	1.3	1.3
9.000	1.3	1.4	1.4	1.4	1.5
9.500	1.5	1.6	1.6	1.6	1.7
10.000	1.7	1.8	1.8	1.9	1.9
10.500	2.0	2.0	2.1	2.2	2.2
11.000	2.3	2.4	2.4	2.5	2.6
11.500	2.7	2.9	3.1	3.4	3.8
12.000	4.6	5.3	5.7	6.0	6.3
12.500	6.4	6.5	6.6	6.7	6.8
13.000	6.8	6.9	7.0	7.0	7.1
13.500	7.2	7.2	7.3	7.3	7.4
14.000	7.4	7.4	7.5	7.5	7.6
14.500	7.6	7.7	7.7	7.7	7.8
15.000	7.8	7.8	7.9	7.9	7.9
15.500	8.0	8.0	8.0	8.0	8.1
16.000	8.1	8.1	8.1	8.2	8.2
16.500	8.2	8.2	8.2	8.3	8.3

Watershed

Subsection: Time-Depth Curve | Return Event: 100 years
Label: Armonk | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.000	8.3	8.3	8.3	8.4	8.4
17.500	8.4	8.4	8.4	8.4	8.5
18.000	8.5	8.5	8.5	8.5	8.5
18.500	8.5	8.6	8.6	8.6	8.6
19.000	8.6	8.6	8.6	8.7	8.7
19.500	8.7	8.7	8.7	8.7	8.7
20.000	8.7	8.7	8.8	8.8	8.8
20.500	8.8	8.8	8.8	8.8	8.8
21.000	8.9	8.9	8.9	8.9	8.9
21.500	8.9	8.9	8.9	8.9	8.9
22.000	9.0	9.0	9.0	9.0	9.0
22.500	9.0	9.0	9.0	9.0	9.0
23.000	9.0	9.1	9.1	9.1	9.1
23.500	9.1	9.1	9.1	9.1	9.1
24.000	9.1	(N/A)	(N/A)	(N/A)	(N/A)

Watershed

Subsection: Time of Concentration Calculations — Return Event: 100 years
Label: PDA-1 — Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	100.00 ft
Manning's n	0.240
Slope	0.050 ft/ft
2 Year 24 Hour Depth	3.4 in
Average Velocity	0.17 ft/s
Segment Time of Concentration	0.160 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	82.00 ft
Is Paved?	False
Slope	0.110 ft/ft
Average Velocity	5.35 ft/s
Segment Time of Concentration	0.004 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.164 hours

Watershed

Subsection: Time of Concentration Calculations | Return Event: 100 years
Label: PDA-1 | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

==== SCS Channel Flow

Tc =
R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:
R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =
Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:
V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

Watershed

Subsection: Time of Concentration Calculations	Return Event: 100 years
Label: PDA-1A	Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs	

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	73.00 ft
Manning's n	0.240
Slope	0.063 ft/ft
2 Year 24 Hour Depth	3.4 in
Average Velocity	0.18 ft/s
Segment Time of Concentration	0.113 hours

Segment #2: TR-55 Channel Flow	
Flow Area	0.2 ft²
Hydraulic Length	80.00 ft
Manning's n	0.012
Slope	0.100 ft/ft
Wetted Perimeter	1.57 ft
Average Velocity	9.82 ft/s
Segment Time of Concentration	0.002 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.116 hours

Watershed

Subsection: Time of Concentration Calculations	Return Event: 100 years
Label: PDA-1A	Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs	

==== SCS Channel Flow

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== SCS TR-55 Sheet Flow

Tc =	(0.007 * ((n * Lf)**0.8)) / ((P**0.5) * (Sf**0.4))
Where:	Tc= Time of concentration, hours n= Manning's n Lf= Flow length, feet P= 2yr, 24hr Rain depth, inches Sf= Slope, %

Watershed

Subsection: Time of Concentration Calculations
Label: PDA-1B
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Return Event: 100 years
Storm Event: 100 Year

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	100.00 ft
Manning's n	0.240
Slope	0.070 ft/ft
2 Year 24 Hour Depth	3.4 in
Average Velocity	0.20 ft/s
Segment Time of Concentration	0.140 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	24.00 ft
Is Paved?	False
Slope	0.042 ft/ft
Average Velocity	3.31 ft/s
Segment Time of Concentration	0.002 hours

Segment #3: TR-55 Channel Flow	
Flow Area	0.2 ft²
Hydraulic Length	233.00 ft
Manning's n	0.012
Slope	0.030 ft/ft
Wetted Perimeter	0.79 ft
Average Velocity	8.53 ft/s
Segment Time of Concentration	0.008 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.149 hours

Watershed

Subsection: Time of Concentration Calculations — Return Event: 100 years
Label: PDA-1B — Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

==== SCS Channel Flow

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

==== SCS TR-55 Sheet Flow

Tc =	(0.007 * ((n * Lf)**0.8)) / ((P**0.5) * (Sf**0.4))
Where:	Tc= Time of concentration, hours n= Manning's n Lf= Flow length, feet P= 2yr, 24hr Rain depth, inches Sf= Slope, %

Watershed

Subsection: Runoff CN-Area | Return Event: 100 years
Label: PDA-1 | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Runoff Curve Number Data

Soil/Surface Description	CN	Area (ft²)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	50,068.000	0.0	0.0	74.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil C	98.000	821.000	0.0	0.0	98.000
Woods - good - Soil C	70.000	5,034.000	0.0	0.0	70.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	55,923.000	(N/A)	(N/A)	73.992

Watershed

Subsection: Runoff CN-Area
Label: PDA-1A
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Return Event: 100 years
Storm Event: 100 Year

Runoff Curve Number Data

Soil/Surface Description	CN	Area (ft²)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	2,725.000	0.0	0.0	74.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil C	98.000	3,197.000	0.0	0.0	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	5,922.000	(N/A)	(N/A)	86.956

Watershed

Subsection: Runoff CN-Area | Return Event: 100 years
Label: PDA-1B | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Runoff Curve Number Data

Soil/Surface Description	CN	Area (ft²)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	16,441.000	0.0	0.0	74.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil C	98.000	9,454.000	0.0	0.0	98.000
Woods - good - Soil C	70.000	2,080.000	0.0	0.0	70.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	27,975.000	(N/A)	(N/A)	81.813

Watershed

Subsection: Unit Hydrograph Equations

Unit Hydrograph Method (Computational Notes)
Definition of Terms

At	Total area (acres): At = Ai+Ap
Ai	Impervious area (acres)
Ap	Pervious area (acres)
CNi	Runoff curve number for impervious area
CNp	Runoff curve number for pervious area
fLoss	f loss constant infiltration (depth/time)
gKs	Saturated Hydraulic Conductivity (depth/time)
Md	Volumetric Moisture Deficit
Psi	Capillary Suction (length)
hK	Horton Infiltration Decay Rate (time^-1)
fo	Initial Infiltration Rate (depth/time)
fc	Ultimate(capacity)Infiltration Rate (depth/time)
Ia	Initial Abstraction (length)
dt	Computational increment (duration of unit excess rainfall) Default dt is smallest value of 0.1333Tc, rtm, and th (Smallest dt is then adjusted to match up with Tp)
UDdt	User specified override computational main time increment (only used if UDdt is => .1333Tc)
D(t)	Point on distribution curve (fraction of P) for time step t
K	2 / (1 + (Tr/Tp)): default K = 0.75: (for Tr/Tp = 1.67)
Ks	Hydrograph shape factor = Unit Conversions * K: = ((1hr/3600sec) * (1ft/12in) * ((5280ft)**2/sq.mi)) * K Default Ks = 645.333 * 0.75 = 484
Lag	Lag time from center of excess runoff (dt) to Tp: Lag = 0.6Tc
P	Total precipitation depth, inches
Pa(t)	Accumulated rainfall at time step t
Pi(t)	Incremental rainfall at time step t
qp	Peak discharge (cfs) for 1in. runoff, for 1hr, for 1 sq.mi. = (Ks * A * Q) / Tp (where Q = 1in. runoff, A=sq.mi.)
Qu(t)	Unit hydrograph ordinate (cfs) at time step t
Q(t)	Final hydrograph ordinate (cfs) at time step t
Rai(t)	Accumulated runoff (inches) at time step t for impervious area
Rap(t)	Accumulated runoff (inches) at time step t for pervious area
Rii(t)	Incremental runoff (inches) at time step t for impervious area
Rip(t)	Incremental runoff (inches) at time step t for pervious area
R(t)	Incremental weighted total runoff (inches)
Rtm	Time increment for rainfall table
Si	S for impervious area: Si = (1000/CNi) - 10
Sp	S for pervious area: Sp = (1000/CNp) - 10
t	Time step (row) number
Tc	Time of concentration
Tb	Time (hrs) of entire unit hydrograph: Tb = Tp + Tr
Tp	Time (hrs) to peak of a unit hydrograph: Tp = (dt/2) + Lag
Tr	Time (hrs) of receding limb of unit hydrograph: Tr = ratio of Tp

Watershed

Subsection: Unit Hydrograph Equations

Unit Hydrograph Method
Computational Notes
Precipitation

Column (1)	Time for time step t
Column (2)	D(t) = Point on distribution curve for time step t
Column (3)	Pi(t) = Pa(t) - Pa(t-1): Col.(4) - Preceding Col.(4)
Column (4)	Pa(t) = D(t) x P: Col.(2) x P

Pervious Area Runoff (using SCS Runoff CN Method)

Column (5)	Rap(t) = Accumulated pervious runoff for time step t
	If (Pa(t) is <= 0.2Sp) then use: Rap(t) = 0.0
	If (Pa(t) is > 0.2Sp) then use:
	
	Rap(t) = (Col.(4)-0.2Sp)**2 / (Col.(4)+0.8Sp)

Column (6)	Rip(t) = Incremental pervious runoff for time step t Rip(t) = Rap(t) - Rap(t-1) Rip(t) = Col.(5) for current row - Col.(5) for preceding row.

Impervious Area Runoff

Column (7 & 8)...	Did not specify to use impervious areas.

Incremental Weighted Runoff

Column (9)	R(t) = (Ap/At) x Rip(t) + (Ai/At) x Rii(t) R(t) = (Ap/At) x Col.(6) + (Ai/At) x Col.(8)

SCS Unit Hydrograph Method

Column (10)	Q(t) is computed with the SCS unit hydrograph method using R(t) and Qu(t).

Watershed

Subsection: Unit Hydrograph Summary — Return Event: 100 years
Label: PDA-1 — Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Storm Event	100 Year
Return Event	100 years
Duration	35.000 hours
Depth	9.1 in
Time of Concentration (Composite)	0.164 hours
Area (User Defined)	55,923.000 ft²

Computational Time Increment	0.022 hours
Time to Peak (Computed)	12.128 hours
Flow (Peak, Computed)	7.19 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	7.14 ft³/s

Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	55,923.000 ft²
Maximum Retention (Pervious)	3.5 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.9 in
Runoff Volume (Pervious)	27,717.370 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	27,720.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.164 hours
Computational Time Increment	0.022 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Watershed

Subsection: Unit Hydrograph Summary　　Return Event: 100 years
Label: PDA-1　　Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

SCS Unit Hydrograph Parameters	
Unit peak, qp	8.86 ft^3/s
Unit peak time, Tp	0.109 hours
Unit receding limb, Tr	0.438 hours
Total unit time, Tb	0.547 hours

Watershed

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: PDA-1A | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Storm Event	100 Year
Return Event	100 years
Duration	35.000 hours
Depth	9.1 in
Time of Concentration (Composite)	0.116 hours
Area (User Defined)	5,922.000 ft²

Computational Time Increment	0.015 hours
Time to Peak (Computed)	12.102 hours
Flow (Peak, Computed)	0.96 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	0.96 ft³/s

Drainage Area	
SCS CN (Composite)	87.000
Area (User Defined)	5,922.000 ft²
Maximum Retention (Pervious)	1.5 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	7.6 in
Runoff Volume (Pervious)	3,727.474 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	3,728.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.116 hours
Computational Time Increment	0.015 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Watershed

Subsection: Unit Hydrograph Summary — Return Event: 100 years
Label: PDA-1A — Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

SCS Unit Hydrograph Parameters	
Unit peak, qp	1.33 ft^3/s
Unit peak time, Tp	0.077 hours
Unit receding limb, Tr	0.308 hours
Total unit time, Tb	0.385 hours

Watershed

Subsection: Unit Hydrograph Summary — Return Event: 100 years
Label: PDA-1B — Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Storm Event	100 Year
Return Event	100 years
Duration	35.000 hours
Depth	9.1 in
Time of Concentration (Composite)	0.149 hours
Area (User Defined)	27,975.000 ft²

Computational Time Increment	0.020 hours
Time to Peak (Computed)	12.131 hours
Flow (Peak, Computed)	4.15 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	4.09 ft³/s

Drainage Area	
SCS CN (Composite)	82.000
Area (User Defined)	27,975.000 ft²
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.9 in
Runoff Volume (Pervious)	16,175.351 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	16,176.000 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.149 hours
Computational Time Increment	0.020 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Watershed

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: PDA-1B | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

SCS Unit Hydrograph Parameters	
Unit peak, qp	4.87 ft^3/s
Unit peak time, Tp	0.100 hours
Unit receding limb, Tr	0.398 hours
Total unit time, Tb	0.498 hours

Watershed

Subsection: Addition Summary | Return Event: 100 years
Label: DP 1 | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Summary for Hydrograph Addition at 'DP 1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	PDA-1
Outlet-2	PO-2

Node Inflows

Inflow Type	Element	Volume (ft^3)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	PDA-1	27,719.877	12.150	7.14
Flow (From)	Outlet-2	5,124.727	12.100	4.06
Flow (In)	DP 1	32,844.604	12.150	11.19

Watershed

Subsection: Time vs. Elevation | Return Event: 100 years
Label: PO-2 (IN) | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	579.25	579.25	579.25	579.25	579.25
0.250	579.25	579.25	579.25	579.25	579.25
0.500	579.25	579.25	579.25	579.25	579.25
0.750	579.25	579.25	579.25	579.25	579.25
1.000	579.25	579.25	579.25	579.25	579.25
1.250	579.25	579.25	579.25	579.25	579.25
1.500	579.25	579.25	579.25	579.25	579.25
1.750	579.25	579.25	579.25	579.25	579.25
2.000	579.25	579.25	579.25	579.25	579.25
2.250	579.25	579.25	579.25	579.25	579.25
2.500	579.25	579.25	579.25	579.25	579.25
2.750	579.25	579.25	579.25	579.25	579.25
3.000	579.25	579.25	579.25	579.25	579.25
3.250	579.25	579.25	579.25	579.25	579.25
3.500	579.25	579.25	579.25	579.25	579.25
3.750	579.25	579.25	579.25	579.25	579.25
4.000	579.25	579.25	579.25	579.25	579.25
4.250	579.25	579.25	579.25	579.25	579.25
4.500	579.25	579.25	579.25	579.25	579.25
4.750	579.25	579.25	579.25	579.25	579.26
5.000	579.26	579.26	579.26	579.26	579.26
5.250	579.26	579.26	579.26	579.26	579.26
5.500	579.26	579.26	579.26	579.26	579.26
5.750	579.26	579.26	579.26	579.26	579.26
6.000	579.26	579.27	579.27	579.27	579.27
6.250	579.27	579.27	579.27	579.27	579.27
6.500	579.27	579.27	579.27	579.27	579.27
6.750	579.28	579.28	579.28	579.28	579.28
7.000	579.28	579.28	579.28	579.28	579.28
7.250	579.28	579.29	579.29	579.29	579.29
7.500	579.29	579.29	579.29	579.29	579.29
7.750	579.29	579.30	579.30	579.30	579.30
8.000	579.30	579.30	579.30	579.30	579.31
8.250	579.31	579.31	579.31	579.31	579.32
8.500	579.32	579.32	579.32	579.32	579.33
8.750	579.33	579.33	579.33	579.34	579.34
9.000	579.34	579.34	579.35	579.35	579.35
9.250	579.35	579.36	579.36	579.36	579.36
9.500	579.37	579.37	579.37	579.37	579.38
9.750	579.38	579.38	579.39	579.39	579.39

Watershed

Subsection: Time vs. Elevation — Return Event: 100 years
Label: PO-2 (IN) — Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
10.000	579.39	579.40	579.40	579.40	579.41
10.250	579.41	579.42	579.42	579.43	579.43
10.500	579.44	579.44	579.45	579.46	579.46
10.750	579.47	579.47	579.48	579.48	579.49
11.000	579.50	579.50	579.51	579.52	579.53
11.250	579.55	579.56	579.58	579.60	579.62
11.500	579.64	579.66	579.71	579.78	579.91
11.750	580.15	580.37	580.60	580.89	581.29
12.000	581.91	583.08	583.75	583.75	583.75
12.250	583.75	583.75	583.73	583.37	583.41
12.500	583.35	583.32	583.29	583.27	583.26
12.750	583.26	583.25	583.24	583.21	583.17
13.000	583.12	583.06	582.99	582.90	582.81
13.250	582.73	582.65	582.56	582.48	582.39
13.500	582.30	582.22	582.14	582.07	581.99
13.750	581.91	581.83	581.74	581.67	581.59
14.000	581.50	581.42	581.34	581.25	581.17
14.250	581.09	581.00	580.92	580.83	580.75
14.500	580.66	580.58	580.50	580.41	580.32
14.750	580.22	580.05	579.87	579.71	579.59
15.000	579.52	579.48	579.46	579.45	579.44
15.250	579.43	579.43	579.43	579.42	579.42
15.500	579.42	579.41	579.41	579.41	579.40
15.750	579.40	579.40	579.40	579.39	579.39
16.000	579.39	579.39	579.38	579.38	579.38
16.250	579.38	579.38	579.37	579.37	579.37
16.500	579.37	579.37	579.37	579.37	579.36
16.750	579.36	579.36	579.36	579.36	579.36
17.000	579.36	579.36	579.36	579.35	579.35
17.250	579.35	579.35	579.35	579.35	579.35
17.500	579.35	579.34	579.34	579.34	579.34
17.750	579.34	579.34	579.34	579.34	579.33
18.000	579.33	579.33	579.33	579.33	579.33
18.250	579.33	579.33	579.33	579.33	579.33
18.500	579.33	579.33	579.33	579.33	579.32
18.750	579.32	579.32	579.32	579.32	579.32
19.000	579.32	579.32	579.32	579.32	579.32
19.250	579.32	579.32	579.32	579.32	579.32
19.500	579.32	579.32	579.32	579.32	579.32
19.750	579.32	579.32	579.32	579.32	579.32
20.000	579.32	579.31	579.31	579.31	579.31

Watershed

Subsection: Time vs. Elevation | Return Event: 100 years
Label: PO-2 (IN) | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
20.250	579.31	579.31	579.31	579.31	579.31
20.500	579.31	579.31	579.31	579.31	579.31
20.750	579.31	579.31	579.31	579.31	579.31
21.000	579.31	579.31	579.31	579.31	579.31
21.250	579.31	579.31	579.31	579.31	579.31
21.500	579.31	579.31	579.31	579.31	579.31
21.750	579.31	579.31	579.30	579.30	579.30
22.000	579.30	579.30	579.30	579.30	579.30
22.250	579.30	579.30	579.30	579.30	579.30
22.500	579.30	579.30	579.30	579.30	579.30
22.750	579.30	579.30	579.30	579.30	579.30
23.000	579.30	579.30	579.30	579.30	579.30
23.250	579.30	579.30	579.30	579.30	579.30
23.500	579.30	579.30	579.30	579.29	579.29
23.750	579.29	579.29	579.29	579.29	579.29
24.000	579.29	579.29	579.29	579.28	579.27
24.250	579.26	579.26	579.25	579.25	579.25
24.500	579.25	579.25	579.25	579.25	579.25
24.750	579.25	579.25	579.25	579.25	579.25
25.000	579.25	579.25	579.25	579.25	579.25
25.250	579.25	579.25	579.25	579.25	579.25
25.500	579.25	579.25	579.25	579.25	579.25
25.750	579.25	579.25	579.25	579.25	579.25
26.000	579.25	579.25	579.25	579.25	579.25
26.250	579.25	579.25	579.25	579.25	579.25
26.500	579.25	579.25	579.25	579.25	579.25
26.750	579.25	579.25	579.25	579.25	579.25
27.000	579.25	579.25	579.25	579.25	579.25
27.250	579.25	579.25	579.25	579.25	579.25
27.500	579.25	579.25	579.25	579.25	579.25
27.750	579.25	579.25	579.25	579.25	579.25
28.000	579.25	579.25	579.25	579.25	579.25
28.250	579.25	579.25	579.25	579.25	579.25
28.500	579.25	579.25	579.25	579.25	579.25
28.750	579.25	579.25	579.25	579.25	579.25
29.000	579.25	579.25	579.25	579.25	579.25
29.250	579.25	579.25	579.25	579.25	579.25
29.500	579.25	579.25	579.25	579.25	579.25
29.750	579.25	579.25	579.25	579.25	579.25
30.000	579.25	579.25	579.25	579.25	579.25
30.250	579.25	579.25	579.25	579.25	579.25

Watershed

Subsection: Time vs. Elevation | Return Event: 100 years
Label: PO-2 (IN) | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
30.500	579.25	579.25	579.25	579.25	579.25
30.750	579.25	579.25	579.25	579.25	579.25
31.000	579.25	579.25	579.25	579.25	579.25
31.250	579.25	579.25	579.25	579.25	579.25
31.500	579.25	579.25	579.25	579.25	579.25
31.750	579.25	579.25	579.25	579.25	579.25
32.000	579.25	579.25	579.25	579.25	579.25
32.250	579.25	579.25	579.25	579.25	579.25
32.500	579.25	579.25	579.25	579.25	579.25
32.750	579.25	579.25	579.25	579.25	579.25
33.000	579.25	579.25	579.25	579.25	579.25
33.250	579.25	579.25	579.25	579.25	579.25
33.500	579.25	579.25	579.25	579.25	579.25
33.750	579.25	579.25	579.25	579.25	579.25
34.000	579.25	579.25	579.25	579.25	579.25
34.250	579.25	579.25	579.25	579.25	579.25
34.500	579.25	579.25	579.25	579.25	579.25
34.750	579.25	579.25	579.25	579.25	579.25
35.000	579.25	(N/A)	(N/A)	(N/A)	(N/A)

Watershed

Subsection: Time vs. Volume | Return Event: 100 years
Label: PO-2 | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Time vs. Volume (ft³)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
0.000	0.000	0.000	0.000	0.000	0.000
0.250	0.000	0.000	0.000	0.000	0.000
0.500	0.000	0.000	0.000	0.000	0.000
0.750	0.000	0.000	0.000	0.000	0.000
1.000	0.000	0.000	0.000	0.000	0.000
1.250	0.000	0.000	0.000	0.000	0.000
1.500	0.000	0.000	0.000	0.000	0.000
1.750	0.000	0.000	0.000	0.000	0.000
2.000	0.000	0.000	0.000	0.000	0.000
2.250	0.000	0.000	0.000	0.000	0.000
2.500	0.000	0.000	0.000	0.000	0.000
2.750	0.000	0.000	0.000	0.000	0.000
3.000	0.000	0.000	0.000	0.000	0.000
3.250	0.000	0.000	0.000	0.000	0.000
3.500	0.000	0.000	0.000	0.000	0.000
3.750	0.000	0.000	0.000	0.000	0.000
4.000	0.000	0.000	1.000	1.000	1.000
4.250	1.000	1.000	1.000	1.000	1.000
4.500	1.000	1.000	1.000	1.000	1.000
4.750	1.000	2.000	2.000	2.000	2.000
5.000	2.000	3.000	3.000	3.000	3.000
5.250	3.000	4.000	4.000	4.000	4.000
5.500	4.000	5.000	5.000	5.000	5.000
5.750	5.000	6.000	6.000	6.000	6.000
6.000	6.000	7.000	7.000	7.000	7.000
6.250	8.000	8.000	8.000	8.000	9.000
6.500	9.000	9.000	10.000	10.000	10.000
6.750	11.000	11.000	12.000	12.000	12.000
7.000	13.000	13.000	14.000	14.000	14.000
7.250	15.000	15.000	16.000	16.000	16.000
7.500	17.000	17.000	18.000	18.000	19.000
7.750	19.000	20.000	20.000	21.000	21.000
8.000	22.000	22.000	23.000	23.000	24.000
8.250	25.000	26.000	26.000	27.000	28.000
8.500	29.000	30.000	31.000	32.000	33.000
8.750	34.000	35.000	36.000	37.000	38.000
9.000	39.000	40.000	41.000	42.000	43.000
9.250	44.000	46.000	47.000	48.000	49.000
9.500	50.000	51.000	53.000	54.000	55.000
9.750	56.000	58.000	59.000	60.000	61.000

