
STORMWATER OPERATION & MAINTENANCE MANUAL

for

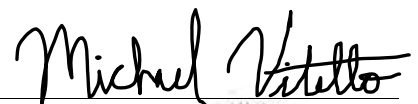
BEACON UNIVERSALIST CHURCH
695 SPRINGFIELD AVENUE
BLOCK No. 1702, LOT No. 47
CITY OF SUMMIT, UNION COUNTY, NEW JERSEY

Prepared For:

Beacon Unitarian Universalist Congregation
4 Waldron Avenue
Summit, New Jersey 07901

Prepared By:

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TABLE OF CONTENTS

1.0 INTRODUCTION	1
2.0 PROJECT DESCRIPTION	1
3.0 STORMWATER MAINTENANCE OBJECTIVE	2
4.0 CONSTRUCTED STORMWATER MANAGEMENT SYSTEM ELEMENTS	3
4.1 STORMWATER MANAGEMENT BMPs	3
4.1.1 Small-Scale Bioretention Basin.....	4
4.1.2 Small-Scale Infiltration Basins	5
4.1.3 Porous Pavement Systems	5
4.2 STORMWATER CONVEYANCE NETWORK	5
4.2.1 Storm Sewer Conveyance Piping.....	6
4.2.2 Precast Concrete Structures	6
5.0 INSPECTION AND MAINTENANCE PROCEDURES.....	6
5.1 PREVENTATIVE MAINTENANCE MEASURES	6
5.1.1 Conveyance Networks	7
5.1.2 Bioretention and Infiltration Basins	7
5.1.3 Porous Pavement Systems	8
5.2 CORRECTIVE MAINTENANCE MEASURES	9
6.0 ESTIMATED COST FOR MAINTENANCE PROCEDURES.....	10

LIST OF DRAWINGS

DRAWING	DESCRIPTION
CG101	Grading Plan
CG102	Drainage Plan
CG501	Drainage Details
CG502	Drainage Details
CG503	Drainage Details
CG504	Drainage Details
CG505	Drainage Details

LIST OF APPENDICES

APPENDIX	DESCRIPTION
A	Stormwater Management Facilities – Inspection Checklist
B	Stormwater Management Facilities – Maintenance Log
C	Manufactured Treatment Device Maintenance Recommendations

1.0 INTRODUCTION

The New Jersey Administrative Code NJAC 7:8-5.8 entitled "Maintenance Requirements" sets forth rules and refers to the New Jersey Stormwater Best Practices Manual (the BMP manual) by the New Jersey Department of Environmental Protection (NJDEP). Chapter 8 of the BMP manual entitled "Maintenance and Retrofit of Stormwater Management Measures" specifically addresses the requirements for maintenance of a major development. Major development is defined in the aforementioned administrative code as any development that provides for ultimately disturbing one or more acres of land or increasing the amount of impervious surface by one-quarter of an acre. This report is prepared to address the maintenance component of the herein described development to ensure the effective, efficient, and enduring service of a particular stormwater measure. This plan contains preventative and corrective maintenance tasks and procedures.

The party responsible for the preventative and corrective maintenance of the stormwater measures described herein is:

Beacon Unitarian Universalist Congregation
4 Waldron Avenue
Summit, New Jersey 07901
Contact: Tuli Patel, Executive Director.
Phone: 908-219-9785 x 805

2.0 PROJECT DESCRIPTION

The project site is comprised of Block No. 1702, Lot No. 47 in the Summit, Union County, New Jersey. The 1.74± acre tract consists of a 2-story office building, detached garage building, and parking areas. Areas within the eastern portion of the site are covered mostly by grass with some trees and vegetation. The site is bound by Wilson Park to the west, Wilson Primary School and baseball field to the north, undeveloped City owned property to the east and Springfield Avenue (CR 512) to the south.

The proposed redevelopment includes the construction of:

- A 2-story building consisting of 18,024± Gross SF (11,795± SF footprint);
- Four solar canopy structures
- Associated driveways, sidewalks, parking areas, stormwater and utility infrastructure, and landscaping

The proposed redevelopment disturbs more than one acre of land; therefore, this project is considered a “major development” from a stormwater management perspective, and the proposed design is required to address stormwater quantity, quality, and groundwater recharge requirements. The proposed stormwater management system consists of the following:

- A subsurface conveyance system consisting of inlets, manholes, and pipes to convey stormwater runoff from the 25-year design storm event;
- 2 small-scale underground infiltration basins;
- 1 rain garden;
- 3 porous asphalt pavement systems;
- Contech StormFilter manufactured treatment devices (SFMH48, Peak Diversion Stormfilter); and,
- Contech Filterra Bioscape Vault manufactured treatment device.

3.0 STORMWATER MAINTENANCE OBJECTIVE

The stormwater management system for the proposed development is intended to collect and convey the stormwater runoff. Regular maintenance procedures are required to ensure the consistent operation and safe conditions of the stormwater management facilities and prevent the occurrence of problems and malfunctions. The maintenance program provides the stormwater maintenance procedures for the site. The maintenance plan shall be evaluated and adjusted as needed.

Funding shall be allocated to cover costs of preventive and corrective maintenance. Such funding must cover the costs of staffing, equipment, materials, maintenance, emergency repairs, replacement of equipment, training of employees, administrative costs, disposal costs and permit fees.

Regularly scheduled inspection and maintenance is necessary to ensure long-term operation and safety of stormwater management facilities. Inspection and maintenance procedure shall be recorded through detailed logs. Copies of maintenance related work orders shall be retained. Logs, work orders, the maintenance plan, and documentation of its evaluation shall be made available, upon request by any public entity with administrative, health, environmental or safety authority of the site.

Maintenance personnel shall be trained about the purpose and operation of the stormwater management facilities. They must understand the importance of the maintenance of such facilities and the consequences of neglect. The training shall include maintenance and inspection techniques, proper record keeping, and emergency procedures. Sample maintenance work order and inspection checklist and logs have been provided in Appendix A

and B of this manual. Actual maintenance work order and inspection checklists and logs shall be developed as part of the site stormwater facilities maintenance program.