Watershed

Subsection: Time vs. Volume | Return Event: 100 years
Label: PO-2 | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Time vs. Volume (ft³)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
10.000	63.000	64.000	65.000	67.000	69.000
10.250	71.000	73.000	75.000	77.000	79.000
10.500	82.000	84.000	86.000	89.000	91.000
10.750	94.000	96.000	99.000	101.000	104.000
11.000	106.000	109.000	112.000	117.000	122.000
11.250	128.000	135.000	143.000	151.000	160.000
11.500	168.000	179.000	197.000	228.000	287.000
11.750	388.000	535.000	730.000	977.000	1,300.000
12.000	1,764.000	2,398.000	2,690.000	2,690.000	2,690.000
12.250	2,690.000	2,690.000	2,679.000	2,524.000	2,542.000
12.500	2,517.000	2,505.000	2,493.000	2,484.000	2,479.000
12.750	2,476.000	2,474.000	2,469.000	2,458.000	2,441.000
13.000	2,419.000	2,391.000	2,359.000	2,324.000	2,285.000
13.250	2,245.000	2,203.000	2,160.000	2,115.000	2,068.000
13.500	2,021.000	1,971.000	1,921.000	1,869.000	1,815.000
13.750	1,760.000	1,704.000	1,646.000	1,587.000	1,526.000
14.000	1,464.000	1,400.000	1,335.000	1,269.000	1,202.000
14.250	1,135.000	1,066.000	997.000	928.000	857.000
14.500	786.000	714.000	642.000	568.000	494.000
14.750	420.000	344.000	268.000	197.000	146.000
15.000	117.000	101.000	91.000	86.000	82.000
15.250	79.000	77.000	76.000	74.000	73.000
15.500	72.000	71.000	69.000	68.000	67.000
15.750	66.000	64.000	63.000	62.000	61.000
16.000	60.000	58.000	57.000	56.000	55.000
16.250	55.000	54.000	53.000	53.000	52.000
16.500	52.000	51.000	51.000	50.000	50.000
16.750	49.000	49.000	48.000	48.000	47.000
17.000	46.000	46.000	45.000	45.000	44.000
17.250	44.000	43.000	43.000	42.000	42.000
17.500	41.000	41.000	40.000	40.000	39.000
17.750	39.000	38.000	38.000	37.000	37.000
18.000	36.000	35.000	35.000	35.000	34.000
18.250	34.000	34.000	33.000	33.000	33.000
18.500	33.000	33.000	33.000	32.000	32.000
18.750	32.000	32.000	32.000	32.000	32.000
19.000	31.000	31.000	31.000	31.000	31.000
19.250	31.000	30.000	30.000	30.000	30.000
19.500	30.000	30.000	29.000	29.000	29.000
19.750	29.000	29.000	29.000	29.000	28.000
20.000	28.000	28.000	28.000	28.000	28.000

Watershed

Subsection: Time vs. Volume | Return Event: 100 years
Label: PO-2 | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Time vs. Volume (ft³)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
20.250	28.000	27.000	27.000	27.000	27.000
20.500	27.000	27.000	27.000	27.000	26.000
20.750	26.000	26.000	26.000	26.000	26.000
21.000	26.000	26.000	25.000	25.000	25.000
21.250	25.000	25.000	25.000	25.000	25.000
21.500	25.000	24.000	24.000	24.000	24.000
21.750	24.000	24.000	24.000	24.000	23.000
22.000	23.000	23.000	23.000	23.000	23.000
22.250	23.000	23.000	22.000	22.000	22.000
22.500	22.000	22.000	22.000	22.000	22.000
22.750	22.000	21.000	21.000	21.000	21.000
23.000	21.000	21.000	21.000	21.000	20.000
23.250	20.000	20.000	20.000	20.000	20.000
23.500	20.000	20.000	20.000	19.000	19.000
23.750	19.000	19.000	19.000	19.000	19.000
24.000	19.000	18.000	16.000	12.000	8.000
24.250	5.000	3.000	2.000	1.000	1.000
24.500	0.000	0.000	0.000	0.000	0.000
24.750	0.000	0.000	0.000	0.000	0.000
25.000	0.000	0.000	0.000	0.000	0.000
25.250	0.000	0.000	0.000	0.000	0.000
25.500	0.000	0.000	0.000	0.000	0.000
25.750	0.000	0.000	0.000	0.000	0.000
26.000	0.000	0.000	0.000	0.000	0.000
26.250	0.000	0.000	0.000	0.000	0.000
26.500	0.000	0.000	0.000	0.000	0.000
26.750	0.000	0.000	0.000	0.000	0.000
27.000	0.000	0.000	0.000	0.000	0.000
27.250	0.000	0.000	0.000	0.000	0.000
27.500	0.000	0.000	0.000	0.000	0.000
27.750	0.000	0.000	0.000	0.000	0.000
28.000	0.000	0.000	0.000	0.000	0.000
28.250	0.000	0.000	0.000	0.000	0.000
28.500	0.000	0.000	0.000	0.000	0.000
28.750	0.000	0.000	0.000	0.000	0.000
29.000	0.000	0.000	0.000	0.000	0.000
29.250	0.000	0.000	0.000	0.000	0.000
29.500	0.000	0.000	0.000	0.000	0.000
29.750	0.000	0.000	0.000	0.000	0.000
30.000	0.000	0.000	0.000	0.000	0.000
30.250	0.000	0.000	0.000	0.000	0.000

Watershed

Subsection: Time vs. Volume — Return Event: 100 years
Label: PO-2 — Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Time vs. Volume (ft³)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
30.500	0.000	0.000	0.000	0.000	0.000
30.750	0.000	0.000	0.000	0.000	0.000
31.000	0.000	0.000	0.000	0.000	0.000
31.250	0.000	0.000	0.000	0.000	0.000
31.500	0.000	0.000	0.000	0.000	0.000
31.750	0.000	0.000	0.000	0.000	0.000
32.000	0.000	0.000	0.000	0.000	0.000
32.250	0.000	0.000	0.000	0.000	0.000
32.500	0.000	0.000	0.000	0.000	0.000
32.750	0.000	0.000	0.000	0.000	0.000
33.000	0.000	0.000	0.000	0.000	0.000
33.250	0.000	0.000	0.000	0.000	0.000
33.500	0.000	0.000	0.000	0.000	0.000
33.750	0.000	0.000	0.000	0.000	0.000
34.000	0.000	0.000	0.000	0.000	0.000
34.250	0.000	0.000	0.000	0.000	0.000
34.500	0.000	0.000	0.000	0.000	0.000
34.750	0.000	0.000	0.000	0.000	0.000
35.000	0.000	(N/A)	(N/A)	(N/A)	(N/A)

Storage Chamber

ID	130	Notes	Created on 02/10/2010. Please check with the manufacturer for the latest data.
Label	SC-740 Chamber		

Storage Chamber

Effective Length	7.12 ft	Manufacturer	StormTech
Section Length Varies?	False	Default Spacing	0.50 ft

Depth-Incremental Volume Per Unit Length Curve

Depth (ft)	Incremental Volume Per Unit Length (ft^3/ft)
0.08	0.31
0.17	0.31
0.25	0.31
0.33	0.30
0.42	0.30
0.50	0.30
0.58	0.29
0.67	0.29
0.75	0.28
0.83	0.28
0.92	0.27
1.00	0.27
1.08	0.26
1.17	0.25
1.25	0.25
1.33	0.24
1.42	0.23
1.50	0.22
1.58	0.21
1.67	0.20
1.75	0.19
1.83	0.18
1.92	0.17
2.00	0.15
2.08	0.13
2.17	0.11
2.25	0.09

Watershed

Subsection: Storage Chamber System | Return Event: 100 years
Label: PO-2 | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Depth-Incremental Volume Per Unit Length Curve

Depth (ft)	Incremental Volume Per Unit Length (ft^3/ft)
2.33	0.04
2.42	0.02
2.50	0.01

Storage Chamber

Storage Chamber Type	Incremental Volume Per Unit Length	Maximum Width	4.25 ft

Storage Chamber (Pond)

Chamber System Invert	579.25 ft
Chamber System Rows	9
Chambers per Row	3
Chamber System Fill Void Space	40.0 %
Chamber System Row Spacing	9.0 in
Chamber System Side Fill	12.0 in
Chamber System Fill Cover Depth	12.0 in
Chamber System Fill Base Depth	12.0 in
Chamber System Fill Side Slope	0.000 H:V
Chamber System End Fill	12.0 in
Chamber System Includes Header?	False

Subsection: Composite Rating Curve | Return Event: 100 years
Label: Nyloplast | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
579.25	0.00	(N/A)	0.00
579.75	0.00	(N/A)	0.00
580.25	0.00	(N/A)	0.00
580.75	0.00	(N/A)	0.00

Watershed

Subsection: Composite Rating Curve | Return Event: 100 years
Label: Nyloplast | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
581.25	0.00	(N/A)	0.00
581.75	0.00	(N/A)	0.00
582.25	0.00	(N/A)	0.00
582.75	0.00	(N/A)	0.00
583.25	0.00	(N/A)	0.00
583.75	4.06	(N/A)	0.00

Contributing Structures
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
Weir - 1
Weir - 1

Watershed

Subsection: Diverted Hydrograph | Return Event: 100 years
Label: Outlet-2 | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Peak Discharge	4.06 ft^3/s
Time to Peak	12.200 hours
Hydrograph Volume	5,124.727 ft^3

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
12.050	0.00	4.06	4.06	4.06	4.06
12.300	4.06	3.86	0.94	1.29	0.82
12.550	0.59	0.36	0.20	0.10	0.04
12.800	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Watershed

Subsection: Elevation-Volume-Flow Table (Pond)
Label: PO-2
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Return Event: 100 years
Storm Event: 100 Year

Infiltration	
Infiltration Method (Computed)	Average Infiltration Rate
Infiltration Rate (Average)	28.0000 in/h

Initial Conditions	
Elevation (Water Surface, Initial)	579.25 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
579.25	0.00	0.000	1,080.400	0.00	0.00	0.00
579.75	0.00	216.080	1,080.400	0.70	0.70	3.10
580.25	0.00	432.160	1,080.400	0.70	0.70	5.50
580.75	0.00	858.627	1,080.400	0.70	0.70	10.24
581.25	0.00	1,268.139	1,080.400	0.70	0.70	14.79
581.75	0.00	1,651.699	1,080.400	0.70	0.70	19.05
582.25	0.00	1,995.003	1,080.400	0.70	0.70	22.87
582.75	0.00	2,257.567	1,080.400	0.70	0.70	25.78
583.25	0.00	2,473.647	1,080.400	0.70	0.70	28.19
583.75	4.06	2,689.727	1,080.400	0.70	4.76	34.64

Watershed

Subsection: Pond Infiltration Calculations | Return Event: 100 years

Label: PO-2 (IN) | Storm Event: 100 Year

Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Average Infiltration Rating Table

Elevation (Water Surface) (ft)	Area (Total) (ft^2)	Flow (Infiltration) (ft^3/s)
579.25	1,080.4	0.00
579.75	1,080.4	0.70
580.25	1,080.4	0.70
580.75	1,080.4	0.70
581.25	1,080.4	0.70
581.75	1,080.4	0.70
582.25	1,080.4	0.70
582.75	1,080.4	0.70
583.25	1,080.4	0.70
583.75	1,080.4	0.70

Watershed

Subsection: Level Pool Pond Routing Summary — Return Event: 100 years

Label: PO-2 (IN) — Storm Event: 100 Year

Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Infiltration	
Infiltration Method (Computed)	Average Infiltration Rate
Infiltration Rate (Average)	28.0000 in/h

Initial Conditions	
Elevation (Water Surface, Initial)	579.25 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	(N/A) ft³/s	Time to Peak (Flow, In)	(N/A) hours
Infiltration (Peak)	(N/A) ft³/s	Time to Peak (Infiltration)	(N/A) hours
Flow (Peak Outlet)	(N/A) ft³/s	Time to Peak (Flow, Outlet)	(N/A) hours

Elevation (Water Surface, Peak)	(N/A) ft
Volume (Peak)	(N/A) ft³

Mass Balance (ft³)	
Volume (Initial)	0.000 ft³
Volume (Total Inflow)	(N/A) ft³
Volume (Total Infiltration)	(N/A) ft³
Volume (Total Outlet Outflow)	(N/A) ft³
Volume (Retained)	(N/A) ft³
Volume (Unrouted)	(N/A) ft³
Error (Mass Balance)	(N/A) %

Watershed

Subsection: Pond Infiltration Hydrograph | Return Event: 100 years
Label: PO-2 (INF) | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Peak Discharge	0.70 ft³/s
Time to Peak	12.800 hours
Hydrograph Volume	15,550.706 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
3.800	0.00	0.00	0.00	0.00	0.00
4.050	0.00	0.00	0.00	0.00	0.00
4.300	0.00	0.00	0.00	0.00	0.00
4.550	0.00	0.00	0.00	0.00	0.00
4.800	0.01	0.01	0.01	0.01	0.01
5.050	0.01	0.01	0.01	0.01	0.01
5.300	0.01	0.01	0.01	0.01	0.01
5.550	0.01	0.02	0.02	0.02	0.02
5.800	0.02	0.02	0.02	0.02	0.02
6.050	0.02	0.02	0.02	0.02	0.02
6.300	0.03	0.03	0.03	0.03	0.03
6.550	0.03	0.03	0.03	0.03	0.04
6.800	0.04	0.04	0.04	0.04	0.04
7.050	0.04	0.04	0.05	0.05	0.05
7.300	0.05	0.05	0.05	0.05	0.05
7.550	0.06	0.06	0.06	0.06	0.06
7.800	0.06	0.07	0.07	0.07	0.07
8.050	0.07	0.07	0.08	0.08	0.08
8.300	0.08	0.09	0.09	0.09	0.09
8.550	0.10	0.10	0.10	0.11	0.11
8.800	0.11	0.12	0.12	0.12	0.13
9.050	0.13	0.13	0.14	0.14	0.14
9.300	0.15	0.15	0.16	0.16	0.16
9.550	0.17	0.17	0.17	0.18	0.18
9.800	0.19	0.19	0.19	0.20	0.20
10.050	0.21	0.21	0.22	0.22	0.23
10.300	0.24	0.24	0.25	0.26	0.26
10.550	0.27	0.28	0.29	0.30	0.30
10.800	0.31	0.32	0.33	0.34	0.34
11.050	0.35	0.36	0.38	0.39	0.42
11.300	0.44	0.46	0.49	0.52	0.55
11.550	0.58	0.64	0.70	0.70	0.70
11.800	0.70	0.70	0.70	0.70	0.70
12.050	0.70	0.70	0.70	0.70	0.70
12.300	0.70	0.70	0.70	0.70	0.70
12.550	0.70	0.70	0.70	0.70	0.70
12.800	0.70	0.70	0.70	0.70	0.70

Watershed

Subsection: Pond Infiltration Hydrograph — Return Event: 100 years
Label: PO-2 (INF) — Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
13.050	0.70	0.70	0.70	0.70	0.70
13.300	0.70	0.70	0.70	0.70	0.70
13.550	0.70	0.70	0.70	0.70	0.70
13.800	0.70	0.70	0.70	0.70	0.70
14.050	0.70	0.70	0.70	0.70	0.70
14.300	0.70	0.70	0.70	0.70	0.70
14.550	0.70	0.70	0.70	0.70	0.70
14.800	0.70	0.70	0.64	0.47	0.38
15.050	0.33	0.30	0.28	0.27	0.26
15.300	0.25	0.25	0.24	0.24	0.23
15.550	0.23	0.22	0.22	0.22	0.21
15.800	0.21	0.21	0.20	0.20	0.19
16.050	0.19	0.19	0.18	0.18	0.18
16.300	0.18	0.17	0.17	0.17	0.17
16.550	0.17	0.16	0.16	0.16	0.16
16.800	0.16	0.16	0.15	0.15	0.15
17.050	0.15	0.15	0.15	0.14	0.14
17.300	0.14	0.14	0.14	0.14	0.13
17.550	0.13	0.13	0.13	0.13	0.13
17.800	0.12	0.12	0.12	0.12	0.12
18.050	0.11	0.11	0.11	0.11	0.11
18.300	0.11	0.11	0.11	0.11	0.11
18.550	0.11	0.11	0.11	0.10	0.10
18.800	0.10	0.10	0.10	0.10	0.10
19.050	0.10	0.10	0.10	0.10	0.10
19.300	0.10	0.10	0.10	0.10	0.10
19.550	0.10	0.10	0.10	0.09	0.09
19.800	0.09	0.09	0.09	0.09	0.09
20.050	0.09	0.09	0.09	0.09	0.09
20.300	0.09	0.09	0.09	0.09	0.09
20.550	0.09	0.09	0.09	0.09	0.09
20.800	0.08	0.08	0.08	0.08	0.08
21.050	0.08	0.08	0.08	0.08	0.08
21.300	0.08	0.08	0.08	0.08	0.08
21.550	0.08	0.08	0.08	0.08	0.08
21.800	0.08	0.08	0.08	0.08	0.08
22.050	0.08	0.07	0.07	0.07	0.07
22.300	0.07	0.07	0.07	0.07	0.07
22.550	0.07	0.07	0.07	0.07	0.07
22.800	0.07	0.07	0.07	0.07	0.07
23.050	0.07	0.07	0.07	0.07	0.07
23.300	0.07	0.07	0.06	0.06	0.06

Watershed

Subsection: Pond Infiltration Hydrograph | Return Event: 100 years
Label: PO-2 (INF) | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
23.550	0.06	0.06	0.06	0.06	0.06
23.800	0.06	0.06	0.06	0.06	0.06
24.050	0.06	0.05	0.04	0.02	0.02
24.300	0.01	0.01	0.00	0.00	0.00

Watershed

Subsection: Pond Routed Hydrograph (total out)
Label: PO-2 (OUT)
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Return Event: 100 years
Storm Event: 100 Year

Peak Discharge	4.06 ft³/s
Time to Peak	12.200 hours
Hydrograph Volume	5,124.727 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
12.050	0.00	4.06	4.06	4.06	4.06
12.300	4.06	3.86	0.94	1.29	0.82
12.550	0.59	0.36	0.20	0.10	0.04
12.800	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Watershed

Subsection: Pond Inflow Summary | Return Event: 100 years
Label: PO-2 (IN) | Storm Event: 100 Year
Scenario: 4 Tripp Street - Synthetic Curve, 100 yrs

Summary for Hydrograph Addition at 'PO-2'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	PDA-1B
<Catchment to Outflow Node>	PDA-1A

Node Inflows

Inflow Type	Element	Volume (ft^3)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	PDA-1B	16,175.835	12.100	4.09
Flow (From)	PDA-1A	3,727.537	12.100	0.96
Flow (In)	PO-2	19,903.372	12.100	5.05

Watershed

Index

Watershed

APPENDIX C

DRAWINGS

LEGEND

- EXISTING PROPERTY LINE
- ADJACENT PROPERTY LINE
- EXISTING BUILDING OVERHANG
- EXISTING BUILDING LINE
- EXISTING PAVEMENT EDGE
- EXISTING CURB LINE
- EXISTING CONTOUR
- EXISTING INDEX CONTOUR
- EXISTING DRY LAID RETAINING WALL
- EXISTING RETAINING WALL
- EXISTING FENCE
- EXISTING TREE AND DESIGNATION
- EXISTING OVERHEAD WIRES
- EXISTING SLOT DRAIN INLET
- EXISTING DRAIN INLET
- EXISTING MANHOLE
- EXISTING UTILITY POLE
- EXISTING SIGN
- EXISTING TREE LINE
- DRAINAGE DIVIDE
- TIME OF CONCENTRATION
- PnB (C) SOIL DIVIDE AND DESIGNATION

NOTES:

1. EXISTING CONDITIONS DEPICTED ON THIS PLAN HAVE BEEN TAKEN FROM SURVEY TITLED, "TOPOGRAPHIC SURVEY," PREPARED BY SUMMIT LAND SURVEYING P.C., LAST REVISED 06/30/2020.

APPROVED BY TOWN OF NORTH CASTLE PLANNING BOARD:
RESOLUTION, DATED: ____________

______________________________ DATE: __________
CHRISTOPHER CARTHY, CHAIRMAN
TOWN OF NORTH CASTLE PLANNING BOARD

ENGINEERING PLANS REVIEWED FOR CONFORMANCE TO RESOLUTION:

______________________________ DATE: __________
JOSEPH M. CERMELE, P.E.
KELLARD SESSIONS CONSULTING
CONSULTING TOWN ENGINEERS

ANY ALTERATION OF PLANS, SPECIFICATIONS, PLATS AND REPORTS BEARING THE SEAL OF A LICENSED PROFESSIONAL ENGINEER OR LICENSED LAND SURVEYOR IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW, EXCEPT AS PROVIDED FOR BY SECTION 7209, SUBSECTION 2.

No.	Revision	Date	By
1.	REVISED PER TOWN ENGINEER'S COMMENTS	07/12/2022	RB
2.	PLANNING BOARD SUBMISSION	01/09/2023	RB
3.	PLANNING BOARD SUBMISSION	09/11/2023	RB
4.	PLANNING BOARD SUBMISSION	10/23/2023	RB
5.	PLANNING BOARD SUBMISSION	02/22/2024	RB
	Previous Editions Obsolete		

APPLICANT/OWNER:
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TOWN OF NORTH CASTLE, NY

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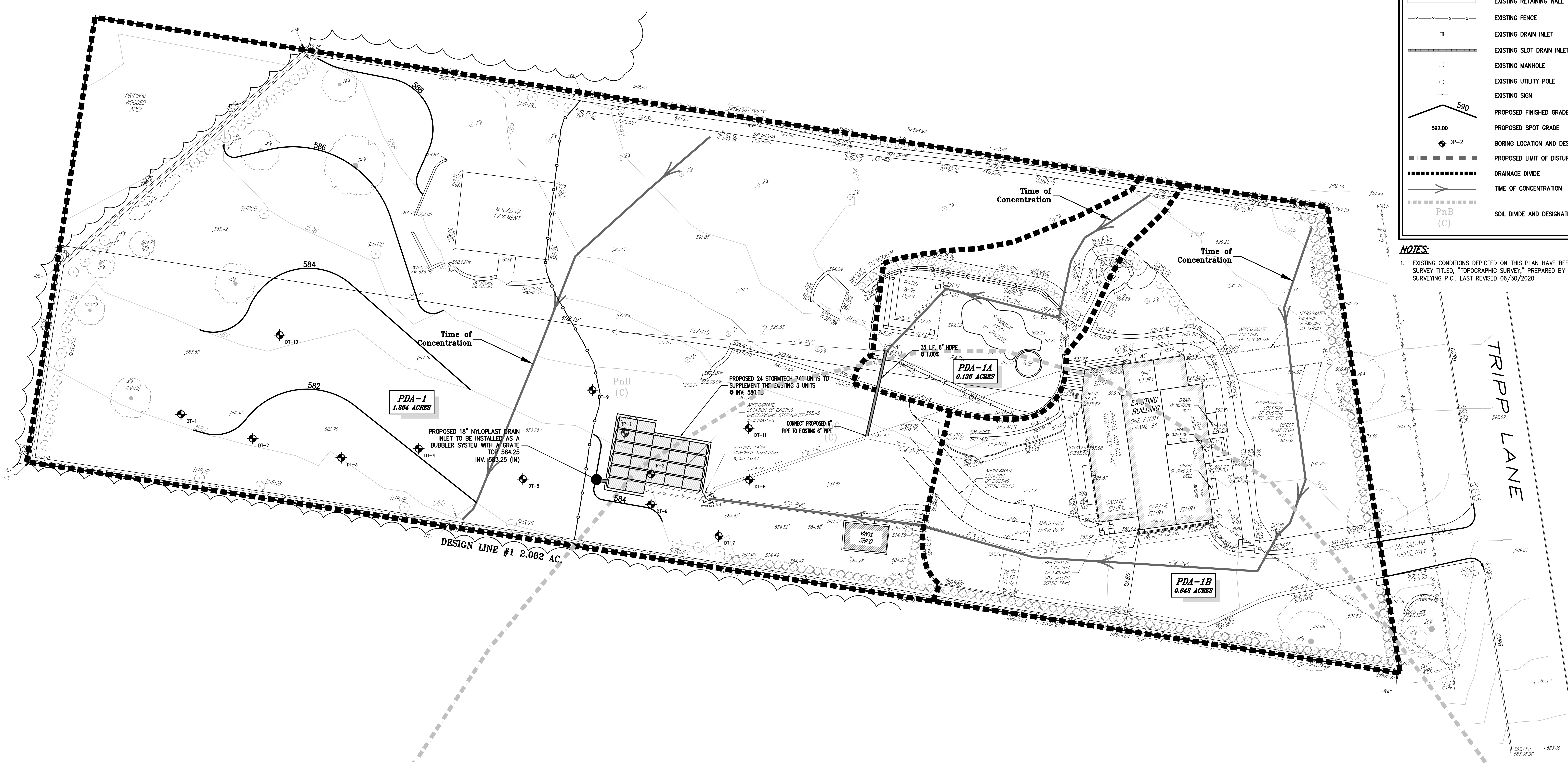
PRE-EXISTING DRAINAGE AREA MAP

PEREIRA RESIDENCE
4 TRIPP LANE
NORTH CASTLE, NY

STATE OF NEW YORK • FREDERICK BOHLANDER • 100532-1 • LICENSED PROFESSIONAL ENGINEER

Drawn: DK	Approved: AN	
Scale: 1" = 20'		
Date: 07/12/2021		
Project No: 20044		
20044-SITE	EDA	EDA.ls
Drawing No: DA-1		



LEGEND

- EXISTING PROPERTY LINE
- ADJACENT PROPERTY LINE
- EXISTING BUILDING OVERHANG
- EXISTING BUILDING LINE
- EXISTING PAVEMENT EDGE
- EXISTING CURB LINE
- EXISTING CONTOUR
- EXISTING INDEX CONTOUR
- EXISTING SPOT GRADE
- EXISTING BOULDERS
- EXISTING RETAINING WALL
- EXISTING FENCE
- EXISTING DRAIN INLET
- EXISTING SLOT DRAIN INLET
- EXISTING MANHOLE
- EXISTING UTILITY POLE
- EXISTING SIGN
- PROPOSED FINISHED GRADE
- PROPOSED SPOT GRADE
- BORING LOCATION AND DESIGNATION
- PROPOSED LIMIT OF DISTURBANCE
- DRAINAGE DIVIDE
- TIME OF CONCENTRATION
- SOIL DIVIDE AND DESIGNATION

NOTES:

1. EXISTING CONDITIONS DEPICTED ON THIS PLAN HAVE BEEN TAKEN FROM SURVEY TITLED, "TOPOGRAPHIC SURVEY," PREPARED BY SUMMIT LAND SURVEYING P.C., LAST REVISED 06/30/2020.

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120 BEDFORD ROAD • ARMONK, NY 10504
voice 914.273.5225 • fax 914.273.2102
www.jmcpllc.com

PROPOSED DRAINAGE AREA MAP

PEREIRA RESIDENCE
4 TRIPP LANE
NORTH CASTLE, NY

APPROVED BY TOWN OF NORTH CASTLE PLANNING BOARD:
RESOLUTION, DATED: ____________

______________________________ DATE: ____________
CHRISTOPHER CARTHY, CHAIRMAN
TOWN OF NORTH CASTLE PLANNING BOARD

ENGINEERING PLANS REVIEWED FOR CONFORMANCE TO RESOLUTION:

______________________________ DATE: ____________
JOSEPH M. CERMELE, P.E.
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STATE OF NEW YORK • FREDERICK BOHLANDER • 100532-1 • LICENSED PROFESSIONAL ENGINEER

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5.	PLANNING BOARD SUBMISSION	02/22/2024	RB
	Previous Editions Obsolete		

Drawn:	DK	Approved:	AN
Scale:	1" = 20'		
Date:	07/12/2021		
Project No:	20044		
20044-SITE	PDA	PDA.ls	
Drawing No:	DA-2		

APPENDIX D

STORMTECH MODEL SC-740 DETENTION SYSTEM MAINTENANCE SHEETS

SC-310 / SC-740 / DC-780

StormTech®

Detention • Retention • Water Quality

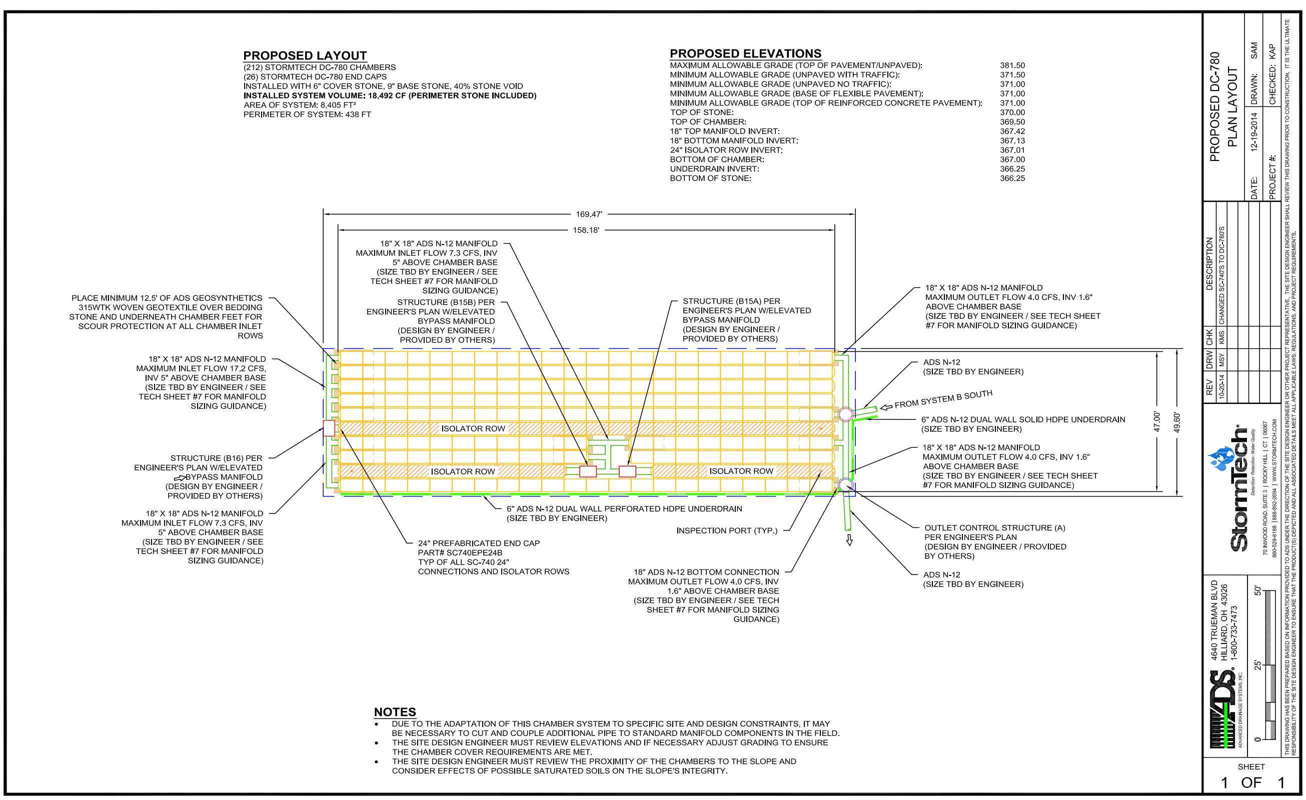
Design Manual

StormTech® Chamber Systems for Stormwater Management

Table of Contents

* For MC-3500 and MC-4500 designs, please refer to the MC-3500/MC-4500 Design Manual

The StormTech Technical Services Department assists design professionals in specifying StormTech stormwater systems. This assistance includes the layout of chambers to meet the engineer's volume requirements and the connections to and from the chambers. The Technical Department can also assist converting and cost engineering projects currently specified with ponds, pipe, concrete and other manufactured stormwater detention/retention products. Please note that it is the responsibility of the design engineer to ensure that the chamber bed layout meets all design requirements and is in compliance with applicable laws and regulations governing this project.



This manual is exclusively intended to assist engineers in the design of subsurface stormwater systems using StormTech chambers.

1.0 Introduction

1.1 INTRODUCTION

StormTech stormwater management systems allow stormwater professionals to create more profitable, environmentally sound developments. Compared with other subsurface systems, StormTech systems offer lower overall installed cost, superior design flexibility and enhanced performance. Applications include commercial, residential, agricultural and highway drainage.

StormTech has invested over $10 million and many years in the development of StormTech chambers. These innovative products exceed the rigorous requirements of the standards governing the design of thermoplastic structures.

1.2 THE GOLD STANDARD IN STORMWATER MANAGEMENT

The advanced designs of StormTech chambers were created by implementing an aggressive research, development, design and manufacturing protocol. StormTech chamber products establish the new gold standard in stormwater management through:

- Collaborations with experts in the field of buried plastic structures and polyolefin materials
- The development and utilization of new testing methods and proprietary test methods
- The use of thermoformed prototypes to verify engineering models, perform in-ground testing and install observation sites
- The investment in custom-designed, injection molding equipment
- The utilization of polypropylene and polyethylene as manufacturing materials
- The design of molded-in features not possible with traditional thermoformed chambers

Section 3.0 of this design manual, *Structural Capabilities*, provides a detailed description of the research, development and design process.

Many of StormTech's unique chamber features can benefit a site developer, stormwater system designer, and installer. Where applicable, StormTech Product Specifications are referenced throughout this design manual. If StormTech's unique product benefits are important to a stormwater system design, consider including the applicable StormTech Product Specifications on the site plans. This can prevent substitutions with inferior products. Refer to Section 14.0, *StormTech Product Specifications.*

1.3 PRODUCT QUALITY AND DESIGN TO INTERNATIONAL STANDARDS

StormTech chambers are designed to meet the full scope of design requirements of Section 12.12 of the AASHTO LRFD Bridge Design Specifications and produced to the requirements of the American Society of Testing Materials (ASTM) International specifications F2418 (polypropylene chambers) and F2922 (polyethylene chambers).

StormTech chambers provide the full AASHTO safety factors for live loads and permanent earth loads. The two ASTM standards mentioned previously are linked to the AASHTO LRFD Bridge Design Specifications Section 12.12 design standard. Both ASTM standards require that the safety factors included in the AASHTO guidance are achieved as a prerequisite to meeting either ASTM F2418 or ASTM F2922. StormTech chambers are also designed in accordance with ASTM F2787, "Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers" which provides specific guidance on how to design thermoplastic chambers in accordance with AASHTO Section 12.12. These standards provide both the assurance of product quality and safe structural design.

For non-proprietary specifications for public bids that ensure high product quality and safe design, consider including the specification in Section 15.0 Chamber Specifications for Contract Documents.

1.4 TECHNICAL SUPPORT FOR PLAN REVIEWS

StormTech's in-house technical support staff is available to review proposed plans that incorporate StormTech chamber systems. They are also available to assist with plan conversions from existing products to StormTech. Not all plan sheets are necessary for StormTech's review. Required sheets include plan view sheet(s) with design contours, cross sections of the stormwater system including catch basins and drainage details.

When specifying StormTech chambers it is recommended that the following items are included in project plans: StormTech chamber system General Notes, applicable StormTech chamber illustrations and StormTech chamber system Product Specifications. These items are available in various formats and can be obtained by contacting StormTech at **1-860-529-8188** or may be downloaded at **www.stormtech.com.**

StormTech's plan review is limited to the sole purpose of determining whether plans meet StormTech chamber systems' minimum requirements. **It is the ultimate responsibility of the design engineer to assure that the stormwater system's design is in full compliance with all applicable laws and regulations.** StormTech products must be designed and installed in accordance with StormTech's minimum requirements.

SEND PLANS TO:

StormTech, Plan Review, 70 Inwood Road, Suite 3, Rocky Hill, CT 06067 E-mail: info@stormtech.com. File size should not exceed 10 MB.

2.0 Product Information

2.1 PRODUCT APPLICATIONS

StormTech chamber systems may function as stormwater detention, retention, first-flush storage, or some combination of these. The StormTech chambers can be used for commercial, municipal, industrial, recreational, and residential applications especially for installations under parking lots and commercial roadways.

One of the key advantages of the StormTech chamber system is its design flexibility. Chambers may be configured into beds or trenches of various sizes or shapes. They can be centralized or decentralized, and fit on nearly all sites. Chamber lengths enhance the ability to develop on both existing and pre-developed projects. The systems can be designed easily and efficiently around utilities, natural or man-made structures and any other limiting boundaries.

2.2 CHAMBERS FOR STORMWATER DETENTION

Chamber systems have been used effectively for stormwater detention for over 15 years. A detention system temporarily holds water while it is released at a defined rate through an outlet. While some infiltration may occur in a detention system, it is often considered an environmental benefit and a storage safety factor. Over 70% of StormTech's installations are non-watertight detention systems. There are only a few uncommon situations where a detention system might need to limit infiltration: the subgrade soil's bearing capacity is significantly affected by saturation such as with expansive clays or karst soils, and; in sensitive aquifer areas where the depth to groundwater does not meet local guidelines. Adequate pretreatment could eliminate concerns for the latter case. A thermoplastic liner may be considered for both situations to limit infiltration.

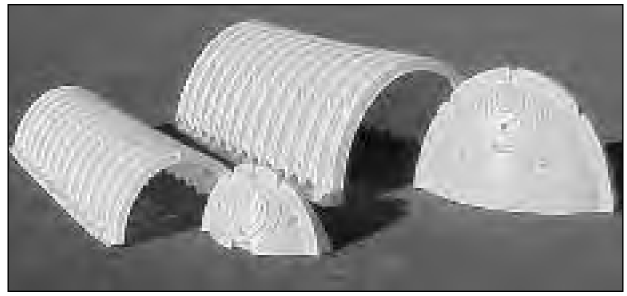
2.3 STONE POROSITY ASSUMPTION

A StormTech chamber system requires the application of clean, crushed, angular stone below, between and above the chambers. This stone serves as a structural component while allowing conveyance and storage of stormwater. Storage volume examples throughout this Design Manual are calculated with an assumption that the stone has an industry standard porosity of 40%. Actual stone porosity may vary. Contact StormTech for information on calculating stormwater volumes with varying stone porosity assumptions.

2.4 CHAMBER SELECTION

Primary considerations when selecting between the SC-310™, SC-740™ and DC-780™ chambers are the depth to restrictive layer, available area for subsurface storage, cover height and outfall restrictions.

The StormTech SC-310 chamber shown on page 4 is ideal for systems requiring low-rise and wide-span solutions. This low profile chamber allows the storage of large volumes, 1.3 ft^3/ft^2 (0.40 m^3/m^2) [minimum], at minimum depths.



The SC-310 and SC-740 chambers and end plates.

StormTech systems can be integrated into retrofit and new construction projects.

Like the Stormtech SC-310, the StormTech SC-310-3 found on page 6 allows for a design option for sites with both limited cover and limited space. With only 3" of spacing between the chambers, the SC-310-3 still provides 1.3 ft^3/ft^2 (0.40 m^3/m^2) [minimum] of storage.

The StormTech SC-740 chamber shown on page 8 optimizes storage volumes in relatively small footprints. By providing 2.2 ft^3/ft^2 (0.67 m^3/m^2) [minimum] of storage, the SC-740 chambers can minimize excavation, backfill and associated costs.

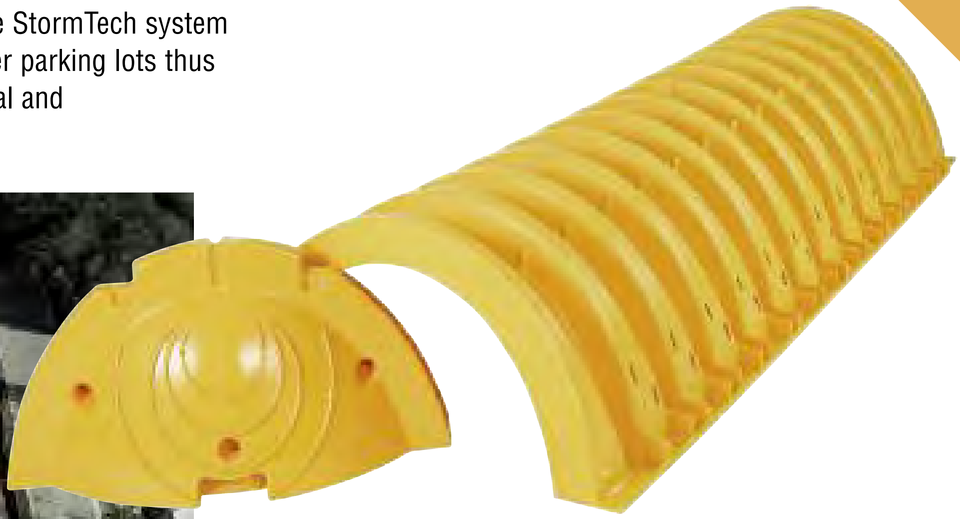
The DC-780 chamber shown on page 10 has been developed for those applications which exceed the maximum 8 ft (2.44 m) burial depth of the SC-740 and SC-310 chambers. The DC-780 is a modified version of the SC-740 allowing it to reach a maximum burial depth of 12 ft (3.66 m). The design of the DC-780 chamber, like other StormTech chambers, is designed and manufactured in accordance with the AASHTO LRFD Bridge Design Specifications as well as ASTM F 2418 and ASTM F 2787 ensuring structural adequacy for deeper systems.

The end corrugations of the DC-780 chamber have not been modified in order to allow connections to the SC-740 chamber. This will allow hybrid systems utilizing both chambers in one system design.

StormTech SC-310 Chamber

SC-310 Chamber

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots thus maximizing land usage for commercial and municipal applications.



StormTech SC-310 Chamber (not to scale)

Nominal Chamber Specifications

Size (L x W x H)	85.4" x 34.0" x 16.0" (2170 x 864 x 406 mm)
Chamber Storage	14.7 ft³ (0.42 m³)
Min. Installed Storage*	31.0 ft³ (0.88 m³)
Weight	37.0 lbs (16.8 kg)

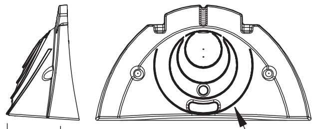
*Assumes 6" (150 mm) stone above, below and between chambers and 40% stone porosity.

Shipping

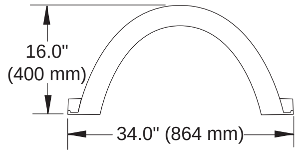
41 chambers/pallet

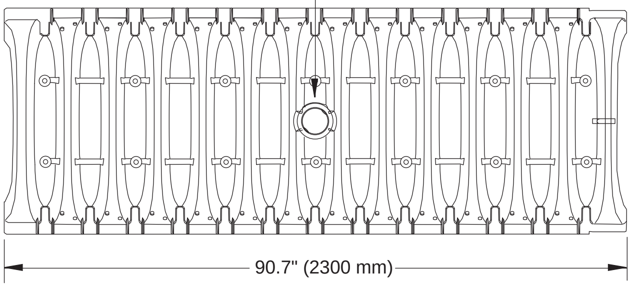
108 end caps/pallet

18 pallets/truck

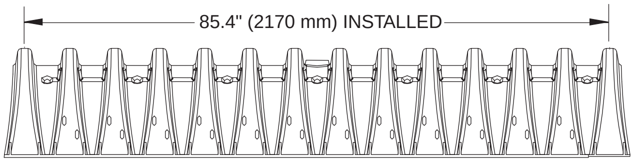


SC-310 End Cap





SC-310 Chamber



StormTech SC-310 Chamber

SC-310 Cumulative Storage Volumes Per Chamber

Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (150 mm) Stone Base Under the Chambers.

Depth of Water in System Inches (mm)	Cumulative Chamber Storage ft³ (m³)	Total System Cumulative Storage ft³ (m³)
28 (711)	14.70 (0.416)	31.00 (0.878)
27 (686)	14.70 (0.416)	30.21 (0.855)
26 (680)	Stone 14.70 (0.416)	29.42 (0.833)
25 (610)	Cover 14.70 (0.416)	28.63 (0.811)
24 (609)	14.70 (0.416)	27.84 (0.788)
23 (584)	14.70 (0.416)	27.05 (0.766)
22 (559)	14.70 (0.416)	26.26 (0.748)
21 (533)	14.64 (0.415)	25.43 (0.720)
20 (508)	14.49 (0.410)	24.54 (0.695)
19 (483)	14.22 (0.403)	23.58 (0.668)
18 (457)	13.68 (0.387)	22.47 (0.636)
17 (432)	12.99 (0.368)	21.25 (0.602)
16 (406)	12.17 (0.345)	19.97 (0.566)
15 (381)	11.25 (0.319)	18.62 (0.528)
14 (356)	10.23 (0.290)	17.22 (0.488)
13 (330)	9.15 (0.260)	15.78 (0.447)
12 (305)	7.99 (0.227)	14.29 (0.425)
11 (279)	6.78 (0.192)	12.77 (0.362)
10 (254)	5.51 (0.156)	11.22 (0.318)
9 (229)	4.19 (0.119)	9.64 (0.278)
8 (203)	2.83 (0.081)	8.03 (0.227)
7 (178)	1.43 (0.041)	6.40 (0.181)
6 (152)	0	4.74 (0.134)
5 (127)	0	3.95 (0.112)
4 (102)	0	3.16 (0.090)
3 (76)	Stone Foundation 0	2.37 (0.067)
2 (51)	0	1.58 (0.046)
1 (25)	0	0.79 (0.022)

Note: Add 0.79 cu. ft. (0.022 m³) of storage for each additional inch (25 mm) of stone foundation.

Storage Volume Per Chamber ft³ (m³)

	Bare Chamber Storage ft³ (m³)	Chamber and Stone Stone Foundation Depth in. (mm)		
		6 (150)	12 (300)	18 (450)
StormTech SC-310	14.7 (0.4)	31.0 (0.9)	35.7 (1.0)	40.4 (1.1)

Note: Assumes 6" (150 mm) of stone above chambers, 6" (150 mm) row spacing and 40% stone porosity.

Amount of Stone Per Chamber

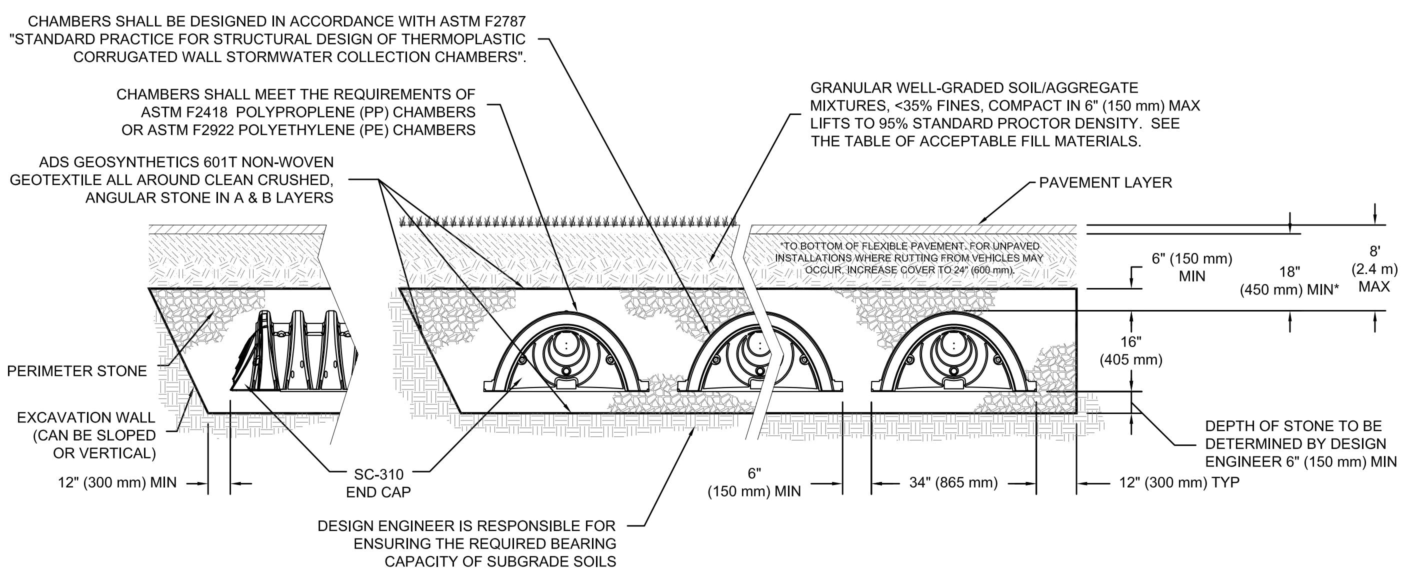
	Stone Foundation Depth		
ENGLISH TONS (yds³)	**6"**	**12"**	**18"**
StormTech SC-310	2.1 (1.5 yd³)	2.7 (1.9 yd³)	3.4 (2.4 yd³)
METRIC KILOGRAMS (m³)	**150 mm**	**300 mm**	**450 mm**
StormTech SC-310	1830 (1.1 m³)	2490 (1.5 m³)	2990 (1.8 m³)

Note: Assumes 6" (150 mm) of stone above, and between chambers.

Volume of Excavation Per Chamber yd³ (m³)

	Stone Foundation Depth		
	6" (150 mm)	**12" (300 mm)**	**18" (450 mm)**
StormTech SC-310	2.9 (2.2)	3.4 (2.6)	3.8 (2.9)

Note: Assumes 6" (150 mm) of row separation and 18" (450 mm) of cover. The volume of excavation will vary as the depth of the cover increases.



THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12 FOR EARTH AND LIVE LOADS, WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.

StormTech SC-310-3 Chamber

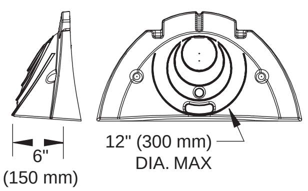
The proven strength and durability of the SC-310-3 Chamber allows for a design option for sites where limited cover, limited space, high water table and escalated aggregate cost are a factor. The SC-310-3 has a minimum cover requirement of 16" (400 mm) to bottom of pavement and reduces the spacing requirement between chambers by 50% to 3" (76 mm). This provides a reduced footprint overall and allows the designer to offer a traffic bearing application yet comply with water table separation regulations.