4.0 CONSTRUCTED STORMWATER MANAGEMENT SYSTEM ELEMENTS

The on-site stormwater management system includes best management practices (BMPs) designed to meet the stormwater quantity, quality, and groundwater recharge requirements for the project site, as well as series of subsurface conveyance systems comprised of precast inlets, manhole structures, drainage pipes, and riprap aprons, which convey stormwater runoff to and from the stormwater management BMPs and ultimately to the proposed off-site discharge points.

4.1 Stormwater Management BMPs

The proposed redevelopment incorporates the following BMPs into the stormwater management design: 2 small-scale underground infiltration basins, 1 Rain Garden (small-scale bioretention basin), 3 porous asphalt pavement systems; Contect StormFilter SFMH48; Contech Peak Diversion StormFilter (6'x12'); and Contech Filterra Bioscape Vault. Refer to Drawing CG102 for the location of each proposed BMP; the table below lists each BMP proposed on the property that is subject to the requirements set forth in this maintenance plan:

Table 1 – Summary of Proposed BMPs		
BMP Designation	Type of BMP	Location on Project Site
UGD-INF1-1	Small-scale underground infiltration basin	Access driveway south end of site
UGD-INF1-2	Small-scale underground infiltration basin	Front yard, south end of site
Rain Garden	Small-scale bioretention basin	South of building entrance and walkway
Porous Asphalt Pavement System 1	Porous Pavement	Northern row of parking spaces
Porous Asphalt Pavement System 2	Porous Pavement	Southern row of parking spaces
Porous Asphalt Pavement System 3	Porous Pavement	Turnaround west of parking spaces
WQ1-1	Mechanical treatment device	Northeast of UGD-INF1-1
WQ1-2	Mechanical treatment device	East of UGD-INF1-2
WQ1-3	GI Mechanical treatment device	Northwest of UGD-INF1-2

4.1.1 Small-Scale Bioretention Basins

There is 1 small-scale bioretention basin (Rain Garden) proposed on the project site. The rain garden is comprised of a 24-inch thick soil media layer, underlain by a 6" thick sand layer and an underdrain collection system comprised of perforated 4" diameter HDPE pipes encased by a minimum of 3 inches of AASHTO #57 stone aggregate both above and below the collection system piping. A variety of ornamental grasses, plants, and shrubs are planted within the basin to promote uptake of pollutants and evapotranspiration. An outlet control structure maintains specific water levels within the Rain Garden for each design storm event.

The Rain Garden is designed to store and percolate the volume of stormwater generated by the water quality design storm event, which is defined as 1.25 inches of rainfall over a period of 2 hours. The first outlet opening within the outlet control is set a maximum 12" above the bottom of the storage area of the basin in order to promote infiltration through the soil media layer and achieve 80% TSS removal.

4.1.2 Small-Scale Underground Infiltration Basins

There are 2 small-scale underground infiltration basins proposed on the project site. Small-scale infiltration basins are comprised of a 24" diameter perforated HDPE pipe (UGD-INF1-1) or Cultec Recharger 360HD arch chambers (UGD-INF1-2). Both underground systems are encased within a gravel storage bed with a minimum 40% void space to act as detention storage. The small-scale underground infiltration basins are designed to store and percolate the volume of stormwater generated by the water quality design storm event, which is defined as 1.25 inches of rainfall over a period of 2 hours.

4.1.3 Porous Pavement Systems

There are three porous pavement system proposed on the project site. Porous pavement systems consist of a porous asphalt surface layer, a choker course that filters pollutants, subbase aggregate that acts as the stormwater runoff storage component of the BMP, and an underdrain collection system comprised of perforated 4" diameter HDPE pipes encased by stone aggregate both above and below the collection system piping. The depth of the subbase aggregate has been designed to store the volume of stormwater generated by the water quality design storm event in order to achieve 80% TSS removal credit. The underdrain collection system prevents runoff from infiltrating into the native subsoils; instead, the runoff is captured and discharged into the proposed subsurface conveyance network.

4.1.4 Manufactured Treatment Devices

NJDEP-certified 80% TSS removal rate manufactured treatment devices are proposed to provide pre-treatment measures in terms of water quality for stormwater runoff prior to discharging into the two small-scale underground infiltration basins. Manufactured treatment devices include Contech StormFilter devices (SFMH48 and 6'x12' Peak Diversion) and the Contech Filterra Bioscape Vault.

4.2 Stormwater Conveyance Network

The proposed project utilizes various series of subsurface conveyance networks to facilitate the collection and conveyance of stormwater runoff for the 25-year design storm event. The conveyance networks consist of precast concrete inlet structures, precast concrete manhole structures, drainage piping, roof lateral connections, and riprap aprons. Refer to Drawings CG102 Drainage Plan for an overview of the conveyance network and location of various pipes and structures.

4.2.1 Storm Sewer Conveyance Piping

High Density Polyethylene (HDPE) Pipe is proposed for the conveyance of stormwater where the proposed cover over the top of the pipe is a minimum 2 feet. Perforated HDPE pipe is proposed to be utilized as the underdrain collection system piping for the BMPs specified to utilize an underdrain collection system as part of their design. HDPE flared-end section (FES2-1) is proposed at west end of site. Nyloplast yard inlets and storm manholes are proposed within landscaped areas at the south end of the site.

4.2.2 Precast Concrete Structures

Precast concrete inlets utilized throughout the site generally consist of NJDOT Type A and Type B inlets. Type B curb inlets will be fitted with Type N Eco curb pieces to prevent trash and floatables from entering the conveyance network. All inlet grates shall be bicycle-safe, and rated to meet heavy-duty H-20 traffic loading requirements. Precast storm manhole structures and inlet box sizes are to be sized to accommodate the largest proposed pipe connections, and polypropylene steps shall be provided for maintenance access. Precast concrete headwall is proposed at the outfall pipe at the northeast corner of the site. Precast concrete outlet control structures are proposed at UGD-INF1-1, UGD-INF1-2 and Rain Garden.

5.0 INSPECTION AND MAINTENANCE PROCEDURES

The owner is responsible for maintenance identified in the maintenance manual and shall maintain a detailed log of all preventative and corrective maintenance for the structural stormwater system measures incorporated into the design of the development, including a record of all inspections and copies of all maintenance-related work orders. The owner is to evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan as needed.