StormTech SC-310-3 Chamber (not to scale)

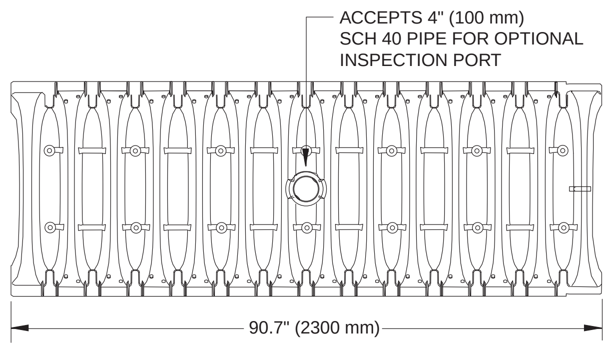
Nominal Chamber Specifications

Size (L x W x H)	85.4" x 34.0" x 16.0" (2170 x 864 x 406 mm)
Chamber Storage	14.7 ft³ (0.42 m³)
Min. Installed Storage*	29.3 ft³ (0.83 m³)
Weight	37.0 lbs (16.8 kg)

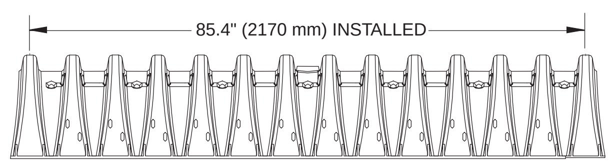
*Assumes 6" (150 mm) stone above and below chambers, 3" (76 mm) row spacing and 40% stone porosity.



SC-310 End Cap



SC-310 Chamber

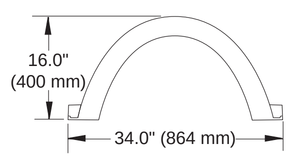


Shipping

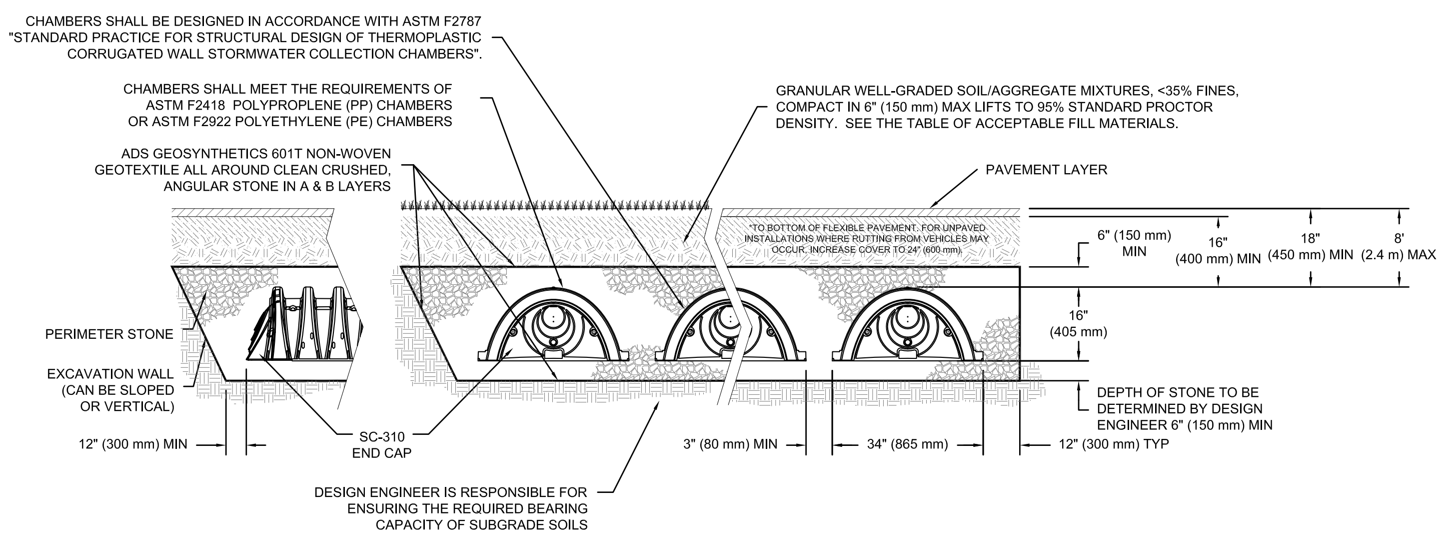
41 chambers/pallet

108 end caps/pallet

18 pallets/truck



Typical Cross Section Detail



THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12 FOR EARTH AND LIVE LOADS, WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.

StormTech SC-310-3 Chamber

SC-310-3 Cumulative Storage Volume Per Chamber

Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (150 mm) Stone Base Under the Chambers.

Depth of Water in System Inches (mm)	Cumulative Chamber Storage ft³ (m³)	Total System Cumulative Storage ft³ (m³)
28 (711)	14.7 (0.416)	29.34 (0.831)
27 (686)	14.7 (0.416)	28.60 (0.810)
26 (660)	Stone 14.7 (0.416)	27.87 (0.789)
25 (635)	Cover 14.7 (0.416)	27.14 (0.769)
24 (610)	14.7 (0.416)	26.41 (0.748)
23 (584)	14.7 (0.416)	25.68 (0.727)
22 (559)	14.7 (0.416)	24.95 (0.707)
21 (533)	14.64 (0.415)	24.18 (0.685)
20 (508)	14.49 (0.410)	23.36 (0.661)
19 (483)	14.22 (0.403)	22.47 (0.636)
18 (457)	13.68 (0.387)	21.41 (0.606)
17 (432)	12.99 (0.368)	20.25 (0.573)
16 (406)	12.17 (0.345)	19.03 (0.539)
15 (381)	11.25 (0.319)	17.74 (0.502)
14 (356)	10.23 (0.290)	16.40 (0.464)
13 (330)	9.15 (0.260)	15.01 (0.425)
12 (305)	7.99 (0.226)	13.59 (0.385)
11 (279)	6.78 (0.192)	12.13 (0.343)
10 (254)	5.51 (0.156)	10.63 (0.301)
9 (229)	4.19 (0.119)	9.11 (0.258)
8 (203)	2.83 (0.080)	7.56 (0.214)
7 (178)	1.43 (0.040)	5.98 (0.169)
6 (152)	0	4.39 (0.124)
5 (127)	0	3.66 (0.104)
4 (102)	Stone Foundation 0	2.93 (0.083)
3 (76)	0	2.19 (0.062)
2 (51)	0	1.46 (0.041)
1 (25)	0	0.73 (0.021)

Note: Add 0.73 ft³ (0.021 m³) of storage for each additional inch (25 mm) of stone foundation.

Storage Volume per Chamber ft³ (m³)

	Bare Chamber Storage ft³ (m³)	Chamber and Stone Volume Stone Foundation Depth in. (mm) 6 (150)	12 (300)	18 (450)
SC-310-3	14.7 (0.42)	29.3 (0.83)	33.7 (0.95)	38.1 (1.08)

Note: Assumes 6" (150 mm) of stone above chambers, 3" (76 mm) row spacing and 40% stone porosity.

Volume of Excavation Per Chamber yd³ (m³)

	Stone Foundation Depth 6" (150)	12" (300)	18" (450)
SC-310-3	2.6 (2.0)	3.0 (2.3)	3.4 (2.6)

Note: Assumes 3" (76 mm) of row separation, 6" (150 mm) of stone above the chambers and 16" (400 mm) of cover. The volume of excavation will vary as depth of cover increases.

Amount of Stone Per Chamber

ENGLISH TONS (yd³)	Stone Foundation Depth 6"	12"	18"
SC-310-3	1.9 (1.4)	2.5 (1.8)	3.1 (2.2)
METRIC KILOGRAMS (m³)	**150 mm**	**300 mm**	**450 mm**
SC-310-3	1724 (1.0)	2268 (1.3)	2812 (1.7)

Note: Assumes 6" (150 mm) of stone above chambers and 3" (76 mm) row spacing.

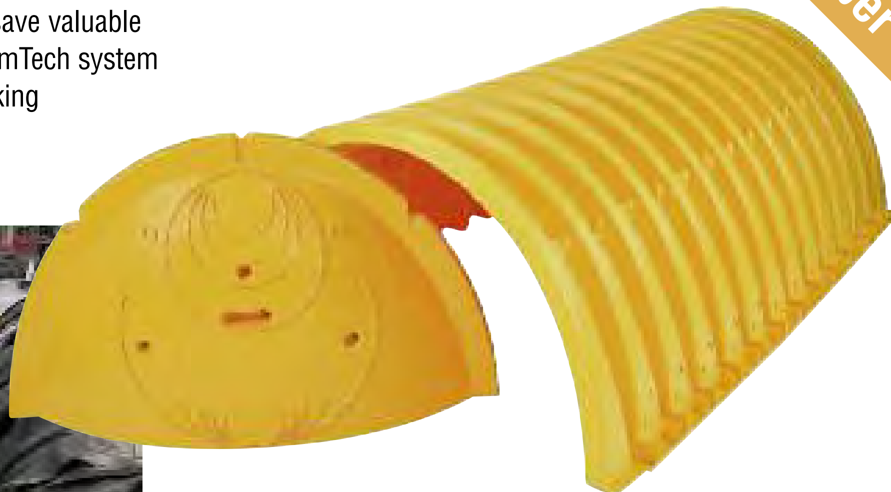
Cover ft (m)	Minimum Required Bearing Resistance for Service Loads ksf (kPa) 3.0 (144)	2.9 (139)	2.8 (134)	2.7 (129)	2.6 (124)	2.5 (120)	2.4 (115)	2.3 (110)	2.2 (105)	2.1 (101)	2.0 (96)
1.5 (0.46)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)
2 (0.61)	6 152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)
2.5 (0.76)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)
3 (0.91)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)
3.5 (1.07)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	12 (305)
4 (1.22)	6 152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)
4.5 (1.37)	6 152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)
5 (1.52)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)
5.5 (1.68)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	12 (305)
6 (1.83)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)
6.5 (1.98)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)
7 (2.13)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)
7.5 (2.29)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)
8 (2.44)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	15 (381)

NOTE: The design engineer is solely responsible for assessing the bearing resistance (allowable bearing capacity) of the subgrade soils and determining the depth of foundation stone. Subgrade bearing resistance should be assessed with consideration for the range of soil moisture conditions expected under a stormwater system.

SC-740 Chamber

StormTech SC-740 Chamber

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots thus maximizing land usage for commercial and municipal applications.



StormTech SC-740 Chamber (not to scale)

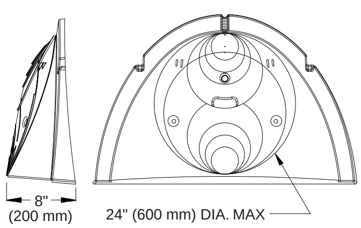
Nominal Chamber Specifications

Size (L x W x H)	85.4" x 51.0" x 30.0" (2170 x 1295 x 762 mm)
Chamber Storage	45.9 ft³ (1.30 m³)
Min. Installed Storage*	74.9 ft³ (2.12 m³)
Weight	74.0 lbs (33.6 kg)

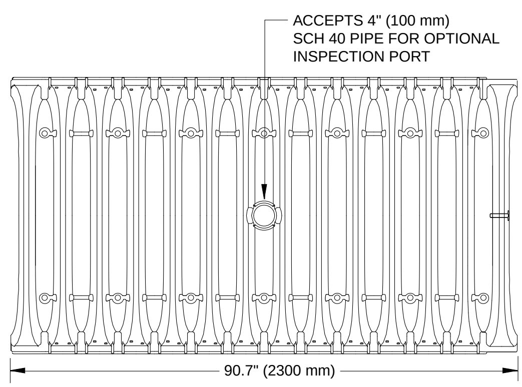
*Assumes 6" (150 mm) stone above, below and between chambers and 40% stone porosity.

Shipping

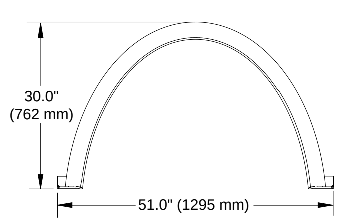
- 30 chambers/pallet
- 60 end caps/pallet
- 12 pallets/truck

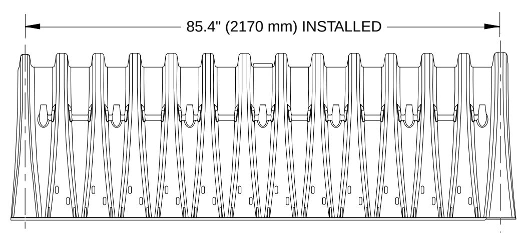


SC-740 End Cap



SC-740 Chamber





StormTech SC-740 Chamber

SC-740 Cumulative Storage Volumes Per Chamber

Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (150 mm) Stone Base Under the Chambers.

Depth of Water in System Inches (mm)	Cumulative Chamber Storage Ft³ (m³)	Total System Cumulative Storage Ft³ (m³)
42 (1067)	45.90 (1.300)	74.90 (2.121)
41 (1041)	45.90 (1.300)	73.77 (2.089)
40 (1016)	Stone 45.90 (1.300)	72.64 (2.057)
39 (991)	Cover 45.90 (1.300)	71.52 (2.025)
38 (965)	45.90 (1.300)	70.39 (1.993)
37 (948)	45.90 (1.300)	69.26 (1.961)
36 (914)	45.90 (1.300)	68.14 (1.929)
35 (889)	45.85 (1.298)	66.98 (1.897)
34 (864)	45.69 (1.294)	65.75 (1.862)
33 (838)	45.41 (1.286)	64.46 (1.825)
32 (813)	44.81 (1.269)	62.97 (1.783)
31 (787)	44.01 (1.246)	61.36 (1.737)
30 (762)	43.06 (1.219)	59.66 (1.689)
29 (737)	41.98 (1.189)	57.89 (1.639)
28 (711)	40.80 (1.155)	56.05 (1.587)
27 (686)	39.54 (1.120)	54.17 (1.534)
26 (660)	38.18 (1.081)	52.23 (1.479)
25 (635)	36.74 (1.040)	50.23 (1.422)
24 (610)	35.22 (0.977)	48.19 (1.365)
23 (584)	33.64 (0.953)	46.11 (1.306)
22 (559)	31.99 (0.906)	44.00 (1.246)
21 (533)	30.29 (0.858)	41.85 (1.185)
20 (508)	28.54 (0.808)	39.67 (1.123)
19 (483)	26.74 (0.757)	37.47 (1.061)
18 (457)	24.89 (0.705)	35.23 (0.997)
17 (432)	23.00 (0.651)	32.96 (0.939)
16 (406)	21.06 (0.596)	30.68 (0.869)
15 (381)	19.09 (0.541)	28.36 (0.803)
14 (356)	17.08 (0.484)	26.03 (0.737)
13 (330)	15.04 (0.426)	23.68 (0.670)
12 (305)	12.97 (0.367)	21.31 (0.608)
11 (279)	10.87 (0.309)	18.92 (0.535)
10 (254)	8.74 (0.247)	16.51 (0.468)
9 (229)	6.58 (0.186)	14.09 (0.399)

SC-740 Cumulative Storage Volumes Per Chamber (cont.)

Depth of Water in System Inches (mm)	Cumulative Chamber Storage Ft³ (m³)	Total System Cumulative Storage Ft³ (m³)
8 (203)	4.41 (0.125)	11.66 (0.330)
7 (178)	2.21 (0.063)	9.21 (0.264)
6 (152)	0	6.76 (0.191)
5 (127)	0	5.63 (0.160)
4 (102)	Stone Foundation 0	4.51 (0.125)
3 (76)	0	3.38 (0.095)
2 (51)	0	2.25 (0.064)
1 (25)	0	1.13 (0.032)

Note: Add 1.13 cu. ft. (0.032 m³) of storage for each additional inch (25 mm) of stone foundation.

Storage Volume Per Chamber ft³ (m³)

	Bare Chamber Storage	Chamber and Stone Stone Foundation Depth in. (mm)		
	ft³ (m³)	6 (150)	12 (300)	18 (450)
StormTech SC-740	45.9 (1.3)	74.9 (2.1)	81.7 (2.3)	88.4 (2.5)

Note: Assumes 6" (150 mm) of stone above chambers, 6" (150 mm) row spacing and 40% porosity.

Amount of Stone Per Chamber

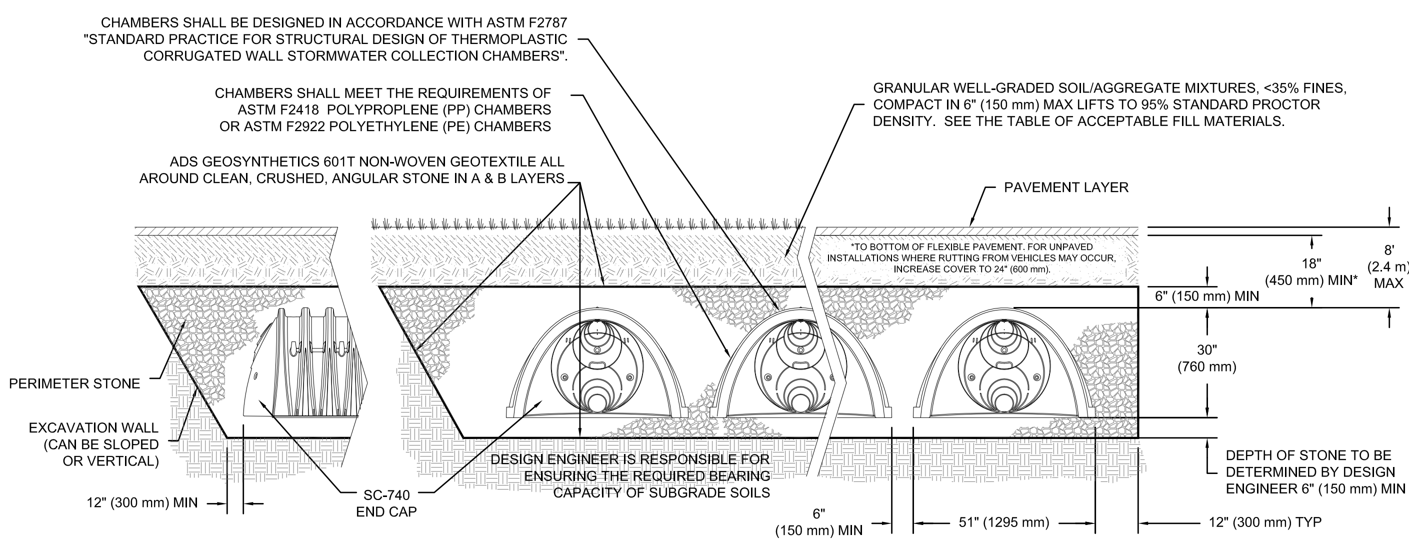
	Stone Foundation Depth		
ENGLISH TONS (yd³)	6"	12"	18"
StormTech SC-740	3.8 (2.8 yd³)	4.6 (3.3 yd³)	5.5 (3.9 yd³)
METRIC KILOGRAMS (m³)	150 mm	300 mm	450 mm
StormTech SC-740	3450 (2.1 m³)	4170 (2.5 m³)	4490 (3.0 m³)

Note: Assumes 6" (150 mm) of stone above, and between chambers.

Volume of Excavation Per Chamber yd³ (m³)

	Stone Foundation Depth		
	6" (150 mm)	12" (300 mm)	18" (450 mm)
StormTech SC-740	5.5 (4.2)	6.2 (4.7)	6.8 (5.2)

Note: Assumes 6" (150 mm) of row separation and 18" (450 mm) of cover. Volume of excavation will vary as depth of cover increases.



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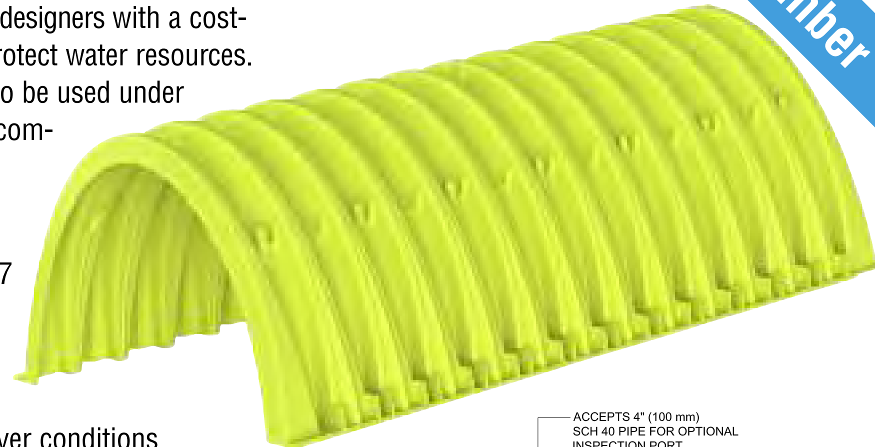
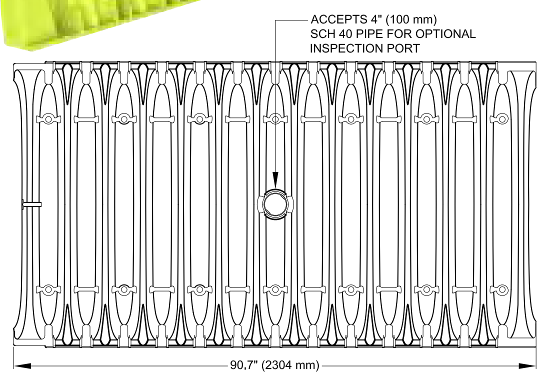
DC-780 Chamber

StormTech DC-780 Chamber

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots thus maximizing land usage for commercial and municipal applications.

- 12' Deep Cover applications.
- Designed in accordance with ASTM F 2787 and produced to meet the ASTM F 2418 product standard.
- AASHTO safety factors provided for AASHTO Design Truck (H20) and deep cover conditions





StormTech DC-780 Chamber (not to scale)

Nominal Chamber Specifications

Size (L x W x H)	85.4" x 51.0" x 30.0" (2169 x 1295 x 762 mm)
Chamber Storage	46.2 ft^3 (1.3 m^3)
Min. Installed Storage*	78.4 ft^3 (2.2 m^3)

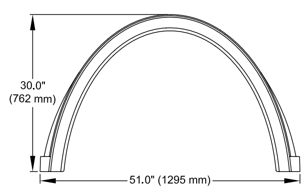
* Assumes 9" (230 mm) stone below, 6" (150 mm) stone above, 6" (150 mm) row spacing and 40% stone porosity.

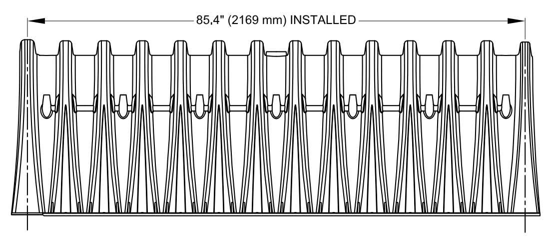
Shipping

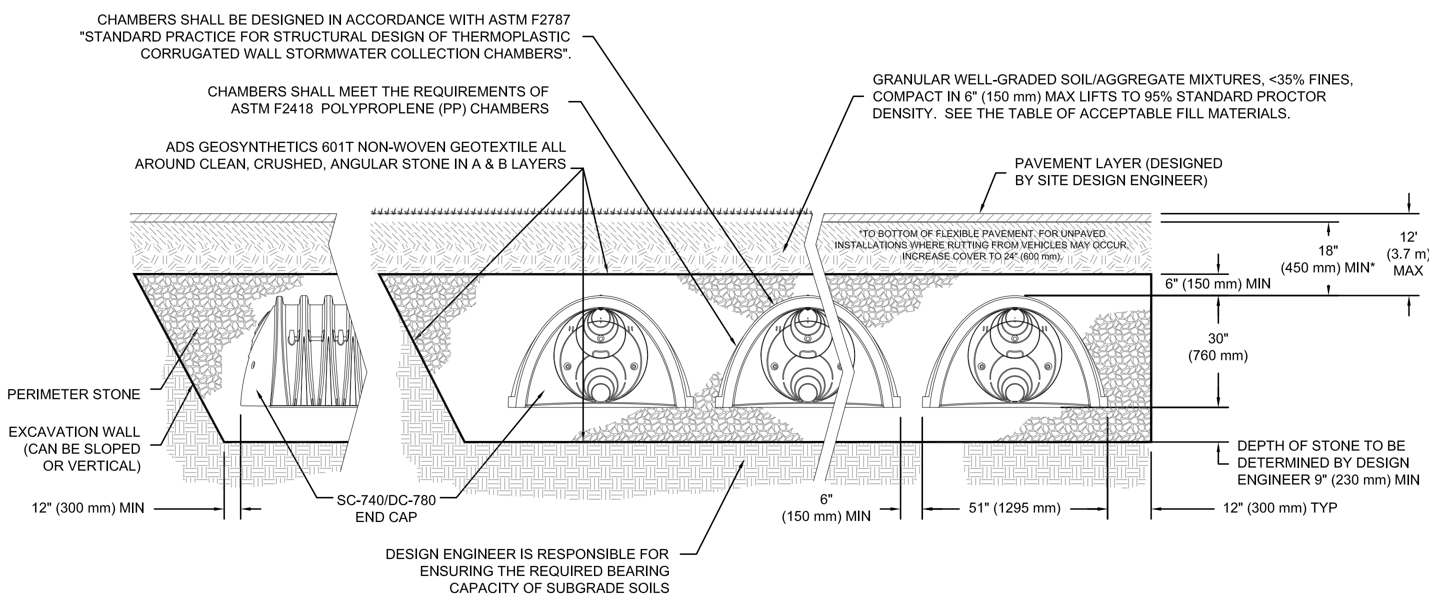
24 chambers/pallet

60 end caps/pallet

12 pallets/truck







THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12 FOR EARTH AND LIVE LOADS, WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.

StormTech DC-780 Chamber

DC-780 Cumulative Storage Volumes Per Chamber

Assumes 40% Stone Porosity. Calculations are Based Upon a 9" (230 mm) Stone Base Under the Chambers.

Depth of Water in System Inches (mm)	Cumulative Chamber Storage ft³ (m³)	Total System Cumulative Storage ft³ (m³)
45 (1143)	46.27 (1.310)	78.47 (2.222)
44 (1118)	46.27 (1.310)	77.34 (2.190)
43 (1092)	Stone 46.27 (1.310)	76.21 (2.158)
42 (1067)	Cover 46.27 (1.310)	75.09 (2.126)
41 (1041)	46.27 (1.310)	73.96 (2.094)
40 (1016)	46.27 (1.310)	72.83 (2.062)
39 (991)	46.27 (1.310)	71.71 (2.030)
38 (965)	46.21 (1.309)	70.54 (1.998)
37 (940)	46.04 (1.304)	69.32 (1.963)
36 (914)	45.76 (1.296)	68.02 (1.926)
35 (889)	45.15 (1.278)	66.53 (1.884)
34 (864)	44.34 (1.255)	64.91 (1.838)
33 (838)	43.38 (1.228)	63.21 (1.790)
32 (813)	42.29 (1.198)	61.43 (1.740)
31 (787)	41.11 (1.164)	59.59 (1.688)
30 (762)	39.83 (1.128)	57.70 (1.634)
29 (737)	38.47 (1.089)	55.76 (1.579)
28 (711)	37.01 (1.048)	53.76 (1.522)
27 (686)	35.49 (1.005)	51.72 (1.464)
26 (660)	33.90 (0.960)	49.63 (1.405)
25 (635)	32.24 (0.913)	47.52 (1.346)
24 (610)	30.54 (0.865)	45.36 (1.285)
23 (584)	28.77 (0.815)	43.18 (1.223)
22 (559)	26.96 (0.763)	40.97 (1.160)
21 (533)	25.10 (0.711)	38.72 (1.096)
20 (508)	23.19 (0.657)	36.45 (1.032)
19 (483)	21.25 (0.602)	34.16 (0.967)
18 (457)	19.26 (0.545)	31.84 (0.902)
17 (432)	17.24 (0.488)	29.50 (0.835)
16 (406)	15.19 (0.430)	27.14 (0.769)
15 (381)	13.10 (0.371)	24.76 (0.701)
14 (356)	10.98 (0.311)	22.36 (0.633)
13 (330)	8.83 (0.250)	19.95 (0.565)
12 (305)	6.66 (0.189)	17.52 (0.496)
11 (279)	4.46 (0.126)	15.07 (0.427)

DC-780 Cumulative Storage Volumes Per Chamber (cont.)

Depth of Water in System Inches (mm)	Cumulative Chamber Storage ft³ (m³)	Total System Cumulative Storage ft³ (m³)
10 (254)	2.24 (0.064)	12.61 (0.357)
9 (229)	0	10.14 (0.287)
8 (203)	0	9.01 (0.255)
7 (178)	0	7.89 (0.223)
6 (152)	Stone 0	6.76 (0.191)
5 (127)	Foundation 0	5.63 (0.160)
4 (102)	0	4.51 (0.128)
3 (76)	0	3.38 (0.096)
2 (51)	0	2.25 (0.064)
1 (25)	0	1.13 (0.032)

Note: Add 1.13 cu. ft. (0.032 m³) of storage for each additional inch (25 mm) of stone foundation.

Storage Volume Per Chamber ft³ (m³)

	Bare Chamber Storage ft³ (m³)	Chamber and Stone Volume- Stone Foundation Depth inches (millimeters)		
		9 (230)	12 (300)	18 (450)
StormTech DC-780	46.2 (1.3)	78.4 (2.2)	81.8 (2.3)	88.6 (2.5)

Note: Assumes 40% porosity for the stone, the bare chamber volume, 6" (150 mm) stone above, and 6" (150 mm) row spacing.

Amount of Stone Per Chamber

	Stone Foundation Depth		
ENGLISH TONS (YD³)	**9"**	**12"**	**18"**
StormTech DC-780	4.2 (3.0 yd³)	4.7 (3.3 yd³)	5.6 (3.9 yd³)
METRIC KILOGRAMS (M³)	**230 mm**	**300 mm**	**450 mm**
StormTech DC-780	3810 (2.3 m³)	4264 (2.5 m³)	5080 (3.0 m³)

Note: Assumes 6" (150 mm) of stone above, and between chambers.

Volume of Excavation Per Chamber yd³ (m³)

	Stone Foundation Depth		
	9" (230 mm)	**12" (300 mm)**	**18" (450 mm)**
StormTech DC-780	5.9 (4.5)	6.3 (4.8)	6.9 (5.3)

Note: Assumes 6" (150 mm) of separation between chamber rows and 18" (450 mm) of cover. The volume of excavation will vary as the depth of the cover increases.

2.5 STORMTECH CHAMBERS

StormTech chamber systems have unique features to improve site optimization and reduce product waste. The SC-740, SC-310 and DC-780 chambers can be cut at the job site in approximately 6.5" (165 mm) increments to shorten a chamber's length. Designing and constructing chamber rows around site obstacles is easily accomplished by including specific cutting instructions or a well placed "cut to fit" note on the design plans. The last chamber of a row can be cut in any of its corrugation's valleys. An end cap placed into the trimmed corrugation's crest completes the row. The trimmed-off piece of a StormTech chamber may then be used to start the next row. See **Figure 4**.

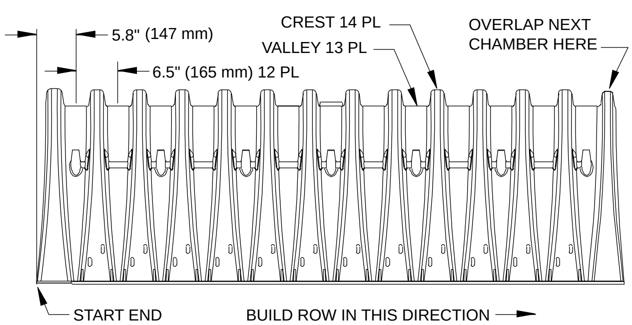
To assist the contractor, StormTech chambers are molded with simple assembly instructions and arrows that indicate the direction in which to build rows. Rows are formed by overlapping the next chamber's "Start End" corrugation with the previously laid chamber's end corrugation. Two people can safely and efficiently form rows of chambers without complicated connectors, special tools or heavy equipment.
Product Specifications: 2.2, 2.4, 2.5, 2.9 and 3.2

2.6 STORMTECH END CAPS

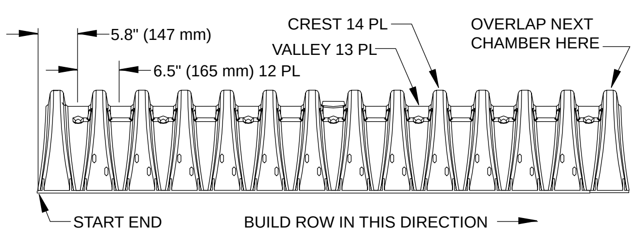
The StormTech end cap has features which make the chamber system simple to design, easy to build and more versatile than other products. StormTech end caps can be easily secured within any corrugation's crest. A molded-in handle makes attaching the end cap a one-person operation. Tools or fasteners are not required.

StormTech end caps are required at each end of a chamber row to prevent stone intrusion (two per row). The SC-740 and DC-780 end caps will accept up to a 24" (600 mm) HDPE inlet pipe. The SC-310 end cap will accept up to a 12" (300 mm) HDPE inlet pipe. See **Figure 5**.
Product Specifications: 3.1, 3.2, 3.3 and 3.4

Figure 4 – Distance Between Corrugations (not to scale)

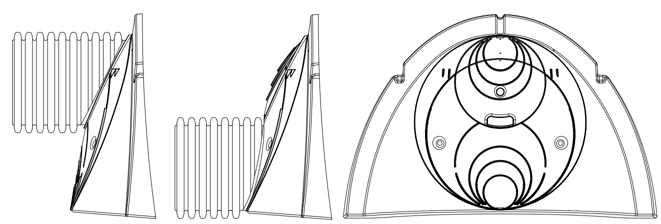


SC-740 chamber



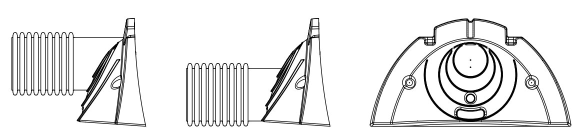
SC-310 chamber

Figure 5 – Chamber End Caps (not to scale)



SC-740/DC-780 CHAMBER FABRICATED END CAP (TOP AND BOTTOM FEED)
PIPES SIZES RANGE FROM 6" (150 mm) TO 24" (600 mm)
(INVERTS VARY WITH PIPE SIZE)

SC-740 / DC-780 end cap



SC-310 CHAMBER FABRICATED END CAP (TOP AND BOTTOM FEED)
PIPES SIZES RANGE FROM 6" (150 mm) TO 12" (300 mm)
(INVERTS VARY WITH PIPE SIZE)

SC-310 end cap

3.0 Structural Capabilities

3.1 STRUCTURAL DESIGN APPROACH

When installed per StormTech's minimum requirements, StormTech products are designed to exceed American Association of State Highway and Transportation Officials (AASHTO) LRFD recommended design factors for Earth loads and Vehicular live loads. AASHTO Vehicular live loads (previously HS-20) consist of two heavy axle configurations, that of a single 32 (142 kN) kip axle and that of tandem 25 (111 kN) kip axles. Factors for impact and multiple presences of vehicles ensure a conservative design where structural adequacy is assumed for a wide range of street legal vehicle weights and axle configurations.

Computer models of the chambers under shallow and deep conditions were developed. Utilizing design forces from computer models, chamber sections were evaluated using AASHTO procedures that consider thrust and moment, and check for local buckling capacity. The procedures also considered the time-dependent strength and stiffness properties of polypropylene and polyethylene. These procedures were developed in a research study conducted by the National Cooperative Highway Research Program (NCHRP) for AASHTO, and published as NCHRP Report 438 Recommended LRFD Specifications for Plastic Pipe and Culverts. *Product Specifications: 2.12.*

StormTech does not recommend installing StormTech products underneath buildings or parking garages. When specifying the StormTech products in close proximity to buildings, it is important to ensure that the StormTech products are not receiving any loads from these structures that may jeopardize the long term performance of the chambers.

3.2 FULL SCALE TESTING

After developing the StormTech chamber designs, the chambers were subjected to rigorous full-scale testing. The test programs verified the predicted safety factors of the designs by subjecting the chambers to more severe load conditions than anticipated during service life. Capacity under live loads and deep fill was investigated by conducting tests with a range of cover depths. Monitoring of long term deep fill installations has been done to validate the long term performance of the StormTech products.

3.3 INDEPENDENT EXPERT ANALYSIS

StormTech worked closely with the consulting firm Simpson Gumpertz & Heger Inc. (SGH) to develop and evaluate the SC-740, SC-310 and DC-780 chamber designs. SGH has world-renowned expertise in the design of buried drainage structures. The firm was the principal investigator for the NCHRP research program that developed the structural analysis and design methods adopted by AASHTO for thermoplastic culverts. SGH conducted design calculations and computer simulations of chamber performance under various installation and live load conditions. They worked with StormTech to design the full-scale test programs to verify the structural capacity of the chambers. SGH also observed all full-scale tests and inspected the chambers after completion of the tests. SGH continues to be StormTech's structural consultant.

3.4 INJECTION MOLDING

To comply with both the structural and design requirements of AASHTO's LRFD specifications and ASTM F 2787 as well as the product requirements of ASTM F 2418 or ASTM F2922, StormTech uses proprietary injection molding equipment to manufacture the chambers and end caps.

In addition to meeting structural goals, injection molding allows StormTech to design added features and advantages into StormTech's parts including:

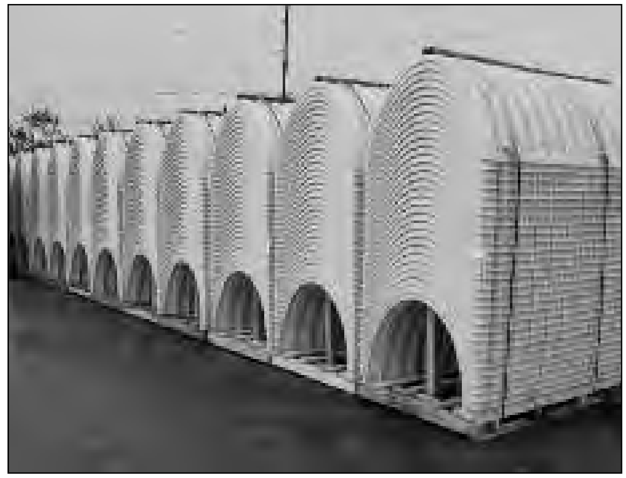
- Precise control of wall thickness throughout parts
- Precise fit of joints and end caps
- Molded-in inspection port fitting
- Molded-in handles on end caps
- Molded-in pipe guides with blade starter slots
- Repeatability for Quality Control (See Section 3.6)

Product Specifications: 2.1, 3.1 and 3.3

3.5 POLYPROPYLENE AND POLYETHYLENE RESIN

StormTech chambers are injection molded from polypropylene and polyethylene. Polypropylene and polyethylene chambers are inherently resistant to chemicals typically found in stormwater run-off. StormTech chambers maintain a greater portion of their structural stiffness through higher installation and service temperatures.

StormTech polypropylene and polyethylene are virgin materials specially designed to achieve a high 75-year creep modulus that is necessary to provide a sound long-term structural design. Since the modulus remains high well beyond the 75-year value, StormTech chambers can exhibit a service life in excess of 75 years.



3.6 QUALITY CONTROL

StormTech chambers are manufactured under tight quality control programs. Materials are routinely tested in an environmentally controlled lab that is verified every six months via the external ASTM Proficiency Testing Program. The chamber material properties are measured and controlled with procedures following ISO 9001:2000 requirements.

Statistical Process Control (SPC) techniques are applied during manufacturing. Established upper and lower control limits are maintained on key manufacturing parameters to maintain consistent product.
Product Specifications: 2.13 and 3.6

4.0 Foundation for Chambers

4.1 FOUNDATION REQUIREMENTS

StormTech chamber systems and embedment stone may be installed in various native soil types. The sub-grade bearing capacity and chamber cover height determine the required depth of clean, crushed, angular stone for the chamber foundation. The chamber foundation is the clean, crushed, angular stone placed between the subgrade soils and the feet of the chamber.

As cover height increases (top of chamber to top of finished grade) the chambers foundation requirements increase. Foundation strength is the product of the sub-grade soils bearing capacity and the depth of clean, crushed, angular stone below the chamber foot. **Table 1** for the SC-740 and SC-310 and **Table 2** for the DC-780 specify the required minimum foundation depth for varying cover heights and subgrade bearing capacities.

4.2 WEAKER SOILS

For sub-grade soils with allowable bearing capacity less than 2000 pounds per square foot [(2.0 ksf) (96 kPa)], a geotechnical engineer should evaluate the specific conditions. These soils are often highly variable, may contain organic materials and could be more sensitive to moisture. A geotechnical engineer's recommendations may include increasing the stone foundation, improving the bearing capacity of the sub-grade soils through compaction, replacement, or other remedial measures including the use of geogrids. The use of a thermoplastic liner may also be considered for systems installed in subgrade soils that are highly affected by moisture. The project engineer is responsible for ensuring overall site settlement is within acceptable limits. A geotechnical engineer should always review installation of StormTech chambers on organic soils.

4.3 CHAMBER SPACING OPTION

StormTech always requires a minimum of 6" (150 mm) clear spacing between the feet of chambers rows for the SC-310, SC-740 and DC-780 chambers. However, increasing the spacing between chamber rows may allow the application of StormTech chambers with either less foundation stone or with weaker subgrade soils. This may be a good option where a vertical restriction on site prevents the use of a deeper foundation. Contact StormTech's Technical Service Department for more information on this option. In all cases, StormTech recommends consulting a geotechnical engineer for subgrade soils with a bearing capacity less than 2.0 ksf (96 kPa).

Table 1 – SC-310 and SC-740 Minimum Required Foundation Depth in inches (millimeters)

Cover	Minimum Required Bearing Resistance for Service Loads ksf (kPa)																					
Ht. ft. (m)	4.1 (196)	4.0 (192)	3.9 (187)	3.8 (182)	3.7 (177)	3.6 (172)	3.5 (168)	3.4 (163)	3.3 (158)	3.2 (153)	3.1 (148)	3.0 (144)	2.9 (139)	2.8 (134)	2.7 (129)	2.6 (124)	2.5 (120)	2.4 (115)	2.3 (110)	2.2 (105)	2.1 (101)	2.0 (96)
1.5 (0.46)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)
2 (0.61)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)
2.5 (0.76)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	18 (457)
3 (0.91)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)
3.5 (1.07)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	18 (457)	18 (457)	21 (533)
4 (1.22)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	18 (457)	18 (457)	21 (533)
4.5 (1.37)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	18 (457)	18 (457)	21 (533)
5 (1.52)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	21 (533)
5.5 (1.68)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	21 (533)
6 (1.83)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	21 (533)	21 (533)
6.5 (1.98)	6 (152)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	18 (457)	21 (533)	24 (610)
7 (2.13)	6 (152)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	21 (533)	21 (533)	24 (610)
7.5 (2.29)	6 (152)	6 (152)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	21 (533)	21 (533)	24 (610)	27 (686)
8 (2.44)	6 (152)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	21 (533)	21 (533)	24 (610)	24 (610)	27 (686)

NOTE: The design engineer is solely responsible for assessing the bearing resistance (allowable bearing capacity) of the subgrade soils and determining the depth of foundation stone. Subgrade bearing resistance should be assessed with consideration for the range of soil moisture conditions expected under a stormwater system.

4.0 Foundation for Chambers/5.0 Cumulative Storage Volumes

Table 2 – DC-780 Minimum Required Foundation Depth in inches (millimeters)

Cover Ht. ft. (m)	Minimum Required Bearing Resistance for Service Loads ksf (kPa) 4.1 (196)	4.0 (192)	3.9 (187)	3.8 (182)	3.7 (177)	3.6 (172)	3.5 (168)	3.4 (163)	3.3 (158)	3.2 (153)	3.1 (148)	3.0 (144)	2.9 (139)	2.8 (134)	2.7 (129)	2.6 (124)	2.5 (120)	2.4 (115)	2.3 (110)	2.2 (105)	2.1 (101)	2.0 (96)
8.5 (2.59)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	18 (457)	21 (533)	24 (610)	24 (610)	27 (686)	30 (762)
9.0 (2.74)	9 (229)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	18 (457)	21 (533)	21 (533)	24 (610)	24 (610)	27 (686)	30 (762)
9.5 (2.90)	9 (229)	9 (229)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	18 (457)	21 (533)	21 (533)	24 (610)	24 (610)	27 (686)	30 (762)	33 (838)
10.0 (3.05)	9 (229)	9 (229)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	18 (457)	21 (533)	21 (533)	24 (610)	24 (610)	27 (686)	30 (762)	33 (838)	36 (915)
10.5 (3.20)	9 (229)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	18 (457)	21 (533)	21 (533)	24 (610)	24 (610)	27 (686)	30 (762)	30 (762)	33 (838)	36 (915)
11.0 (3.35)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	18 (457)	21 (533)	21 (533)	24 (610)	24 (610)	27 (686)	27 (686)	30 (762)	33 (838)	36 (915)	39 (991)
11.5 (3.50)	12 (305)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	18 (457)	21 (533)	21 (533)	24 (610)	24 (610)	27 (686)	27 (686)	30 (762)	33 (838)	36 (915)	39 (991)	42 (1067)
12.0 (3.66)	12 (305)	12 (305)	12 (305)	15 (381)	15 (381)	15 (381)	15 (381)	18 (457)	18 (457)	18 (457)	21 (533)	21 (533)	21 (533)	24 (610)	24 (610)	27 (686)	30 (762)	30 (762)	33 (838)	36 (915)	39 (991)	42 (1067)

NOTE: The design engineer is solely responsible for assessing the bearing resistance (allowable bearing capacity) of the subgrade soils and determining the depth of foundation stone. Subgrade bearing resistance should be assessed with consideration for the range of soil moisture conditions expected under a stormwater system.

Tables 3, 4 and **5** provide cumulative storage volumes for the SC-310, SC-740 and DC-780 chamber systems. This information may be used to calculate a detention/retention system's stage storage volume. A spreadsheet is available at www.stormtech.com in which the number of chambers can be input for quick cumulative storage calculations. *Product Specifications: 1.1, 2.2, 2.3, 2.4, and 2.6*

Table 3 - SC-310 Cumulative Storage Volumes Per Chamber

Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (150 mm) Stone Base Under the Chambers.

Depth of Water in System Inches (mm)	Cumulative Chamber Storage ft³ (m³)	Total System Cumulative Storage ft³ (m³)
28 (711)	14.70 (0.416)	31.00 (0.878)
27 (686)	14.70 (0.416)	30.21 (0.855)
26 (680)	Stone 14.70 (0.416)	29.42 (0.833)
25 (610)	Cover 14.70 (0.416)	28.63 (0.811)
24 (609)	14.70 (0.416)	27.84 (0.788)
23 (584)	14.70 (0.416)	27.05 (0.766)
22 (559)	14.70 (0.416)	26.26 (0.748)
21 (533)	14.64 (0.415)	25.43 (0.720)
20 (508)	14.49 (0.410)	24.54 (0.695)
19 (483)	14.22 (0.403)	23.58 (0.668)
18 (457)	13.68 (0.387)	22.47 (0.636)
17 (432)	12.99 (0.368)	21.25 (0.602)

Table 3 - SC-310 Cumulative Storage Volumes (cont.)

Depth of Water in System Inches (mm)	Cumulative Chamber Storage ft³ (m³)	Total System Cumulative Storage ft³ (m³)
16 (406)	12.17 (0.345)	19.97 (0.566)
15 (381)	11.25 (0.319)	18.62 (0.528)
14 (356)	10.23 (0.290)	17.22 (0.488)
13 (330)	9.15 (0.260)	15.78 (0.447)
12 (305)	7.99 (0.227)	14.29 (0.425)
11 (279)	6.78 (0.192)	12.77 (0.362)
10 (254)	5.51 (0.156)	11.22 (0.318)
9 (229)	4.19 (0.119)	9.64 (0.278)
8 (203)	2.83 (0.081)	8.03 (0.227)
7 (178)	1.43 (0.041)	6.40 (0.181)
6 (152)	0	4.74 (0.134)
5 (127)	0	3.95 (0.112)
4 (102)	Stone 0	3.16 (0.090)
3 (76)	Foundation 0	2.37 (0.067)
2 (51)	0	1.58 (0.046)
1 (25)	0	0.79 (0.022)

Note: Add 0.79 ft³ (0.022 m³) of storage for each additional inch (25 mm) of stone foundation.

5.0 Cumulative Storage Volumes

TABLE 4 – SC-740 Cumulative Storage Volumes Per Chamber
Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (150 mm) Stone Base Under the Chambers.