Maintenance and inspection access to all proposed stormwater BMPs shall be maintained at all times. All components of the stormwater management measures must be readily accessible; trees, shrubs, and ornamental grasses must be pruned or trimmed as necessary to maintain access, and areas adjacent to these BMPs shall be made clear during scheduled maintenance activities to allow for ease of access for maintenance vehicles.

5.1 Preventative Maintenance Measures

The frequency and type of preventative maintenance prescribed is adopted from the New Jersey Best Management Practices Manual.

5.1.1 Conveyance Networks

The conveyance systems, including inlets, manholes, and pipes are expected to receive and/or accumulate debris and sediment. These systems shall be inspected for clogging and sediment accumulation at least bi-annually, and shall be inspected for trash and debris removal at least quarterly, and may require cleaning to prevent the loss of discharge capacity storage volume. Sediment removal should take place when all runoff has drained from the pipe networks and the systems are reasonably dry. Disposal of debris, trash, sediment, and other waste material should be done at suitable disposal/recycling sites and in compliance with all applicable local, state, and federal waste regulations.

All structural components must be inspected for cracking, subsidence, breaching, wearing and deterioration at least annually. The conditions of surrounding and above lying materials shall be inspected for evidence of potential failures or deterioration.

Two people may be needed to perform routine maintenance of the conveyance systems. The routine equipment expected to be utilized for the maintenance tasks may include a jet vacuum vehicle, shovels, lighting equipment and a wheelbarrow or truck for the hauling off of debris. All inspections and maintenance operations shall be documented and logged. All documentations and logs shall be retained for future review.

5.1.2 Rain Garden (Small-scale Bioretention Basin)

The rain garden shall be inspected for sediment accumulation at least quarterly, and shall be inspected for trash and debris removal at least quarterly. The bottom elevation and design storage volume of each basin must be maintained in order to maintain adequate capacity; sediment and debris build-up shall be removed upon inspection. The basins and associated riprap aprons should be inspected for signs of erosion at least quarterly, and after each major rainfall event in excess of 2 inches. Structural components associated with the outlet control structure, including any trash racks, should be inspected at least annually.

Meadow mix seeding is utilized along the bottom and embankment sides of the proposed bioretention basins. After the first growing season, and if the meadow mix seeding is well established, the meadow mix native vegetation shall be mowed only once annually in order to promote sustained growth. If the meadow mix is not fully established, the meadow mix areas shall be supplemented with additional seeding to ensure re-establishing all meadow mix areas. The annual maintenance mowing shall be done in late winter during the month of March.

5.1.3 Small Scale Underground Infiltration Basins

The underground infiltration basins, including manholes, outlet control structures and pipes are expected to receive and/or accumulate debris and sediment. These systems shall be inspected for clogging and sediment accumulation at least bi-annually, and shall be inspected for trash and debris removal at least quarterly, and may require cleaning to prevent the loss of discharge capacity storage volume. Sediment removal should take place when all runoff has drained from the pipe networks and the systems are reasonably dry. Disposal of debris, trash, sediment, and other waste material should be done at suitable disposal/recycling sites and in compliance with all applicable local, state, and federal waste regulations.

All structural components must be inspected for cracking, subsidence, breaching, wearing and deterioration at least annually. The conditions of surrounding and above lying materials shall be inspected for evidence of potential failures or deterioration.

Two people may be needed to perform routine maintenance of the conveyance systems. The routine equipment expected to be utilized for the maintenance tasks may include a jet vacuum vehicle, shovels, lighting equipment and a wheelbarrow or truck for the hauling off of debris.

All inspections and maintenance operations shall be documented and logged. All documentations and logs shall be retained for future review.

5.1.4 Porous Pavement Systems

All components of the porous asphalt pavement systems should be inspected at least twice annually unless otherwise noted. The perforated HDPE underdrain system should be inspected for clogging and jet-cleaned as necessary to remove sediment. The porous asphalt layer should be inspected for clogging at least quarterly, and after each major rain event in excess of 2 inches, for signs of clogging, sediment build-up, and weed growth. Sediment be removed and jet-cleaned as necessary, in order to maintain adequate permeability for runoff to percolate into the storage bed below.

5.1.5 Manufactured Treatment Devices

All components associated with the manufactured treatment devices shall be maintained in accordance with the manufacturer's recommendations, which are included in Appendix C of this report.

5.2 Corrective Maintenance Measures

Depending on many factors, such as the performance of preventative maintenance actions, weather, or unexpected incidents, corrective maintenance requirements may not be precisely anticipated. Corrective maintenance is required on an emergency or non-routine basis to correct problems or malfunctions and to restore the components of the stormwater management system to its intended operations and safe conditions.

Standing water within the proposed basins more than 72 hours after a storm event has ended is a sign that there is inadequate infiltration and/or discharge through the outlet control structure is occurring. The outlet control structure orifice openings, soil media layer, and underdrain collection piping within bioretention basins shall be inspected for sediment build-up, clogging, or debris and corrected immediately. The outlet control structure and sand layer within infiltration basins shall be inspected sediment build-up, clogging, or debris and corrected immediately.

Sediment, debris, and trash which threaten the discharge capacity and storage volume of a stormwater facility should be removed immediately and properly disposed of in a timely manner. Equipment and personnel must be available to perform the removal work on short notice. Disposal of debris, trash, sediments and other waste material should be done at suitable disposal/recycling sites and in compliance with all applicable local, state and federal waste regulations. The lack of an available disposal site should not delay the removal of trash, debris, and sediment. Temporary storage shall be utilized until an approved disposal site is available.

Structural damage to precast structures, treatment devices, pipes, and trash racks must be repaired promptly. Equipment, materials and personnel must be available to perform these repairs on short notice. The immediacy of the repairs will depend upon the nature of the damage and its effects on the safety and operations of the facility. The analysis of structural damage and the design and performance of structural repairs should only be undertaken by qualified personnel.

All corrective maintenance operation shall be documented and logged. All documentation and logs shall be retained for future review.

6.0 ESTIMATED COST FOR MAINTENANCE PROCEDURES

Storm Sewer Conveyance Systems sediment removal by jet vacuum truck (2-man crew) performed annually:

\$3,000 per session X 1 = \$3,000.00 annual cost (if required)

Bioretention/Infiltration basins and preventative maintenance performed annually:

\$5,000 per session X 1 = \$5,000.00 annual cost (if required)

Porous Asphalt Pavement System sediment removal by jet vacuum truck (2-man crew) performed annually:

\$5,000 per session X 1 = \$5,000.00 annual cost (if required)

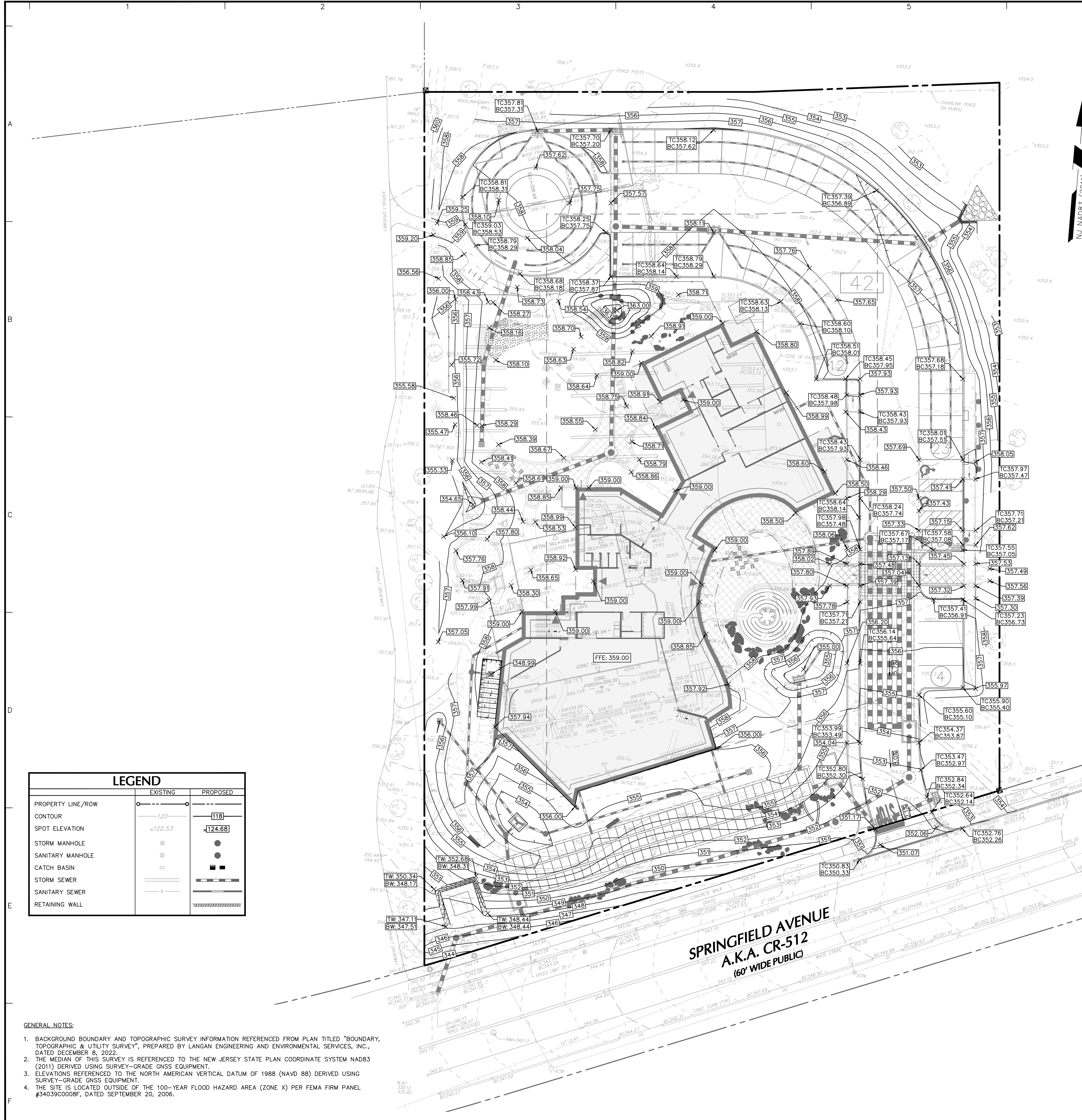
Trash and Debris removal by manual labor (2-man crew) performed Bi-annually

\$1,000.00 per session X 2 = \$2,000.00 annual cost

Total = \$15,000.00 annual cost (if required)

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DRAWINGS



GRADING AND DRAINAGE PLAN NOTES:

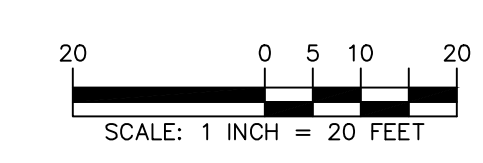
1. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND / OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF VARIOUS UTILITY COMPANIES AND, WHERE POSSIBLE MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 48 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES, WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
2. CONTRACTOR SHALL REFER TO ARCHITECTURAL PLANS AND SPECIFICATIONS FOR ACTUAL LOCATIONS OF ALL UTILITY ENTRANCES TO INCLUDE SANITARY SEWER LATERALS, DOMESTIC WATER SERVICE, ELECTRICAL TELEPHONE AND GAS SERVICE. CONTRACTOR SHALL COORDINATE INSTALLATION OF UTILITIES IN SUCH A MANNER AS TO AVOID CONFLICTS AND TO ENSURE PROPER DEPTHS ARE ACHIEVED AS WELL AS COORDINATING WITH THE UTILITY COMPANIES AS TO LOCATION AND SCHEDULING OF CONNECTIONS TO THEIR FACILITIES.
3. PVC = POLYVINYL CHLORIDE PIPE
HDPE = HIGH DENSITY POLYETHYLENE PIPE
RCP = REINFORCED CONCRETE PIPE
4. STORM DRAINAGE PIPING TO UTILIZE WATER TIGHT JOINTS.
5. COMPACTION CRITERIA FOR FILL PLACEMENT IN THE FOLLOWING AREAS SHALL MEET OR EXCEED THE FOLLOWING MINIMUM PERCENTAGE OF MAXIMUM MODIFIED PROCTOR DRY DENSITY AS DETERMINED BY ASTM D-1557 USED ON REPRESENTATIVE SOIL SAMPLES, UNLESS MORE STRINGENT CRITERIA GIVEN ELSEWHERE:


FILL AREA	PERCENT OF MAXIMUM MODIFIED PROCTOR DRY DENSITY
BUILDING FOOTPRINT	95%
PAVEMENT AND ROADWAYS	98%
SIDEWALKS	95%
LANDSCAPE AREAS	90%
TRENCH BACKFILL	95%
6. PROTECT SUBGRADE FROM EXCESSIVE WHEEL LOADING DURING CONSTRUCTION, INCLUDING CONCRETE TRUCKS AND DUMP TRUCKS.
7. REMOVE AREAS OF FINISHED SUBGRADE FOUND TO HAVE INSUFFICIENT COMPACTION DENSITY TO DEPTH NECESSARY AND REPLACE IN A MANNER THAT WILL COMPLY WITH COMPACTION REQUIREMENTS BY USE OF MATERIAL EQUAL TO OR BETTER THAN BEST SUBGRADE MATERIAL ON SITE. SURFACE OF SUBGRADE AFTER COMPACTION SHALL BE HARD, UNIFORM, SMOOTH, STABLE, AND TRUE TO GRADE AND CROSS SECTION.
8. ALL CONCRETE, UNLESS OTHERWISE NOTED OR SPECIFIED BY REGULATORY AUTHORITIES, SHALL BE A MINIMUM OF 4,000 PSI.
9. THE CONTRACTOR SHALL REVIEW THE STORM DRAINAGE CONNECTIONS TO THE INLETS, MANHOLES, ETC. AND PROVIDE THE APPROPRIATE BOX SIZE, MANHOLES SIZE, TOP PIECES, ETC. AS NECESSARY TO ACCOMMODATE THE PROPOSED INLET AND OUTLET PIPES.
10. CONTRACTOR TO PROVIDE A SHOP DRAWING FOR REVIEW AND APPROVAL BY THE OWNER'S ENGINEER FOR EACH CATCH BASIN, MANHOLE, AND OTHER PRECAST STORM STRUCTURES DETAILING STRUCTURE DIMENSIONS, LOCATION OF STEPS, PIPE CONNECTIONS AND OPENINGS, AND RIM/GRATE/INVERT ELEVATIONS. A SHOP DRAWING, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW JERSEY, SHALL BE PROVIDED FOR EACH TYPE OF PRECAST CONCRETE STRUCTURE THAT DETAILS THE STRUCTURAL DESIGN. ALL PRECAST STRUCTURES AND FRAMES/GRATES SHALL MEET H-20 TRAFFIC LOADING REQUIREMENTS, CATCH BASINS, MANHOLES, AND DETENTION SYSTEM PIPING SHALL BE CONSTRUCTED IN A MANNER THAT WILL PREVENT FLOATION DUE TO GROUNDWATER. CONTRACTOR SHALL SUBMIT METHODOLOGY AND SUPPORTING BUOYANCY CALCULATIONS PREPARED BY AND SIGNED/SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW JERSEY FOR ANTI-FLOATION OF THE STORM STRUCTURES IF THEY ARE TO BE LOCATED WITHIN THE GROUNDWATER TABLE.
11. THE CONTRACTOR SHALL PROVIDE A RETAINING WALL DESIGN FOR EACH PROPOSED WALL PREPARED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW JERSEY FOR REVIEW BY THE OWNER'S ENGINEER PRIOR TO INSTALLATION. THE CONTRACTOR AND THE RETAINING WALL DESIGNER SHALL SPECIFICALLY NOTE ANY EXISTING OR PROPOSED STRUCTURES THAT ARE LOCATED IN OR NEAR THE WALL (INLETS, LIGHT POLES, FENCES, STORM PIPES, UTILITIES, GUIDE RAILS, AND OTHER FEATURES) AND SHALL COORDINATE DESIGN AND INSTALLATION OF RETAINING WALL SUCH THAT THE FEATURES ARE ACCOMMODATED IN THE DESIGN AS APPROPRIATE.
12. PIPE LENGTHS PROVIDED ARE MEASURED FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE.
13. CONTRACTOR SHALL CLEAR EXISTING STORM PIPES OF ANY DEBRIS OR SEDIMENT.
14. TRENCH DEPTH REQUIREMENTS MEASURED FROM FINISHED GRADE OR PAVED SURFACE SHALL MEET THE FOLLOWING REQUIREMENTS OR APPLICABLE CODES AND ORDINANCES:
 - a. SANITARY SEWER: DEPTHS, ELEVATIONS AND GRADES AS INDICATED ON DRAWINGS.
 - b. STORM SEWER: DEPTHS, ELEVATIONS, AND GRADES AS SHOWN ON DRAWINGS.
 - c. ELECTRICAL CONDUITS: 24 INCHES MINIMUM TO TOP OF CONDUIT OR AS REQUIRED BY NEC 300-5, NEC 710-36 CODES, OR THE LOCAL UTILITY COMPANY REQUIREMENTS, WHICHEVER IS DEEPER.
 - d. TV CONDUITS: 18 INCHES MINIMUM TO TOP OF CONDUIT OR AS REQUIRED BY THE LOCAL UTILITY COMPANY, WHICHEVER IS DEEPER.
 - e. TELEPHONE CONDUITS: 18 INCHES MINIMUM TO TOP OF CONDUIT OR AS REQUIRED BY THE LOCAL UTILITY COMPANY, WHICHEVER IS DEEPER.
 - f. GAS MAINS AND SERVICE: 30 INCHES MINIMUM TO TOP OF PIPE, OR AS REQUIRED BY THE LOCAL UTILITY COMPANY, WHICHEVER IS DEEPER.
15. SITE GRADING SHALL NOT PROCEED UNTIL ALL EROSION CONTROL MEASURES HAVE BEEN INSTALLED.
16. CONTRACTOR SHALL PROVIDE WRITTEN REQUESTS FOR INFORMATION TO THE OWNER AND OWNER'S ENGINEER PRIOR TO THE CONSTRUCTION OF ANY SPECIFIC SITEMARK ITEM IF ANY SPECIFIC SITEMARK ITEM DEPICTED ON THE PLANS WARRANTS ADDITIONAL INFORMATION REQUIRED FOR CONSTRUCTION AND IS NOT RELATED TO MEANS AND METHODS OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SPECIFIC SITE WORK ITEMS INSTALLED DIFFERENTLY THAN INTENDED AS DEPICTED ON THE PLANS IN THE ABSENCE OF SUBMITTING AND ADDRESSING WRITTEN REQUESTS FOR INFORMATION.
17. PROPOSED SIDEWALKS SHALL BE CONSTRUCTED WITH CROSS-SLOPES THAT DO NOT EXCEED 1.5%.