Depth of Water in System Inches (mm)	Cumulative Chamber Storage Ft³ (m³)	Total System Cumulative Storage Ft³ (m³)
42 (1067)	45.90 (1.300)	74.90 (2.121)
41 (1041)	45.90 (1.300)	73.77 (2.089)
40 (1016)	Stone 45.90 (1.300)	72.64 (2.057)
39 (991)	Cover 45.90 (1.300)	71.52 (2.025)
38 (965)	45.90 (1.300)	70.39 (1.993)
37 (948)	45.90 (1.300)	69.26 (1.961)
36 (914)	45.90 (1.300)	68.14 (1.929)
35 (889)	45.85 (1.298)	66.98 (1.897)
34 (864)	45.69 (1.294)	65.75 (1.862)
33 (838)	45.41 (1.286)	64.46 (1.825)
32 (813)	44.81 (1.269)	62.97 (1.783)
31 (787)	44.01 (1.246)	61.36 (1.737)
30 (762)	43.06 (1.219)	59.66 (1.689)
29 (737)	41.98 (1.189)	57.89 (1.639)
28 (711)	40.80 (1.155)	56.05 (1.587)
27 (686)	39.54 (1.120)	54.17 (1.534)
26 (660)	38.18 (1.081)	52.23 (1.479)
25 (635)	36.74 (1.040)	50.23 (1.422)
24 (610)	35.22 (0.977)	48.19 (1.365)
23 (584)	33.64 (0.953)	46.11 (1.306)
22 (559)	31.99 (0.906)	44.00 (1.246)
21 (533)	30.29 (0.858)	41.85 (1.185)
20 (508)	28.54 (0.808)	39.67 (1.123)
19 (483)	26.74 (0.757)	37.47 (1.061)
18 (457)	24.89 (0.705)	35.23 (0.997)
17 (432)	23.00 (0.651)	32.96 (0.939)
16 (406)	21.06 (0.596)	30.68 (0.869)
15 (381)	19.09 (0.541)	28.36 (0.803)
14 (356)	17.08 (0.484)	26.03 (0.737)
13 (330)	15.04 (0.426)	23.68 (0.670)
12 (305)	12.97 (0.367)	21.31 (0.608)
11 (279)	10.87 (0.309)	18.92 (0.535)
10 (254)	8.74 (0.247)	16.51 (0.468)
9 (229)	6.58 (0.186)	14.09 (0.399)
8 (203)	4.41 (0.125)	11.66 (0.330)
7 (178)	2.21 (0.063)	9.21 (0.264)
6 (152)	0	6.76 (0.191)
5 (127)	0	5.63 (0.160)
4 (102)	Stone 0	4.51 (0.125)
3 (76)	Foundation 0	3.38 (0.095)
2 (51)	0	2.25 (0.064)
1 (25)	0	1.13 (0.032)

Note: Add 1.13 ft³ (0.032 m³) of storage for each additional inch (25 mm) of stone foundation.

Table 5 - DC-780 Cumulative Storage Volumes Per Chamber
Assumes 40% Stone Porosity. Calculations are Based Upon a 9" (230 mm) Stone Base Under the Chambers.

Depth of Water in System Inches (mm)	Cumulative Chamber Storage Ft³ (m³)	Total System Cumulative Storage Ft³ (m³)
45 (1143)	46.27 (1.310)	78.47 (2.222)
44 (1118)	46.27 (1.310)	77.34 (2.190)
43 (1092)	Stone 46.27 (1.310)	76.21 (2.158)
42 (1067)	Cover 46.27 (1.310)	75.09 (2.126)
41 (1041)	46.27 (1.310)	73.96 (2.094)
40 (1016)	46.27 (1.310)	72.83 (2.062)
39 (991)	46.27 (1.310)	71.71 (2.030)
38 (965)	46.21 (1.309)	70.54 (1.998)
37 (940)	46.04 (1.304)	69.32 (1.963)
36 (914)	45.76 (1.296)	68.02 (1.926)
35 (889)	45.15 (1.278)	66.53 (1.884)
34 (864)	44.34 (1.255)	64.91 (1.838)
33 (838)	43.38 (1.228)	63.21 (1.790)
32 (813)	42.29 (1.198)	61.43 (1.740)
31 (787)	41.11 (1.164)	59.59 (1.688)
30 (762)	39.83 (1.128)	57.70 (1.634)
29 (737)	38.47 (1.089)	55.76 (1.579)
28 (711)	37.01 (1.048)	53.76 (1.522)
27 (686)	35.49 (1.005)	51.72 (1.464)
26 (660)	33.90 (0.960)	49.63 (1.405)
25 (635)	32.24 (0.913)	47.52 (1.346)
24 (610)	30.54 (0.865)	45.36 (1.285)
23 (584)	28.77 (0.815)	43.18 (1.223)
22 (559)	26.96 (0.763)	40.97 (1.160)
21 (533)	25.10 (0.711)	38.72 (1.096)
20 (508)	23.19 (0.657)	36.45 (1.032)
19 (483)	21.25 (0.602)	34.16 (0.967)
18 (457)	19.26 (0.545)	31.84 (0.902)
17 (432)	17.24 (0.488)	29.50 (0.835)
16 (406)	15.19 (0.430)	27.14 (0.769)
15 (381)	13.10 (0.371)	24.76 (0.701)
14 (356)	10.98 (0.311)	22.36 (0.633)
13 (330)	8.83 (0.250)	19.95 (0.565)
12 (305)	6.66 (0.189)	17.52 (0.496)
11 (279)	4.46 (0.126)	15.07 (0.427)
10 (254)	2.24 (0.064)	12.61 (0.357)
9 (229)	0	10.14 (0.287)
8 (203)	0	9.01 (0.255)
7 (178)	Stone 0	7.89 (0.223)
6 (152)	Foundation 0	6.76 (0.191)
5 (127)	0	5.63 (0.160)
4 (102)	0	4.51 (0.128)
3 (76)	0	3.38 (0.096)
2 (51)	0	2.25 (0.064)
1 (25)	0	1.13 (0.032)

Note: Add 1.13 cu. ft. (0.032 m³) of storage for each additional inch (25 mm) of stone foundation.

6.1 CHAMBER ROW SEPARATION

StormTech SC-740, SC-310 and DC-780 chambers must be specified with a minimum 6" (150 mm) space between the feet of adjacent parallel chamber rows. Increasing the space between rows is acceptable. This will increase the storage volume due to additional stone voids.

6.2 STONE SURROUNDING CHAMBERS

Refer to **Table 6** for acceptable stone materials. StormTech requires clean, crushed, angular stone below, between and above chambers as shown in **Figure 6**. Acceptable gradations are listed in **Table 6.** Subrounded and rounded stone are not acceptable.

6.3 GEOTEXTILE SEPARATION REQUIREMENT

A non-woven geotextile that meets AASHTO M288 Class 2 Separation requirements must be applied as a separation layer to prevent soil intrusion into the clean, crushed, angular stone as shown in **Figure 6**. The geotextile is required between the clean, crushed, angular stone and the subgrade soils, the excavation's sidewalls and the fill materials. The geotextile should completely envelope the clean, crushed, angular stone. Overlap adjacent geotextile rolls per AASHTO M288 separation guidelines. Contact StormTech for a list of acceptable geotextiles.

6.4 FILL ABOVE CHAMBERS

Refer to **Table 6** and **Figure 6** for acceptable fill material above the 6" (150 mm) of clean, crushed, angular stone. Minimum and maximum fill requirements for the SC-740, SC-310 and DC-780 chambers are shown in **Figure 6** below. StormTech requires a minimum of 24" (600 mm) of fill in non-paved installations where rutting from vehicles may occur. **Table 6** provides details on soil class and compaction requirements for suitable fill materials.

Table 6 – Acceptable Fill Materials

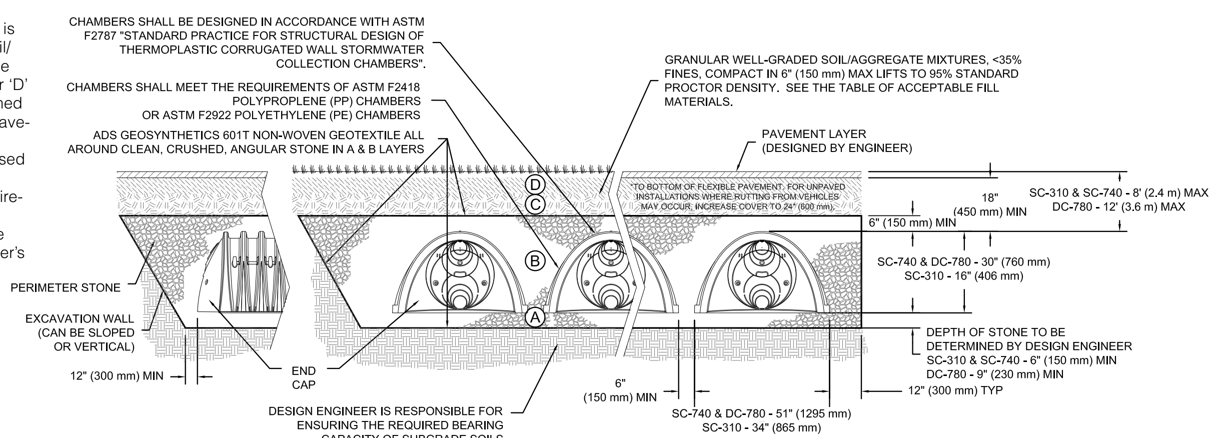
MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4-2 INCH (20-50 mm)	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4-2 INCH (20-50 mm)	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. [2 3]

PLEASE NOTE:

1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.

Figure 6 – Fill Material Locations

Once layer 'C' is placed any soil/material can be placed in layer 'D' up to the finished grade. Most pavement subbase soils can be used to replace the materials requirements of layer 'C' or 'D' at the design engineer's discretion.



7.0 Inletting the Chambers

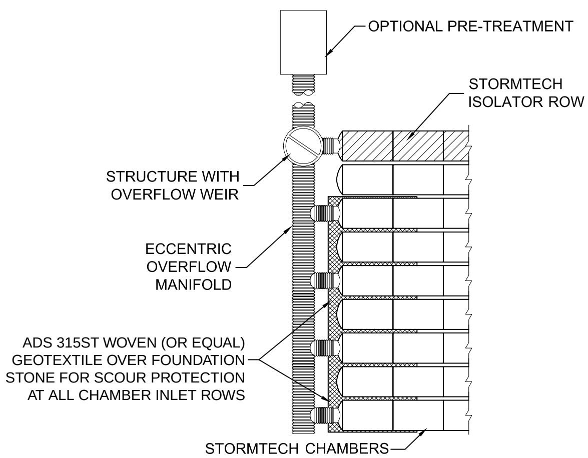
The design flexibility of a StormTech chamber system includes many inletting possibilities. Contact StormTech's Technical Service Department for guidance on designing an inlet system to meet specific site goals.

7.1 TREATMENT TRAIN

A properly designed inlet system can ensure good water quality, easy inspection and maintenance, and a long system service life. StormTech recommends a treatment train approach for inletting an underground stormwater management system under a typical commercial parking area. *Treatment train* is an industry term for a multi-tiered water quality network. As shown in **Figure 7**, a StormTech recommended inlet system can inexpensively have tiers of treatment upstream of the StormTech chambers:

Tier 1 – Pre-treatment (BMP)
Tier 2 - StormTech Isolator® Row
Tier 3 - Enhanced Treatment (BMP)

Figure 7 – Typical StormTech Treatment Train Inlet System



7.2 PRE-TREATMENT (BMP) – TREATMENT TIER 1

In some areas pre-treatment of the stormwater is required prior to entry into a stormwater system. By treating the stormwater prior to entry into the system, the service life of the system can be extended, pollutants such as hydrocarbons may be captured, and local regulations met. Pre-treatment options are often described as a Best Management Practice or simply a BMP.

Pre-treatment devices differ greatly in complexity, design and effectiveness. Depending on a site's characteristics and treatment goals, the simple, least expensive pre-treatment solutions can sometimes be just as effective as the complex systems. Options include a simple deep sumped manhole with a 90° bend on its outlet, baffle boxes, swirl concentrators, and devices that combine these processes. Some of the most effective pre-treatment options combine engineered site grading with vegetation such as bio-swales or grassy strips.

The type of pretreatment device specified as the first level of treatment up-stream of a StormTech chamber system can vary greatly throughout the country and from site-to-site. It is the responsibility of the design engineer to understand the water quality requirements and design a stormwater treatment system that will satisfy local regulators and follow applicable laws. A design engineer should apply their understanding of local weather conditions, site topography, local maintenance requirements, expected service life, etc…to select an appropriate stormwater pre-treatment system.

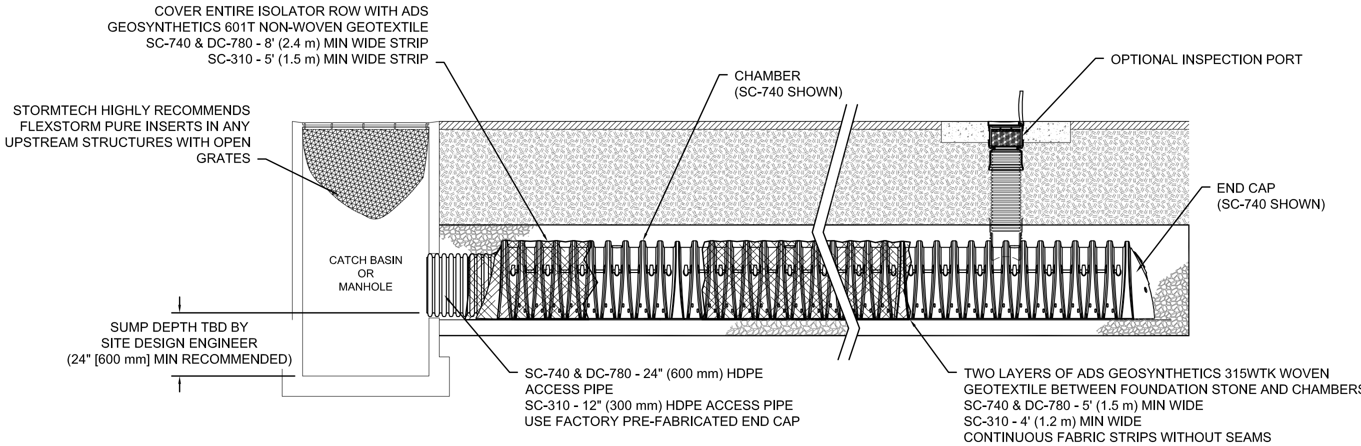
7.3 STORMTECH ISOLATOR ROW – TREATMENT TIER 2

StormTech has a patented technique to inexpensively enhance Total Suspended Solids (TSS) removal and provide easy access for inspection and maintenance. The StormTech Isolator Row is a row of standard StormTech chambers surrounded with appropriate filter fabrics and connected to a manhole for easy access. This application basically creates a filter/detention basin that allows water to egress through the surrounding filter fabric while sediment is trapped within. It may be best to think of the Isolator Row as a first-flush treatment device. *First-Flush* is a term typically used to describe the first ½" to 1" (13-25 mm) of rainfall or runoff on a site. The majority of stormwater pollutants are carried in the sediments of the first-flush, therefore the Isolator Row is an effective component of a treatment train.

The StormTech Isolator Row should be designed with a manhole with an overflow weir at its upstream end. The diversion manhole is multi-purposed. It can provide access to the Isolator Row for both inspection and maintenance and acts as a diversion structure. The manhole is connected to the Isolator Row with a short length of 12" (300 mm) pipe for the SC-310 chamber and 24" (600 mm) pipe for the SC-740 and DC-780 chambers. These pipes are connected to the Isolator Row with a 12" (300 mm) fabricated end cap for the SC-310 chamber and a 24" (600 mm) fabricated end cap for the SC-740 and DC-780 chambers. The overflow weir typically has its crest set between the top of the chamber and its midpoint. This allows stormwater in excess of the Isolator Row's storage/conveyance capacity to bypass into the chamber system through the downstream manifold system.

Specifying and installing proper geotextiles is essential for efficient operation and to prevent damage to the system during the JetVac maintenance process. In a typical configuration, two strips of woven geotextile that meet AASHTO M288 Class 1 requirements are required between the chambers and the stone foundation. This strong filter fabric traps sediments and protects the stone base during maintenance. A strip of non-woven

Figure 8 – StormTech Isolator Row Detail



Note: Non-woven geotextile over DC-780 Isolator Row chambers is not required.

AASHTO M288 Class 2 geotextile is draped over the Isolator chamber row. This 6-8 oz. (217-278 g/m^2) non-woven filter fabric prevents sediments from migrating out of the chamber perforations while allowing modest amounts of water to flow out of the Isolator Row. **Figure 8** is a detail of the Isolator Row that shows proper application of the geotextiles. Contact StormTech for a table of acceptable geotextiles.

Inspection is easily accomplished through the upstream manhole or optional inspection ports. Maintenance of an Isolator Row is fast and easy using the JetVac process through the upstream manhole. Section 12.0 explains the inspection and maintenance process in more detail.

Isolator Rows can be sized to accommodate either a water quality volume or a water quality flow rate requirement. The use of filter fabric around the Isolator Row chambers allows stormwater to egress out of the row during and between storm events. The rate of egression for design is dependent upon the chamber model and sediment accumulation on the geotextile. Contact StormTech's Technical Services Department for more information on Isolator Row sizing.

7.4 ENHANCED TREATMENT (BMP) – TREATMENT TIER 3

As regulations have become more stringent, requiring higher levels of containment removal, water quality systems may be required to treat higher flow rates, greater volumes or to provide a higher level of filtration or other more sophisticated treatment process. StormTech systems can easily be configured with enhanced treatment techniques located either upstream or down stream of the retention or detention chamber system. Located upstream of an infiltration bed, between the pretreatment device and the Isolator Row, enhanced treatment provides a high level of contaminant removal which protects groundwater or better preserves the infiltration surface. Located downstream of detention, enhanced treatment provides a higher level of contaminant removal prior to discharge to a receiving body.

Enhanced treatment BMPs are normally applied where specific regulations and specific water quality product approvals are in place. StormTech works closely with providers of enhanced treatment technologies to meet local requirements.

7.5 TREATMENT TRAIN CONCLUSION

The treatment train is a highly effective water-quality approach that may not add significant cost to a StormTech system being installed under commercial parking areas. The StormTech Isolator Row adds a significant level of treatment, easy inspection and maintenance, while maintaining storage volume credit for the cost of a modest amount of geotextile. Finally where higher levels of treatment are required, StormTech can integrate other technologies into the treatment train to provide the most cost effective treatment approach. This treatment train concept provides three levels of treatment, inspection and maintenance upstream and downsstream of the StormTech detention/retention bed.

7.0 Inletting the Chambers

7.6 OTHER INLET OPTIONS

While the three-tiered treatment train approach is the recommended method of inletting StormTech chambers for typical under-commercial parking applications, there are other effective inlet methods that may be considered. For instance, Isolator Rows, while adding an inexpensive level of confidence, are not always necessary. A header system with fewer inlets can be designed to further minimize the cost of a StormTech system. There may be applications where stormwater pre-treatment may not be necessary at all and the system can be inlet directly from the source. Contact StormTech's Technical Service Department to discuss inlet options.

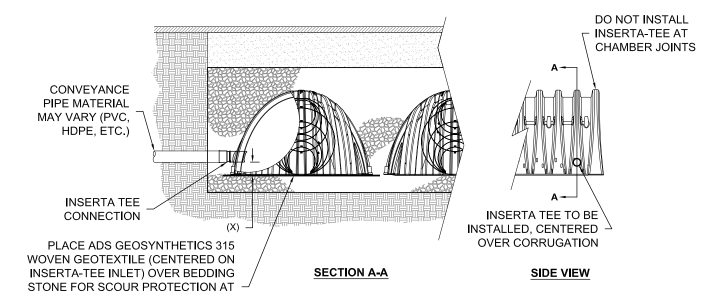
7.7 LATERAL FLOW RATES

The embedment stone surrounding the StormTech chambers allows the rapid conveyance of stormwater between chamber rows. Stormwater will rise and fall evenly within a bed of chambers. A single StormTech SC-740 chamber is able to release or accept stormwater at a rate of at least 0.5 cfs (14.2 l/s) through the surrounding stone.

7.8 INLETTING PERPENDICULAR TO A ROW OF CHAMBERS WITH INSERTA TEE

There is an easy, inexpensive method to perpendicularly inlet a row of chambers. Simply connect the inlet directly to the chamber with an Inserta Tee. **Figure 9** shows a typical detail along with the standard sizes offered for each chamber model.

Figure 9 – Inserta Tee Detail



CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		

NOTE:
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.

7.9 MAXIMUM INLET PIPE VELOCITIES TO PREVENT SCOURING OF THE STONE FOUNDATION

The primary function of the inlet manifold is to convey and distribute flows to a sufficient number of rows in the chamber bed such that there is ample conveyance capacity to pass the peak flows without creating an unacceptable backwater condition in upstream piping or scour the foundation stone under the chambers.

Manifolds are connected to the end caps either at the top or bottom of the end cap. High inlet flow rates from either connection location produce a shear scour potential of the foundation stone. Inlet flows from top inlets also produce impingement scour potential. Scour potential is reduced when standing water is present over the foundation stone. However, for safe design across the wide range of applications, StormTech assumes minimal standing water at the time the design flow occurs.

To minimize scour potential, StormTech recommends the installation of woven scour protection fabric at each inlet row. This enables a protected transition zone from the concentrated flow coming out of the inlet pipe to a uniform flow across the entire width of the chamber for both top and bottom connections. Allowable flow rates for design are dependent upon: the elevation of inlet pipe, foundation stone size and scour protection. An appropriate scour protection geotextile is installed from the end cap to at least 10.5' (3.2 m) for the SC-310, SC-740 and DC 780 chambers for both top and bottom feeding inlet pipes.

See StormTech's Tech Sheet #7 for guidance on manifold sizing. ADS's Technical Services department can also assist with sizing inlet manifolds for the StormTech chamber systems.

Table 7A – Standard distances from base of chamber to invert of inlet and outlet manifolds on StormTech end caps.

SC-310 ENDCAPS				
	PIPE DIA.	INV. (IN)	INV. (FT)	INV. (MM)
TOP	6" (150 mm)	5.8"	0.48	146
TOP	8" (200 mm)	3.5"	0.29	88
TOP	10" (250 mm)	1.4"	0.12	37
BOTTOM	6" (150 mm)	0.5"	0.04	12
BOTTOM	8" (200 mm)	0.6"	0.05	15
BOTTOM	10" (250 mm)	0.7"	0.06	18
BOTTOM	12" (300 mm)	0.9"	0.08	24

SC-740 / DC-780 ENDCAPS				
	PIPE DIA.	INV. (IN)	INV. (FT)	INV. (MM)
TOP	6" (150 mm)	18.5"	1.54	469
TOP	8" (200 mm)	16.5"	1.38	421
TOP	10" (250 mm)	14.5"	1.21	369
TOP	12" (300 mm)	12.5"	1.04	317
TOP	15" (375 mm)	9"	0.75	229
TOP	18" (450 mm)	5"	0.42	128
BOTTOM	6" (150 mm)	0.5"	0.04	12
BOTTOM	8" (200 mm)	0.6"	0.05	15
BOTTOM	10" (250 mm)	0.7"	0.06	18
BOTTOM	12" (300 mm)	1.2"	0.10	30
BOTTOM	15" (375 mm)	1.3"	0.11	34
BOTTOM	18" (450 mm)	1.6"	0.13	40
BOTTOM	24" (600 mm)	0.1"	0.01	3

See StormTech's Tech Sheet #7 for manifold sizing guidance

8.0 OUTLETS FOR STORMTECH CHAMBER SYSTEMS

The majority of StormTech installations are detention systems and have some type of outlet structure. An outlet manifold is generally designed to ensure that peak flows can be conveyed to the outlet structure.

To drain the system completely, an underdrain system is located at or below the bottom of the foundation stone. Some beds may be designed with a pitched base to ensure complete drainage of the system. A grade of ½% is usually satisfactory.

An outlet pipe may be located at a higher invert within a bed. This allows a designed volume of water to infiltrate while excess volumes are outlet as necessary. This is an excellent method of recharging groundwater, replicating a site's pre-construction hydraulics.

Depending on the bed layout and inverts, outlet pipes should be placed in the embedment stone along the bed's perimeter as shown in **Figures 10** and **11**. Solid outlet pipes should also be used to penetrate the StormTech end caps at the designed outlet invert as shown in **Figure 12**. An Isolator Row should not be directly penetrated with an outlet pipe. For systems requiring higher outlet flow rates, a combination of connections may be utilized as shown in **Figure 13**.

In detention and retention applications the discharge of water from the stormwater management system is determined based on the hydrology of the area and the hydraulic design of the system. It is the design engineer's responsibility to design an outlet system that meets their hydraulic objectives while following local laws and regulations.

Table 7B – Maximum outlet flow rate capacities from StormTech manifolds.