LEGEND

PROPERTY LINE/ROW	EXISTING	PROPOSED
CONTOUR	-120	118
SPOT ELEVATION	x122.53	x124.68
STORM MANHOLE	⊙	●
SANITARY MANHOLE	⊙	●
CATCH BASIN	□	■
STORM SEWER	—	—
SANITARY SEWER	—	—
RETAINING WALL	—	—

- GENERAL NOTES:**
1. BACKGROUND BOUNDARY AND TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM PLAN TITLED "BOUNDARY, TOPOGRAPHIC & UTILITY SURVEY", PREPARED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC., DATED DECEMBER 8, 2022.
 2. THE MEDIAN OF THIS SURVEY IS REFERENCED TO THE NEW JERSEY STATE PLAN COORDINATE SYSTEM NAD83 (2011) DERIVED USING SURVEY-GRADE GNSS EQUIPMENT.
 3. ELEVATIONS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) DERIVED USING SURVEY-GRADE GNSS EQUIPMENT.
 4. THE SITE IS LOCATED OUTSIDE OF THE 100-YEAR FLOOD HAZARD AREA (ZONE X) PER FEMA FIRM PANEL #34039C0008F, DATED SEPTEMBER 20, 2006.



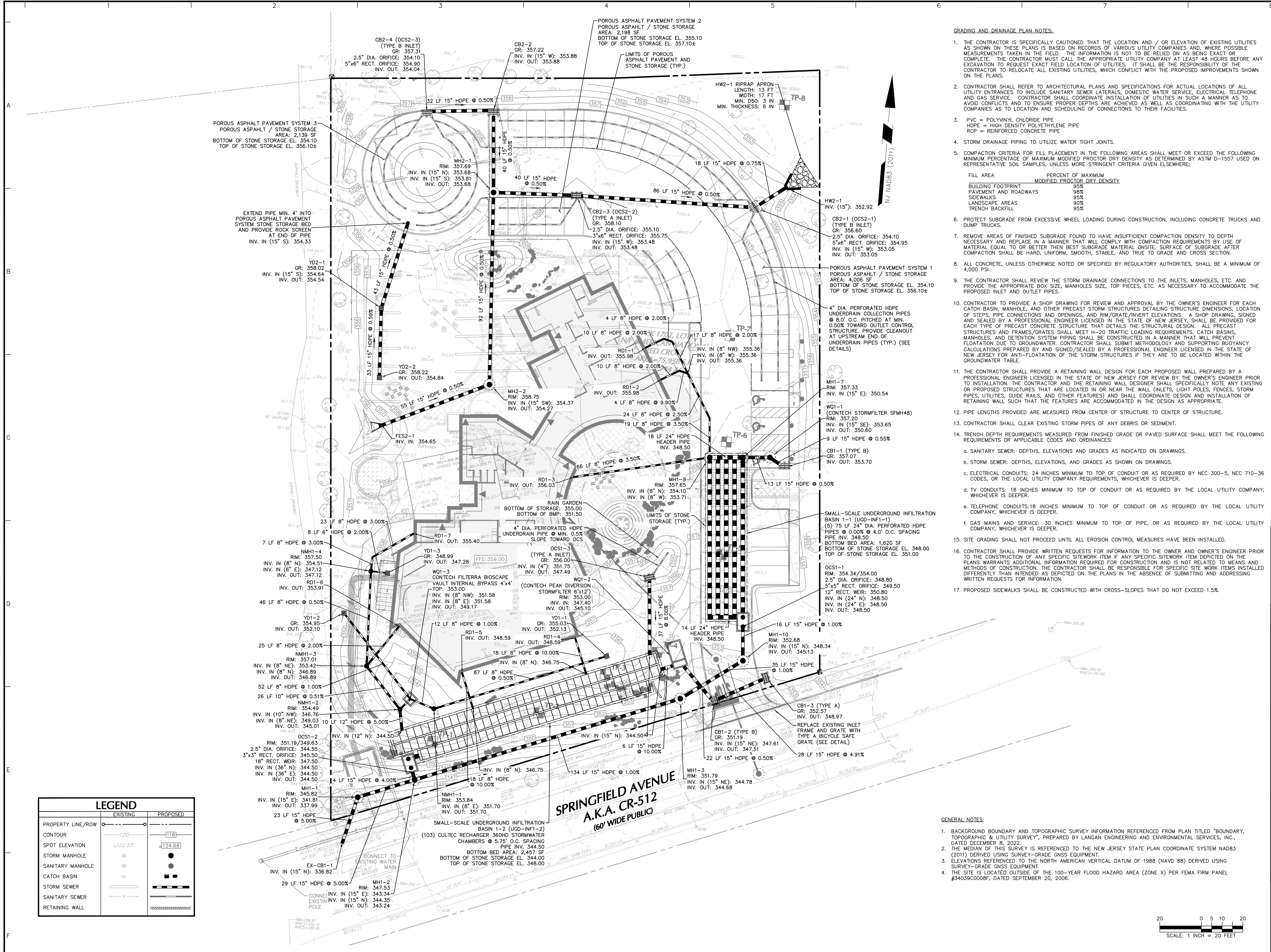
Date	Description	No.
Revisions		
		
Digitally signed by John C Cote Date: 2024.02.22 08:38:27-05'00'		
SIGNATURE	JOHN COTE PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800	DATE

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Project
BEACON UNITARIAN UNIVERSALIST CHURCH
SUMMIT NEW JERSEY

Drawing Title
GRADING PLAN

Project No. 101007201	Drawing No. CG101
Date FEBRUARY 9, 2024	
Drawn By SM	
Checked By TH	
Sheet 7 of 19	



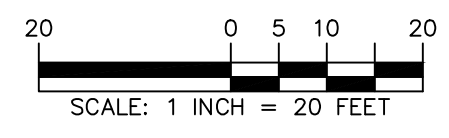
- GRADING AND DRAINAGE PLAN NOTES:**
- THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND / OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF VARIOUS UTILITY COMPANIES AND, WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 48 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES, WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
 - CONTRACTOR SHALL REFER TO ARCHITECTURAL PLANS AND SPECIFICATIONS FOR ACTUAL LOCATIONS OF ALL UTILITY ENTRANCES TO INCLUDE SANITARY SEWER LATERALS, DOMESTIC WATER SERVICE, ELECTRICAL TELEPHONE AND GAS SERVICE. CONTRACTOR SHALL COORDINATE INSTALLATION OF UTILITIES IN SUCH A MANNER AS TO AVOID CONFLICTS AND TO ENSURE PROPER DEPTHS ARE ACHIEVED AS WELL AS COORDINATING WITH THE UTILITY COMPANIES AS TO LOCATION AND SCHEDULING OF CONNECTIONS TO THEIR FACILITIES.
 - PVC = POLYVINYL CHLORIDE PIPE
HDPE = HIGH DENSITY POLYETHYLENE PIPE
RCP = REINFORCED CONCRETE PIPE
 - STORM DRAINAGE PIPING TO UTILIZE WATER TIGHT JOINTS.
 - COMPACTION CRITERIA FOR FILL PLACEMENT IN THE FOLLOWING AREAS SHALL MEET OR EXCEED THE FOLLOWING MINIMUM PERCENTAGE OF MAXIMUM MODIFIED PROCTOR DRY DENSITY AS DETERMINED BY ASTM D-1557 USED ON REPRESENTATIVE SOIL SAMPLES, UNLESS MORE STRINGENT CRITERIA GIVEN ELSEWHERE:

FILL AREA	PERCENT OF MAXIMUM MODIFIED PROCTOR DRY DENSITY
BUILDING FOOTPRINT	95%
PAVEMENT AND ROADWAYS	98%
SIDEWALKS	95%
LANDSCAPE AREAS	90%
TRENCH BACKFILL	95%
 - PROTECT SUBGRADE FROM EXCESSIVE WHEEL LOADING DURING CONSTRUCTION, INCLUDING CONCRETE TRUCKS AND DUMP TRUCKS.
 - REMOVE AREAS OF FINISHED SUBGRADE FOUND TO HAVE INSUFFICIENT COMPACTION DENSITY TO DEPTH NECESSARY AND REPLACE IN A MANNER THAT WILL COMPLY WITH COMPACTION REQUIREMENTS BY USE OF MATERIAL EQUAL TO OR BETTER THAN BEST SUBGRADE MATERIAL ON SITE. SURFACE OF SUBGRADE AFTER COMPACTION SHALL BE HARD, UNIFORM, SMOOTH, STABLE, AND TRUE TO GRADE AND CROSS SECTION.
 - ALL CONCRETE, UNLESS OTHERWISE NOTED OR SPECIFIED BY REGULATORY AUTHORITIES, SHALL BE A MINIMUM OF 4,000 PSI.
 - THE CONTRACTOR SHALL REVIEW THE STORM DRAINAGE CONNECTIONS TO THE INLETS, MANHOLES, ETC. AND PROVIDE THE APPROPRIATE BOX SIZE, MANHOLES SIZE, TOP PIECES, ETC. AS NECESSARY TO ACCOMMODATE THE PROPOSED INLET AND OUTLET PIPES.
 - CONTRACTOR TO PROVIDE A SHOP DRAWING FOR REVIEW AND APPROVAL BY THE OWNER'S ENGINEER FOR EACH CATCH BASIN, MANHOLE, AND OTHER PRECAST STORM STRUCTURES DETAILING STRUCTURE DIMENSIONS, LOCATION OF STEPS, PIPE CONNECTIONS AND OPENINGS, AND RIM/GRADE/INVERT ELEVATIONS. A SHOP DRAWING, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW JERSEY, SHALL BE PROVIDED FOR EACH TYPE OF PRECAST CONCRETE STRUCTURE THAT DETAILS THE STRUCTURAL DESIGN. ALL PRECAST STRUCTURES AND FRAMES/GRATES SHALL MEET H-20 TRAFFIC LOADING REQUIREMENTS, CATCH BASINS, MANHOLES, AND DETENTION SYSTEM PIPING SHALL BE CONSTRUCTED IN A MANNER THAT WILL PREVENT FLOATAION DUE TO GROUNDWATER. CONTRACTOR SHALL SUBMIT METHODOLOGY AND SUPPORTING BUOYANCY CALCULATIONS PREPARED BY AND SIGNED/SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW JERSEY FOR ANTI-FLOATAION OF THE STORM STRUCTURES IF THEY ARE TO BE LOCATED WITHIN THE GROUNDWATER TABLE.
 - THE CONTRACTOR SHALL PROVIDE A RETAINING WALL DESIGN FOR EACH PROPOSED WALL PREPARED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW JERSEY FOR REVIEW BY THE OWNER'S ENGINEER PRIOR TO INSTALLATION. THE CONTRACTOR AND THE RETAINING WALL DESIGNER SHALL SPECIFICALLY NOTE ANY EXISTING OR PROPOSED STRUCTURES THAT ARE LOCATED IN OR NEAR THE WALL (INLETS, LIGHT POLES, FENCES, STORM PIPES, UTILITIES, GUIDE RAILS, AND OTHER FEATURES) AND SHALL COORDINATE DESIGN AND INSTALLATION OF RETAINING WALL SUCH THAT THE FEATURES ARE ACCOMMODATED IN THE DESIGN AS APPROPRIATE.
 - PIPE LENGTHS PROVIDED ARE MEASURED FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE.
 - CONTRACTOR SHALL CLEAR EXISTING STORM PIPES OF ANY DEBRIS OR SEDIMENT.
 - TRENCH DEPTH REQUIREMENTS MEASURED FROM FINISHED GRADE OR PAVED SURFACE SHALL MEET THE FOLLOWING REQUIREMENTS OR APPLICABLE CODES AND ORDINANCES:
 - SANITARY SEWER: DEPTHS, ELEVATIONS AND GRADES AS INDICATED ON DRAWINGS.
 - STORM SEWER: DEPTHS, ELEVATIONS, AND GRADES AS SHOWN ON DRAWINGS.
 - ELECTRICAL CONDUITS: 24 INCHES MINIMUM TO TOP OF CONDUIT OR AS REQUIRED BY NEC 300-5, NEC 710-36 CODES, OR THE LOCAL UTILITY COMPANY REQUIREMENTS, WHICHEVER IS DEEPER.
 - TV CONDUITS: 18 INCHES MINIMUM TO TOP OF CONDUIT OR AS REQUIRED BY THE LOCAL UTILITY COMPANY, WHICHEVER IS DEEPER.
 - TELEPHONE CONDUITS: 18 INCHES MINIMUM TO TOP OF CONDUIT OR AS REQUIRED BY THE LOCAL UTILITY COMPANY, WHICHEVER IS DEEPER.
 - GAS MAINS AND SERVICE: 30 INCHES MINIMUM TO TOP OF PIPE, OR AS REQUIRED BY THE LOCAL UTILITY COMPANY, WHICHEVER IS DEEPER.
 - SITE GRADING SHALL NOT PROCEED UNTIL ALL EROSION CONTROL MEASURES HAVE BEEN INSTALLED.
 - CONTRACTOR SHALL PROVIDE WRITTEN REQUESTS FOR INFORMATION TO THE OWNER AND OWNER'S ENGINEER PRIOR TO THE CONSTRUCTION OF ANY SPECIFIC SITEMARK ITEM IF ANY SPECIFIC SITEMARK ITEM DEPICTED ON THE PLANS WARRANTS ADDITIONAL INFORMATION REQUIRED FOR CONSTRUCTION AND IS NOT RELATED TO MEANS AND METHODS OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SPECIFIC SITE WORK ITEMS INSTALLED DIFFERENTLY THAN INTENDED AS DEPICTED ON THE PLANS IN THE ABSENCE OF SUBMITTING AND ADDRESSING WRITTEN REQUESTS FOR INFORMATION.
 - PROPOSED SIDEWALKS SHALL BE CONSTRUCTED WITH CROSS-SLOPES THAT DO NOT EXCEED 1.5%.