OUTLET FLOW		
PIPE DIA.	**FLOW (CFS)**	**FLOW (L/S)**
6" (150 mm)	0.4	11.3
8" (200 mm)	0.7	19.8
10" (250 mm)	1.0	28.3
12" (300 mm)	2.0	56.6
15" (375 mm)	2.7	76.5
18" (450 mm)	4.0	113.3
24" (600 mm)	7.0	198.2
30" (750 mm)	11.0	311.5
36" (900 mm)	16.0	453.1
42" (1050 mm)	22.0	623.0
48" (1200 mm)	28.0	792.9

Figure 10 – Underdrain Parallel

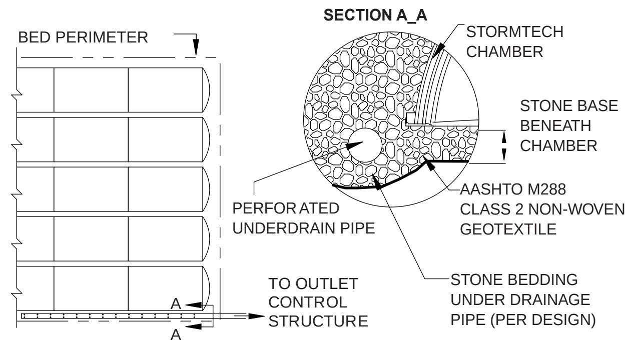


Figure 11 – Underdrain Perpendicular

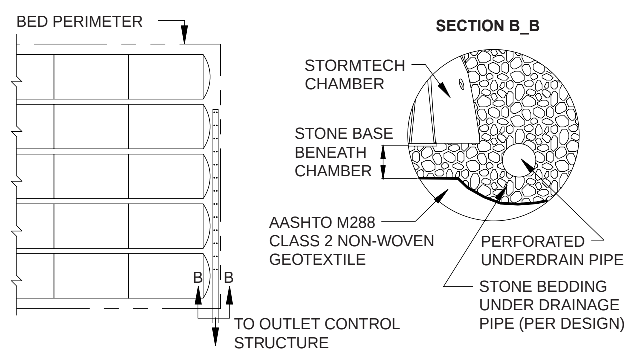


Figure 12 – Outlet Manifold

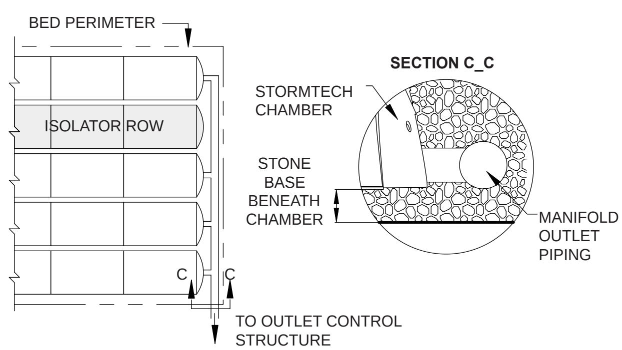
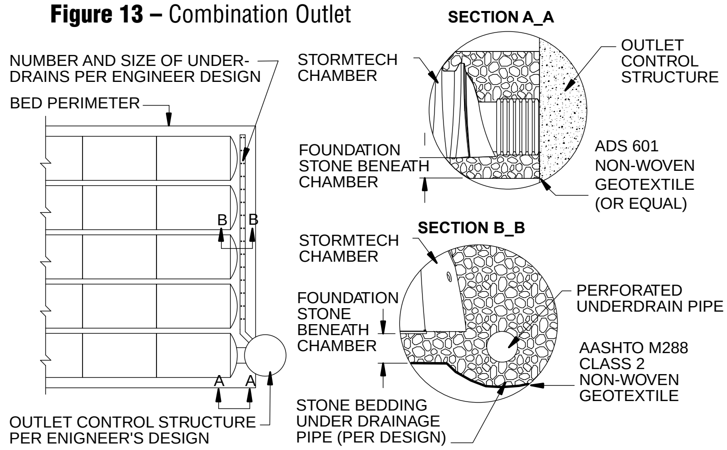


Figure 13 – Combination Outlet



9.0 Other Considerations

9.1 EROSION CONTROL

Erosion and sediment control measures must be integrated into the plan to protect the stormwater system both during and after construction. These practices may have a direct impact on the system's infiltration performance and longevity. Vegetation, temporary sediment barriers (silt fences, hay bales, fabric-wrapped catch basin grates), and strategic stormwater runoff management may be used to control erosion and sedimentation. StormTech recommends the use of pipe plugs on the inlet pipe until the system is in service.

9.2 SITE IMPROVEMENT TECHNIQUES

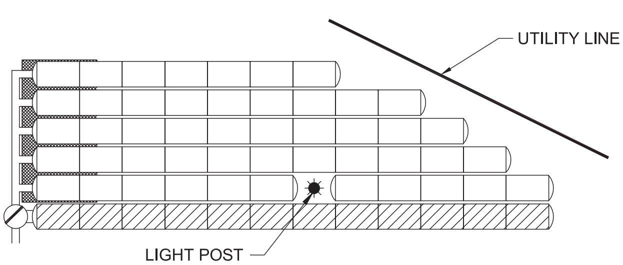
When site conditions are less than optimal, StormTech recognizes many methods for improving a site for construction. Some techniques include the removal and replacement of poor materials, the use of engineered subgrade materials, aggregates, chemical treatment, and mechanical treatments including the use of geosynthetics. StormTech recommends referring to AASHTO M 288 guidelines for the appropriate use of geotextiles.

StormTech also recognizes geogrid as a potential component of an engineered solution to improve site conditions or as a construction tool for the experienced contractor. StormTech chamber systems are compatible with the use of geosynthetics. The use of geosynthetics or any other site improvement method does not eliminate or modify any of StormTech's requirements. **It is the ultimate responsibility of the design engineer to ensure that site conditions are suitable for a StormTech chamber system.**

9.3 CONFORMING TO SITE CONSTRAINTS

StormTech chambers have the unique ability to conform to site constraints such as utility lines, light posts, large trees, etc. Rows of chambers can be ended short or interrupted by placing an end cap at the desired location, leaving the required number of chambers out of the row to get by the obstruction, then starting the row of chambers again with another end cap. See **Figure 14** for an example.

Figure 14 – Ability to Conform to Site Constraints



9.4 LINERS

StormTech chambers offer the distinct advantage and versatility that allow them to be designed as an open bottom detention or retention system. In fact, the vast majority of StormTech installations and designs are open bottom detention systems. Using an open bottom system enables treatment of the storm water through the underlying soils and provides a volume safety factor based on the infiltrative capacity of the underlying soils.

In some applications, however, open bottom detention systems may not be allowed. StormTech's Tech Sheet #2 provides guidance for the design and installation of thermoplastic liners for detention systems using StormTech chambers. The major points of the memo are:

- Infiltration of stormwater is generally a desirable stormwater management practice, often required by regulations. Lined systems should only be specified where unique site conditions preclude significant infiltration.
- Thermoplastic liners provide cost effective and viable means to contain stormwater in StormTech subsurface systems where infiltration is undesirable.
- PVC and LLDPE are the most cost effective, installed membrane materials.
- Enhanced puncture resistance from angular aggregate on the water side and from protrusions on the soil side can be achieved by placing a non-woven geotextile reinforcement on each side of the geomembrane. A sand underlayment in lieu of the geotextile reinforcement on the soil side may be considered when cost effective.
- StormTech does not design, fabricate, sell or install thermoplastic liners. StormTech recommends consulting with liner professionals for final design and installation advice.

Figure 15 – Chamber bed placed around light post.

For quick calculations, refer to the Site Calculator on StormTech's website at ***www.stormtech.com****.*

10.1 SYSTEM SIZING

The following steps provide the calculations necessary to size a system. If you need assistance determining the number of chambers per row or customizing the bed configuration to fit a specific site, call StormTech's Technical Services Department at **1-888-892-2694.**

1) Determine the amount of storage volume (V_S) required.

It is the design engineer's sole responsibility to determine the storage volume required by local codes.

TABLE 8 – Storage Volume Per Chamber ft³ (m³)

	Bare Chamber Storage	Chamber and Stone Foundation Depth in. (mm)		
	ft³ (m³)	**6 (150)**	**12 (300)**	**18 (450)**
StormTech SC-740	45.9 (1.3)	74.9 (2.1)	81.7 (2.3)	88.4 (2.5)
StormTech SC-310	14.7 (0.4)	31.0 (0.9)	35.7 (1.0)	40.4 (1.1)
	ft³ (m³)	**9 (230)**	**12 (300)**	**18 (450)**
StormTech DC-780	46.2 (1.3)	78.4 (2.2)	81.8 (2.3)	88.6 (2.5)

Note: Assumes 40% porosity for the stone plus the chamber volume.

2) Determine the number of chambers (C) required.

To calculate the number of chambers needed for adequate storage, divide the storage volume (Vs) by the volume of the selected chamber, as follows:
C = Vs / Volume per Chamber

3) Determine the required bed size (S).

To find the size of the bed, multiply the number of chambers needed (C) by either:

StormTech SC-740 / DC-780
bed area per chamber = 33.8 ft² (3.1 m³)

StormTech SC-310
bed area per chamber = 23.7 ft² (2.2 m³)

S = (C x bed area per chamber) + [1 foot (0.3 m) x bed perimeter in feet (meters)]

NOTE: It is necessary to add one foot (0.3 m) around the perimeter of the bed for end caps and working space.

4) Determine the amount of clean, crushed, angular stone (Vst) required.

TABLE 9 – Amount of Stone Per Chamber

	Stone Foundation Depth		
ENGLISH tons (yd³)	**6"**	**12"**	**18"**
StormTech SC-740	3.8 (2.8)	4.6 (3.3)	5.5 (3.9)
StormTech SC-310	2.1 (1.5)	2.7 (1.9)	3.4 (2.4)
METRIC kg (m³)	**150 mm**	**300 mm**	**450 mm**
StormTech SC-740	3450 (2.1)	4170 (2.5)	4490 (3.0)
StormTech SC-310	1830 (1.1)	2490 (1.5)	2990 (1.8)
ENGLISH tons (yd³)	**9"**	**12"**	**18"**
StormTech DC-780	4.2 (3.0)	4.7 (3.3)	5.6 (3.9)
METRIC kg (m³)	**230 mm**	**300 mm**	**450 mm**
StormTech DC-780	3810 (2.3)	4264 (2.5)	5080 (3.0)

Note: Assumes 6" (150 mm) of stone above, and between chambers.

To calculate the total amount of clean, crushed, angular stone required, multiply the number of chambers (C) by the selected weight of stone from **Table 9.**
NOTE: Clean, crushed, angular stone is also required around the perimeter of the system.

5) Determine the volume of excavation (Ex) required.
6) Determine the area of filter fabric (F) required.

TABLE 10 – Volume of Excavation Per Chamber yd³ (m³)

	Stone Foundation Depth		
	6" (150 mm)	**12" (300 mm)**	**18" (450 mm)**
StormTech SC-740	5.5 (4.2)	6.2 (4.7)	6.8 (5.2)
StormTech SC-310	2.9 (2.2)	3.4 (2.6)	3.8 (2.9)
	9" (230 mm)	**12" (300 mm)**	**18" (457 mm)**
StormTech DC-780	5.9 (4.5)	6.3 (4.8)	6.9 (5.3)

Note: Assumes 6" (150 mm) of separation between chamber rows and 18" (450 mm) of cover. The volume of excavation will vary as the depth of the cover increases.

Each additional foot of cover will add a volume of excavation of 1.3 yds³ (1.0 m³) per SC-740 / DC-780 and 0.9 yds³ (0.7 m³) per SC-310 chamber.

The bottom and sides of the bed and the top of the embedment stone must be covered with ADS 601 (or equal) a non-woven geotextile (filter fabric). The area of the sidewalls must be calculated and a 2 foot (0.6 m) overlap must be included where two pieces of filter fabric are placed side-by-side or end-to-end. Geotextiles typically come in 15 foot (4.6 m) wide rolls.

7) Determine the number of end caps (E_C) required.

Each row of chambers requires two end caps.

E_C = number of rows x 2

11.0 Detail Drawings

Figure 16 – Inspection Port Detail

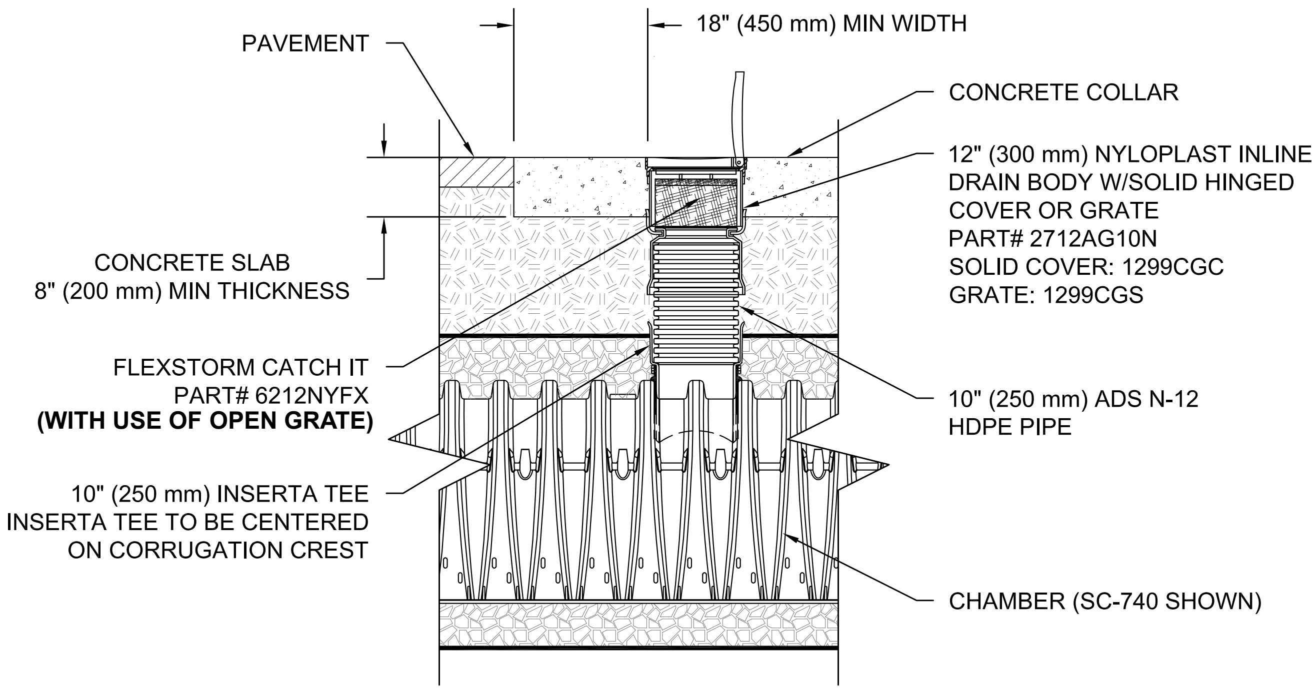
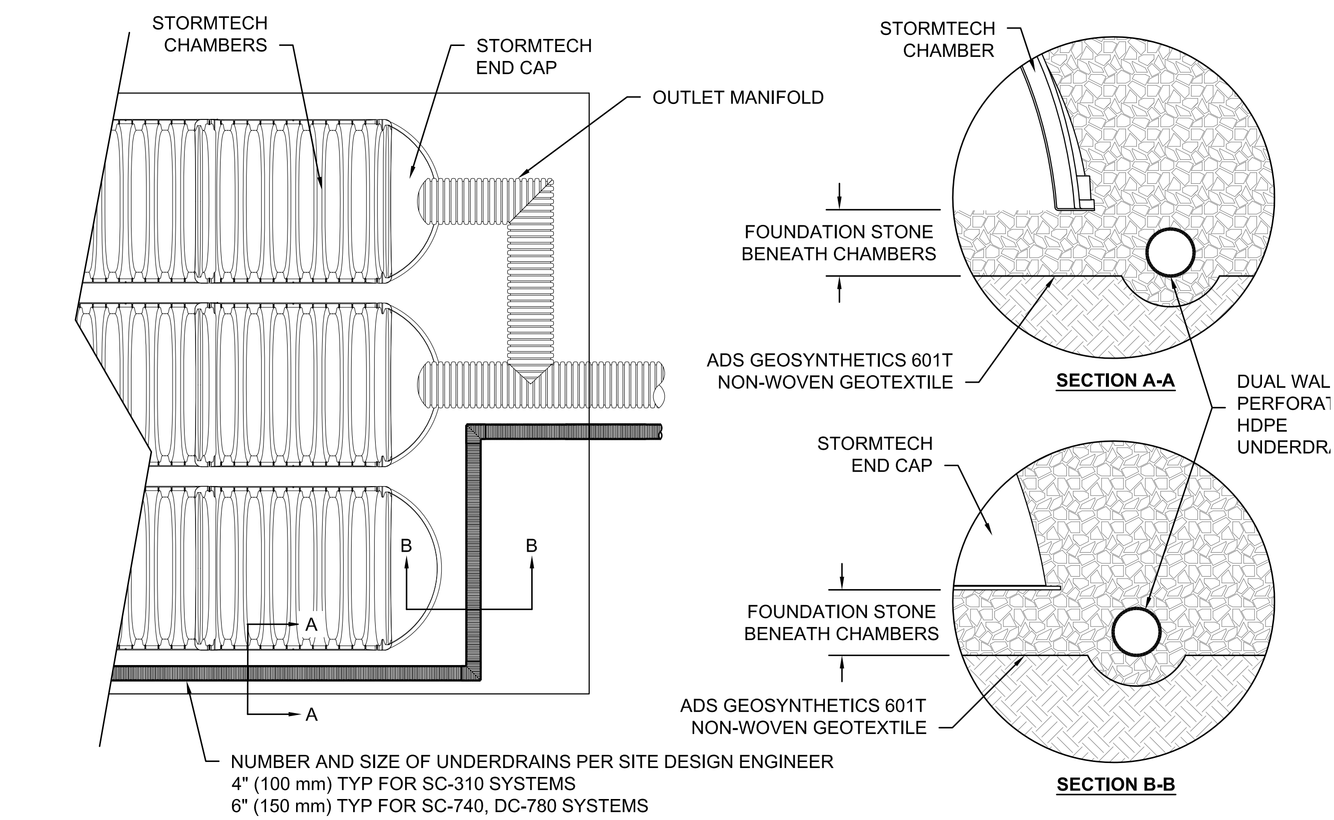


Figure 17 – Under Drain Detail



12.1 ISOLATOR ROW INSPECTION

Regular inspection and maintenance are essential to assure a properly functioning stormwater system. Inspection is easily accomplished through the manhole or optional inspection ports of an Isolator Row. Please follow local and OSHA rules for a confined space entry.

Inspection ports can allow inspection to be accomplished completely from the surface without the need for a confined space entry. Inspection ports provide visual access to the system with the use of a flashlight. A stadia rod may be inserted to determine the depth of sediment. If upon visual inspection it is found that sediment has accumulated to an average depth exceeding 3" (76 mm), cleanout is required.

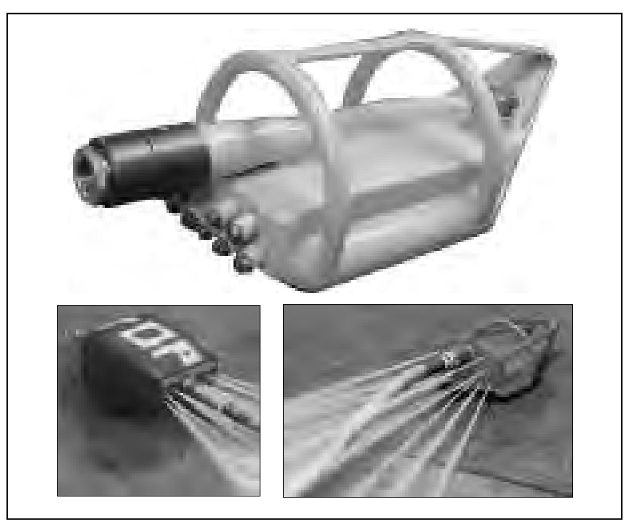
A StormTech Isolator Row should initially be inspected immediately after completion of the site's construction. While every effort should be made to prevent sediment from entering the system during construction, it is during this time that excess amounts of sediments are most likely to enter any stormwater system. Inspection and maintenance, if necessary, should be performed prior to passing responsibility over to the site's owner. Once in normal service, a StormTech Isolator Row should be inspected bi-annually until an understanding of the sites characteristics is developed. The site's maintenance manager can then revise the inspection schedule based on experience or local requirements.

12.2 ISOLATOR ROW MAINTENANCE

JetVac maintenance is recommended if sediment has been collected to an average depth of 3" (76 mm) inside the Isolator Row. More frequent maintenance may be required to maintain minimum flow rates through the Isolator Row. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, a wave of suspended sediments is flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/ JetVac combination vehicles. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45" (1143 mm) are best. The JetVac process shall only be performed on StormTech Rows that have AASHTO class 1 woven geotextile over the foundation stone (ADS 315ST or equal).

Looking down the Isolator Row.

A typical JetVac truck. (This is not a StormTech product.)



Examples of culvert cleaning nozzles appropriate for Isolator Row maintenance. (These are not StormTech products.)

12.0 Inspection & Maintenance

STORMTECH ISOLATOR™ ROW - STEP-BY-STEP MAINTENANCE PROCEDURES

Step 1) Inspect Isolator Row for sediment

A) Inspection ports (if present)

i. Remove lid from floor box frame

ii. Remove cap from inspection riser

iii. Using a flashlight and stadia rod, measure depth of sediment

iv. If sediment is at, or above, 3" (76 mm) depth proceed to Step 2. If not proceed to Step 3.

B) All Isolator Rows

i. Remove cover from manhole at upstream end of Isolator Row

ii. Using a flashlight, inspect down Isolator Row through outlet pipe

1. Follow OSHA regulations for confined space entry if entering manhole

2. Mirrors on poles or cameras may be used to avoid a confined space entry

iii. If sediment is at or above the lower row of sidewall holes [approximately 3" (76 mm)] proceed to Step 2. If not proceed to Step 3.

Step 2) Clean out Isolator Row using the JetVac process

A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45" (1143 mm) or more is preferable

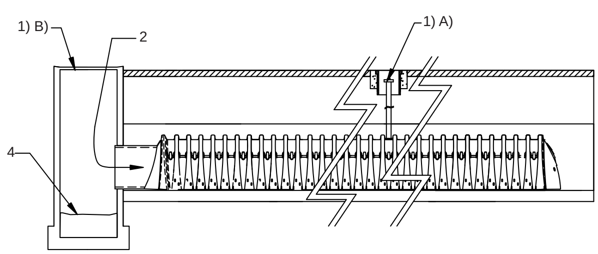
B) Apply multiple passes of JetVac until backflush water is clean

C) Vacuum manhole sump as required during jetting

Step 3) Replace all caps, lids and covers

Step 4) Inspect and clean catch basins and manholes upstream of the StormTech system following local guidelines.

Figure 20 – StormTech Isolator Row (not to scale)



12.3 ECCENTRIC PIPE HEADER INSPECTION

Theses guidelines do not supercede a pipe manufacturer's recommended I&M procedures. Consult with the manufacturer of the pipe header system for specific I&M procedures. Inspection of the header system should be carried out quarterly. On sites which generate higher levels of sediment more frequent inspections may be necessary. Headers may be accessed through risers, access ports or manholes. Measurement of sediment may be taken with a stadia rod or similar device. Cleanout of sediment should occur when the sediment volume has reduced the storage area by 25% or the depth of sediment has reached approximately 25% of the diameter of the structure.

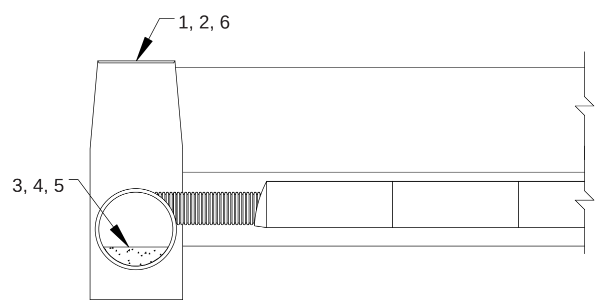
12.4 ECCENTRIC PIPE MANIFOLD MAINTENANCE

Cleanout of accumulated material should be accomplished by vacuum pumping the material from the header. Cleanout should be accomplished during dry weather. Care should be taken to avoid flushing sediments out through the outlet pipes and into the chamber rows.

Eccentric Header Step-by-Step Maintenance Procedures

1. Locate manholes connected to the manifold system
2. Remove grates or covers
3. Using a stadia rod, measure the depth of sediment
4. If sediment is at a depth of about 25% pipe volume or 25% pipe diameter proceed to step 5. If not proceed to step 6.
5. Vacuum pump the sediment. Do not flush sediment out inlet pipes.
6. Replace grates and covers
7. Record depth and date and schedule next inspection

Figure 21 – Eccentric Manifold Maintenance



Please contact StormTech's Technical Services Department at 888-892-2894 for a spreadsheet to estimate cleaning intervals.

13.0 General Notes

1. StormTech ("StormTech") requires installing contractors to use and understand StormTech's latest Installation Instructions prior to beginning system installation.
2. Our Technical Services Department offers installation consultations to installing contractors. Contact our Technical Service Representatives at least 30 days prior to system installation to arrange a pre-installation consultation. Our representatives can then answer questions or address comments on the StormTech chamber system and inform the Installing contractor of the minimum installation requirements before beginning the system's construction. Call **860-529-8188** to speak to a Technical Service Representative or visit **www.stormtech.com** to receive a copy of our Installation Instructions.
3. StormTech's requirements for systems with pavement design (asphalt, concrete pavers, etc.): Minimum cover for the SC-740, DC-780 and SC-310 chambers is 18" (457 mm) not including pavement; Maximum cover for the SC-740 and SC-310 chambers is 96" (2.4 m) including pavement design; Maximum cover for the DC-780 chamber is 12' (3.6 m) including pavement design. For installations that do not include pavement, where rutting from vehicles may occur, minimum required cover is 24" (610 mm), maximum cover is as stated above.
4. The contractor must report any discrepancies with the bearing capacity of the chamber foundation materials to the design engineer.
5. AASHTO M288 Class 2 non-woven geotextile (filter fabric) must be used as indicated in the project plans.
6. Stone placement between chamber rows and around perimeter must follow instructions as indicated in the most current version of StormTech's Installation Instructions.
7. Backfilling over the chambers must follow requirements as indicated in the most current version of StormTech's Installation Instructions.
8. The contractor must refer to StormTech's Installation Instructions for a Table of Acceptable Vehicle Loads at various depths of cover. This information is also available at StormTech's website: **www.stormtech.com.** The contractor is responsible for preventing vehicles that exceed StormTech's requirements from traveling across or parking over the stormwater system. Temporary fencing, warning tape and appropriately located signs are commonly used to prevent unauthorized vehicles from entering sensitive construction areas.
9. The contractor must apply erosion and sediment control measures to protect the stormwater system during all phases of site construction per local codes and design engineer's specifications.
10. STORMTECH PRODUCT WARRANTY IS LIMITED. Contact StormTech for warranty information.