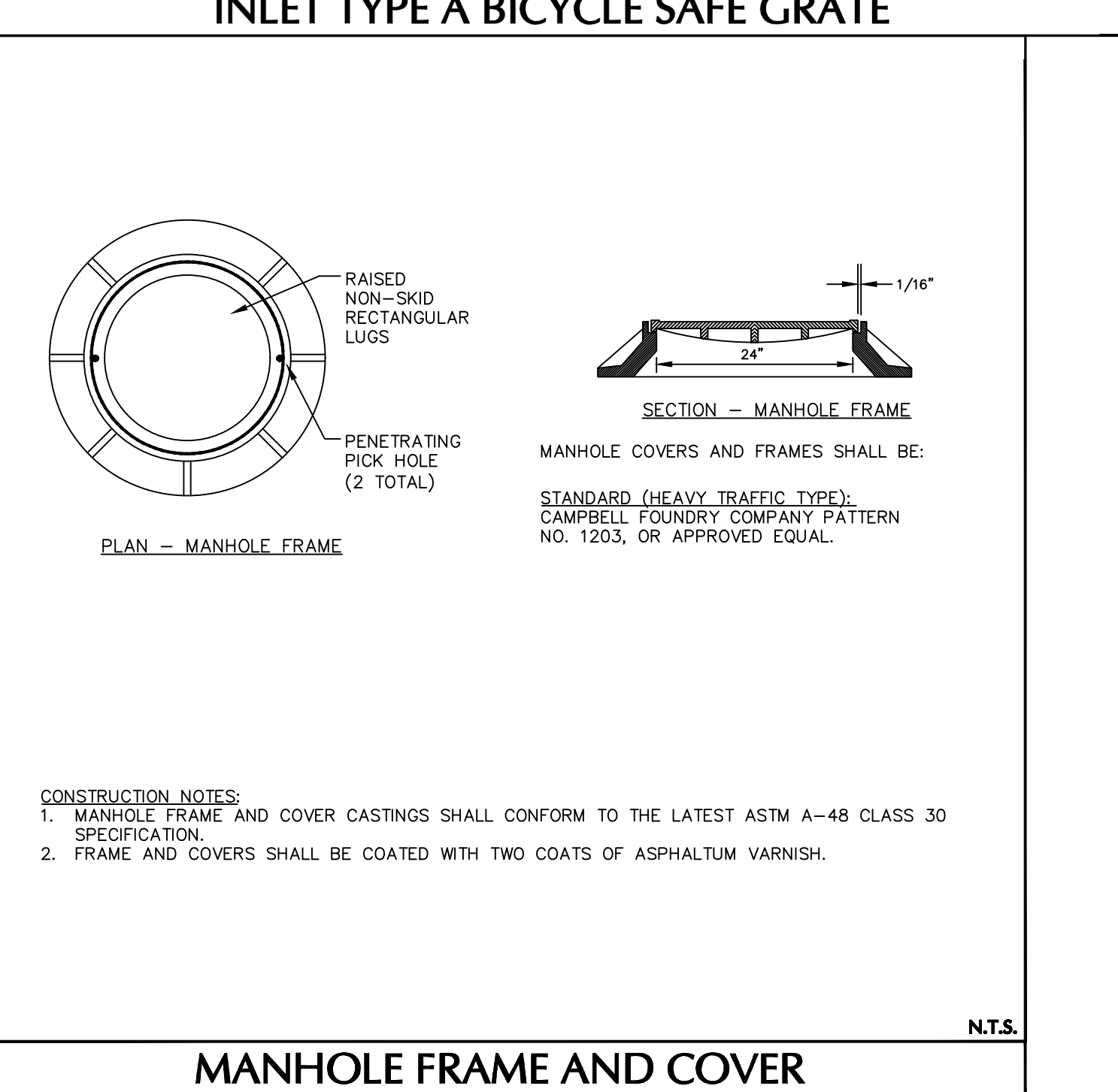