14.0 StormTech Product Specifications

1.0 GENERAL

1.1 StormTech chambers are designed to control stormwater runoff. As a subsurface retention system, StormTech chambers retain and allow effective infiltration of water into the soil. As a subsurface detention system, StormTech chambers detain and allow for the metered flow of water to an outfall.

2.0 CHAMBER PARAMETERS

2.1 The Chamber shall be injection molded of an impact modified polypropylene or polyethylene copolymer to maintain adequate stiffness through higher temperatures experienced during installation and service.

2.2 The nominal chamber dimensions of the StormTech SC-740 and DC-780 shall be 30.0" (762 mm) tall, 51.0" (1295 mm) wide and 90.7" (2304 mm) long. The nominal chamber dimensions of the StormTech SC-310 shall be 16.0" (406 mm) tall, 34.0" (864 mm) wide and 90.7" (2304 mm) long. The installed length of a joined chamber shall be 85.4" (2169 mm).

2.3 The chamber shall have a continuously curved section profile.

2.4 The chamber shall be open-bottomed.

2.5 The chamber shall incorporate an overlapping corrugation joint system to allow chamber rows of almost any length to be created. The overlapping corrugation joint system shall be effective while allowing a chamber to be trimmed to shorten its overall length.

2.6 The nominal storage volume of all StormTech chambers includes the volume of the clean, crushed, angular stone with an assumed 40% porosity. The nominal storage volume of a joined StormTech SC-740 chamber shall be 74.9 ft^3 (2.1 m^3) per chamber when installed per StormTech's typical details. This equates to a storage volume per unit area of bed of 2.2 ft^3/ft^2 (0.67 m^3/m^2). The nominal storage volume of a joined StormTech DC-780 chamber shall be 78.4 ft^3 (2.2 m^3) per chamber when installed per StormTech's typical details. This equates to a storage volume per unit area of bed of 2.3 ft^3/ft^2 (0.70 m^3/m^2). The nominal storage volume of a joined StormTech SC-310 chamber shall be 31.0 ft^3 (0.88 m^3) per chamber when installed per StormTech's typical details. This equates to a storage volume per unit area of bed of 1.3 ft^3/ft^2 (0.40 m^3/m^2).

2.7 The SC-740 and SC-310 chambers shall have forty-eight orifices penetrating the sidewalls to allow for lateral conveyance of water.

2.8 The chamber shall have two orifices near its top to allow for equalization of air pressure between its interior and exterior.

2.9 The chamber shall have both of its ends open to allow for unimpeded hydraulic flows and visual inspections down a row's entire length.

2.10 The chamber shall have 14 corrugations.

2.11 The chamber shall have a circular, indented, flat surface on the top of the chamber for an optional 4" (100 mm) diameter (maximum) inspection port.

2.12 The chamber shall be analyzed and designed using AASHTO methods for thermoplastic culverts contained in the LRFD Bridge Design Specifications, 2nd Edition, including Interim Specifications through 2001. Design live load shall be the AASHTO design truck. Design shall consider earth and live loads as appropriate for the minimum to maximum specified depth of fill.

2.13 The chamber shall be manufactured in an ISO 9001:2000 certified facility.

3.0 END CAP PARAMETERS

3.1 The end cap shall be designed to fit into any corrugation of a chamber, which allows: capping a chamber that has its length trimmed; segmenting rows into storage basins of various lengths.

3.2 The end cap shall have saw guides to allow easy cutting for various diameters of pipe that may be used to inlet the system.

3.3 The end cap shall have excess structural adequacies to allow cutting an orifice of any size at any invert elevation.

3.4 The primary face of an end cap shall be curved outward to resist horizontal loads generated near the edges of beds.

3.5 The end cap shall be manufactured in an ISO 9001:2000 certified facility.

15.0 Chamber Specifications for Contract Documents

STORMWATER CHAMBER SPECIFICATIONS:

1. Chambers shall be StormTech SC-740, SC-310 or approved equal.
2. Chambers shall conform to the requirements of ASTM F 2922, “Standard Specification for Polyethylene (PE) Corrugated Wall Stormwater Collection Chambers.”
3. Chamber rows shall provide continuous, unobstructed internal space with no internal support panels.
4. The structural design of the chambers, the structural backfill and the installation requirements shall ensure that the load factors specified in the AASHTO LRFD Bridge Design Specifications, Section 12.12 are met for: 1) long-duration dead loads and 2) short-duration live loads, based on the AASHTO Design Truck with consideration for impact and multiple vehicle presences.
5. Chambers shall conform to the requirements of ASTM F2787, “Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers.”
6. Only chambers that are approved by the engineer will be allowed. The contractor shall submit (3 sets) of the following to the engineer for approval before delivering chambers to the project site:
   - A structural evaluation by a registered structural engineer that demonstrates that the load factors specified in the AASHTO LRFD Bridge Design Specifications, Section 12.12 are met. The 50-year creep modulus data specified in ASTM F2922 must be used as part of the AASHTO structural evaluation to verify long-term performance.
7. Chambers shall be produced at an ISO 9001 certified manufacturing facility.
8. All design specifications for chambers shall be in accordance with the manufacturer’s latest design manual.
9. The installation of chambers shall be in accordance with the manufacturer’s latest installation instructions.

STORMWATER CHAMBER SPECIFICATIONS:

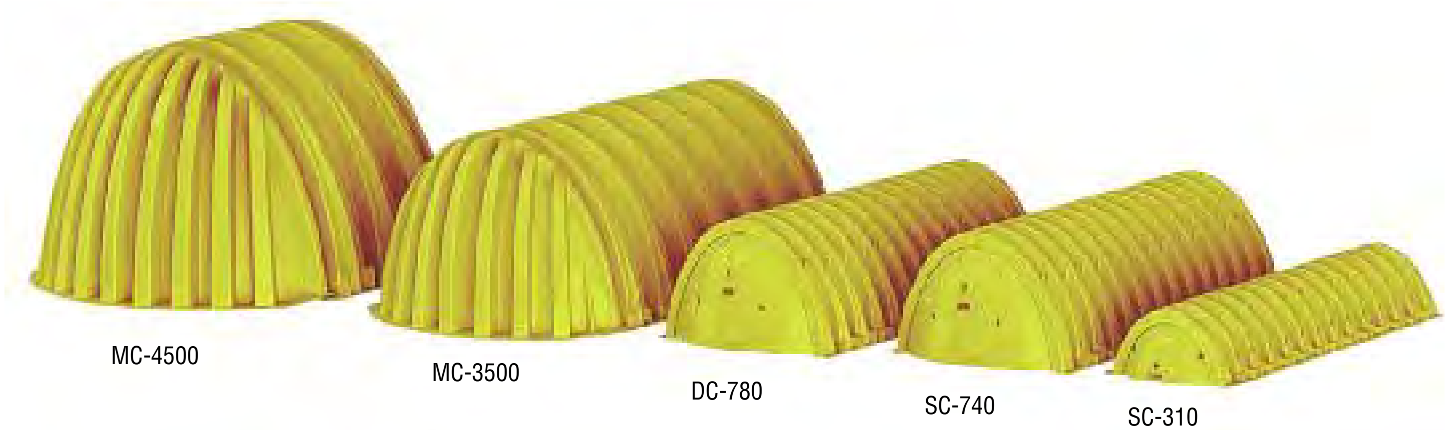
1. Chambers shall be StormTech DC-780 or approved equal.
2. Chambers shall conform to the requirements of ASTM F 2418, “Standard Specification for Polypropylene (PP) Corrugated Wall Stormwater Collection Chambers.”
3. Chamber rows shall provide continuous, unobstructed internal space with no internal support panels.
4. The structural design of the chambers, the structural backfill and the installation requirements shall ensure that the load factors specified in the AASHTO LRFD Bridge Design Specifications, Section 12.12 are met for: 1) long-duration dead loads and 2) short-duration live loads, based on the AASHTO Design Truck with consideration for impact and multiple vehicle presences.
5. Chambers shall conform to the requirements of ASTM F2787, “Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers.”
6. Only chambers that are approved by the engineer will be allowed. The contractor shall submit (3 sets) of the following to the engineer for approval before delivering chambers to the project site:
   - A structural evaluation by a registered structural engineer that demonstrates that the load factors specified in the AASHTO LRFD Bridge Design Specifications, Section 12.12 are met. The 50-year creep modulus data specified in ASTM F2418 must be used as part of the AASHTO structural evaluation to verify long-term performance.
7. Chambers shall be produced at an ISO 9001 certified manufacturing facility.
8. All design specifications for chambers shall be in accordance with the manufacturer’s latest design manual.
9. The installation of chambers shall be in accordance with the manufacturer’s latest installation instructions.

A Family of Products and Services for the Stormwater Industry:

- MC-3500 and MC-4500 Chambers and End Caps
- SC-310 and SC-740 Chambers and End Caps
- DC-780 Chambers and End Caps
- Fabricated End Caps
- Fabricated Manifold Fittings
- Patented Isolator Row for Maintenance and Water Quality
- Chamber Separation Spacers
- In-House System Layout Assistance
- On-Site Educational Seminars
- Worldwide Technical Sales Group
- Centralized Product Applications Department
- Research and Development Team
- Technical Literature, O&M Manuals and Detailed CAD drawings all downloadable via our Web Site

StormTech provides state of the art products and services that meet or exceed industry performance standards and expectations. We offer designers, regulators, owners and contractors the highest quality products and services for stormwater management that "Saves Valuable Land and Protects Water Resources."

Please contact one of our inside project application professionals or Engineered Product Managers (EPMs) to discuss your particular application. A wide variety of technical support material is available in print, electronic media or from our website at www.stormtech.com. For any questions, please call StormTech at 888-892-2694.



StormTech®
Detention • Retention • Water Quality
A division of ADS
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860.529.8188 | 888.892.2694 | fax 866.328.8401 | fax 860.529.8040 | www.stormtech.com
www.stormtech.com

APPENDIX E

SOILS PERCOLATION TESTING
&
WEB SOIL SURVEY INFORMATION

S:\PERC TEST MATERIALS\PERC TEST STORM.xlsx

DESIGN DATA SHEET - STORMWATER INFILTRATION SYSTEM JOB NO. 20044

Owner ANA PEREIRA Address 4 TRIPP LANE

Located at (Street) WEST OF NYS ROUTE 22 Sec. 108.02 Block 1 Lot 10

(Indicate nearest cross st.)

Municipality TOWN OF NORTH CASTLE Watershed INLAND LONG ISLAND SOUND BASIN

SOIL INFILTRATION TEST DATA

Presoak Date: 7/27/22 Run Date: 7/27/22

Hole #	CLOCK TIME				INFILTRATION			
Hole Number	Run No.	Start	Stop	Elapse Time Min.	Depth From Grd (INCHES)	To surface water (INCHES)	Water Level Drop In Inches	Soil Rate In/Hr Drop
1	1	826	856	30	42	18	10	20
	2	856	926	30	42	18	9	18
	3	926	956	30	42	18	8	16
	4							
2	1	812	842	30	42	18	20	40
	2	842	912	30	42	18	20	40
	3	912	942	30	42	18	20	40
	4							
3	1							
	2							
	3							
	4							
4	1							
	2							
	3							
	4							

Notes: Perc test done by: JMC, PLLC

1) Tests to be repeated at same depth until approximately equal soil rates are obtained at each infiltration test hole. All data to be submitted for review.
2) Depth measurements to be made from top of hole. DO NOT REPORT INCREMENTS OF LESS THAN ONE INCH.

S:\PERC TEST MATERIALS\PERC TEST STORM.xlsx

DESCRIPTION OF SOILS ENCOUNTERED IN TEST HOLES

DEPTH	HOLE NO. 1	HOLE NO. 2	HOLE NO. 3	HOLE NO. 4
	±584 EX ELEV.	± 584 EX ELEV.		
G.L.				
6"	TOP SOIL	TOP SOIL		
12"				
18"		FILL		
24"	FILL			
30"				
36"				
42"				
48"		SILTY LOAM WITH FEW COBBLES		
54"	SILTY LOAM WITH FEW COBBLES			
60"				
66"				
72"				
78"				
84"	NO GW NO ROCK	NO GW NO ROCK		

WAS GROUNDWATER ENCOUNTERED? NO

INDICATE LEVEL AT WHICH GROUND WATER IS ENCOUNTERED N/A

INDICATE LEVEL AT WHICH WATER RISES AFTER BEING ENCOUNTERED N/A

DEEP TESTS MADE BY JMC, PLLC   DATE OF DEEP TESTS 7/27/22

DESIGN

Soil Rate Used: 16 IN/HR ~~Min/1" Drop:~~

Name RICK BOHLANDER   Signature

Address JMC, PLLC   SEAL
120 Bedford Road
Armonk, NY 10504

STATE OF NEW YORK
FREDERICK BOHLANDER
100532-1
LICENSED PROFESSIONAL ENGINEER

F:\PERC TEST TEMPLATES\PERC TEST STORM.xlsx

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New York
Location	
Longitude	73.687 degrees West
Latitude	41.135 degrees North
Elevation	0 feet
Date/Time	Mon, 12 Jul 2021 07:14:58 -0400

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.34	0.52	0.64	0.84	1.05	1.31	**1yr**	0.91	1.23	1.50	1.85	2.28	2.81	3.18	**1yr**	2.49	3.06	3.55	4.26	4.91	**1yr**
2yr	0.40	0.62	0.77	1.02	1.28	1.60	**2yr**	1.10	1.49	1.84	2.27	2.79	3.43	3.86	**2yr**	3.03	3.71	4.26	5.05	5.72	**2yr**
5yr	0.47	0.73	0.92	1.23	1.58	1.99	**5yr**	1.36	1.83	2.30	2.85	3.51	4.31	4.88	**5yr**	3.81	4.69	5.44	6.33	7.10	**5yr**
10yr	0.53	0.83	1.05	1.42	1.85	2.36	**10yr**	1.60	2.15	2.73	3.40	4.18	5.12	5.84	**10yr**	4.53	5.61	6.55	7.52	8.36	**10yr**
25yr	0.61	0.97	1.24	1.72	2.29	2.95	**25yr**	1.97	2.66	3.43	4.28	5.28	6.44	7.40	**25yr**	5.70	7.12	8.38	9.43	10.38	**25yr**
50yr	0.69	1.11	1.43	2.00	2.69	3.50	**50yr**	2.32	3.12	4.08	5.10	6.28	7.67	8.86	**50yr**	6.78	8.52	10.09	11.21	12.24	**50yr**
100yr	0.79	1.27	1.64	2.33	3.17	4.15	**100yr**	2.74	3.67	4.86	6.08	7.50	9.13	10.61	**100yr**	8.08	10.21	12.17	13.32	14.43	**100yr**
200yr	0.89	1.46	1.89	2.71	3.74	4.93	**200yr**	3.23	4.32	5.78	7.26	8.94	10.89	12.72	**200yr**	9.64	12.23	14.68	15.83	17.02	**200yr**
500yr	1.07	1.76	2.29	3.33	4.66	6.19	**500yr**	4.02	5.35	7.28	9.16	11.30	13.75	16.17	**500yr**	12.17	15.55	18.81	19.89	21.18	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.26	0.40	0.48	0.65	0.80	0.96	**1yr**	0.69	0.94	1.29	1.60	2.00	2.58	2.74	**1yr**	2.28	2.64	3.20	3.72	4.24	**1yr**
2yr	0.39	0.61	0.75	1.01	1.24	1.49	**2yr**	1.07	1.45	1.70	2.17	2.74	3.32	3.74	**2yr**	2.94	3.60	4.13	4.89	5.56	**2yr**
5yr	0.43	0.66	0.82	1.13	1.44	1.74	**5yr**	1.24	1.70	1.97	2.57	3.21	3.96	4.51	**5yr**	3.51	4.34	5.01	5.82	6.58	**5yr**
10yr	0.47	0.72	0.89	1.24	1.60	1.96	**10yr**	1.38	1.92	2.22	2.93	3.64	4.53	5.20	**10yr**	4.01	5.00	5.79	6.57	7.47	**10yr**
25yr	0.50	0.77	0.95	1.36	1.79	2.28	**25yr**	1.55	2.23	2.57	3.46	4.29	5.39	6.28	**25yr**	4.77	6.04	7.01	7.69	8.81	**25yr**
50yr	0.53	0.80	1.00	1.44	1.93	2.55	**50yr**	1.67	2.49	2.89	3.94	4.87	6.15	7.25	**50yr**	5.44	6.97	8.09	8.59	9.98	**50yr**
100yr	0.56	0.84	1.06	1.53	2.09	2.83	**100yr**	1.81	2.77	3.25	4.50	5.48	7.02	8.38	**100yr**	6.21	8.06	9.34	9.63	11.31	**100yr**
200yr	0.59	0.89	1.13	1.63	2.27	3.16	**200yr**	1.96	3.09	3.66	5.14	6.23	7.99	9.68	**200yr**	7.07	9.31	10.80	10.70	12.82	**200yr**
500yr	0.63	0.94	1.20	1.75	2.49	3.66	**500yr**	2.15	3.58	4.29	6.19	7.39	9.51	11.71	**500yr**	8.41	11.26	13.06	12.27	15.11	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.37	0.57	0.70	0.94	1.16	1.40	**1yr**	1.00	1.37	1.59	2.08	2.61	3.04	3.45	**1yr**	2.69	3.32	3.83	4.61	5.31	**1yr**
2yr	0.43	0.66	0.82	1.10	1.36	1.58	**2yr**	1.18	1.55	1.81	2.31	2.89	3.55	3.99	**2yr**	3.14	3.84	4.42	5.30	5.93	**2yr**
5yr	0.51	0.79	0.98	1.35	1.72	2.02	**5yr**	1.48	1.97	2.32	2.97	3.71	4.66	5.27	**5yr**	4.12	5.07	5.88	6.84	7.64	**5yr**
10yr	0.61	0.94	1.16	1.62	2.09	2.43	**10yr**	1.81	2.37	2.82	3.59	4.51	5.74	6.51	**10yr**	5.08	6.26	7.30	8.40	9.29	**10yr**
25yr	0.77	1.18	1.46	2.09	2.75	3.13	**25yr**	2.37	3.06	3.65	4.63	5.80	7.56	8.62	**25yr**	6.69	8.29	9.75	11.05	12.02	**25yr**
50yr	0.92	1.40	1.74	2.51	3.37	3.80	**50yr**	2.91	3.72	4.45	5.61	7.04	9.33	10.66	**50yr**	8.26	10.25	12.14	13.60	14.61	**50yr**
100yr	1.11	1.68	2.10	3.03	4.16	4.63	**100yr**	3.59	4.52	5.42	6.81	8.69	11.53	13.20	**100yr**	10.21	12.69	15.14	16.77	17.78	**100yr**
200yr	1.33	2.01	2.55	3.68	5.14	5.62	**200yr**	4.43	5.50	6.61	8.24	10.57	14.26	16.34	**200yr**	12.62	15.71	18.88	20.67	21.65	**200yr**
500yr	1.73	2.57	3.31	4.81	6.84	7.27	**500yr**	5.90	7.11	8.59	10.63	13.72	18.89	21.69	**500yr**	16.72	20.85	25.30	27.36	28.07	**500yr**

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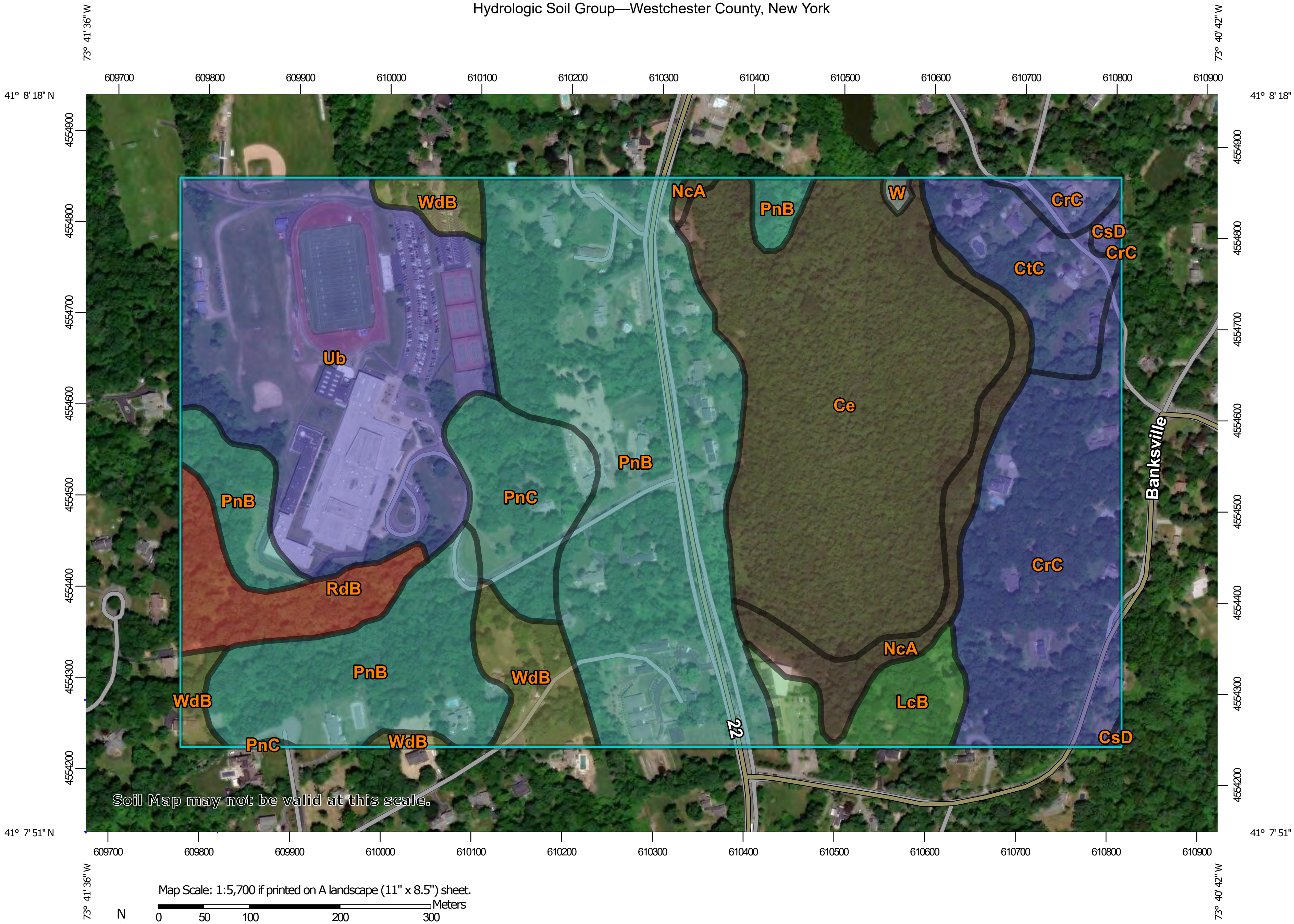
Northeast Regional Climate Center



Map Scale: 1:5,700 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 250, 500, 1000, 1500

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Westchester County, New York
Survey Area Data: Version 16, Jun 11, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Oct 16, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Ce	Catden muck, 0 to 2 percent slopes	B/D	31.4	19.5%
CrC	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	B	18.4	11.5%
CsD	Chatfield-Charlton complex, 15 to 35 percent slopes, very rocky	B	0.5	0.3%
CtC	Chatfield-Hollis-Rock outcrop complex, 0 to 15 percent slopes	B	6.1	3.8%
LcB	Leicester loam, 3 to 8 percent slopes, stony	A/D	4.1	2.6%
NcA	Natchaug muck, 0 to 2 percent slopes	B/D	5.4	3.3%
PnB	Paxton fine sandy loam, 3 to 8 percent slopes	C	47.6	29.6%
PnC	Paxton fine sandy loam, 8 to 15 percent slopes	C	6.6	4.1%
RdB	Ridgebury complex, 3 to 8 percent slopes	D	5.3	3.3%
Ub	Udorthents, smoothed	B	28.8	17.9%
W	Water		0.2	0.1%
WdB	Woodbridge loam, 3 to 8 percent slopes	C/D	6.4	4.0%
Totals for Area of Interest			**160.8**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher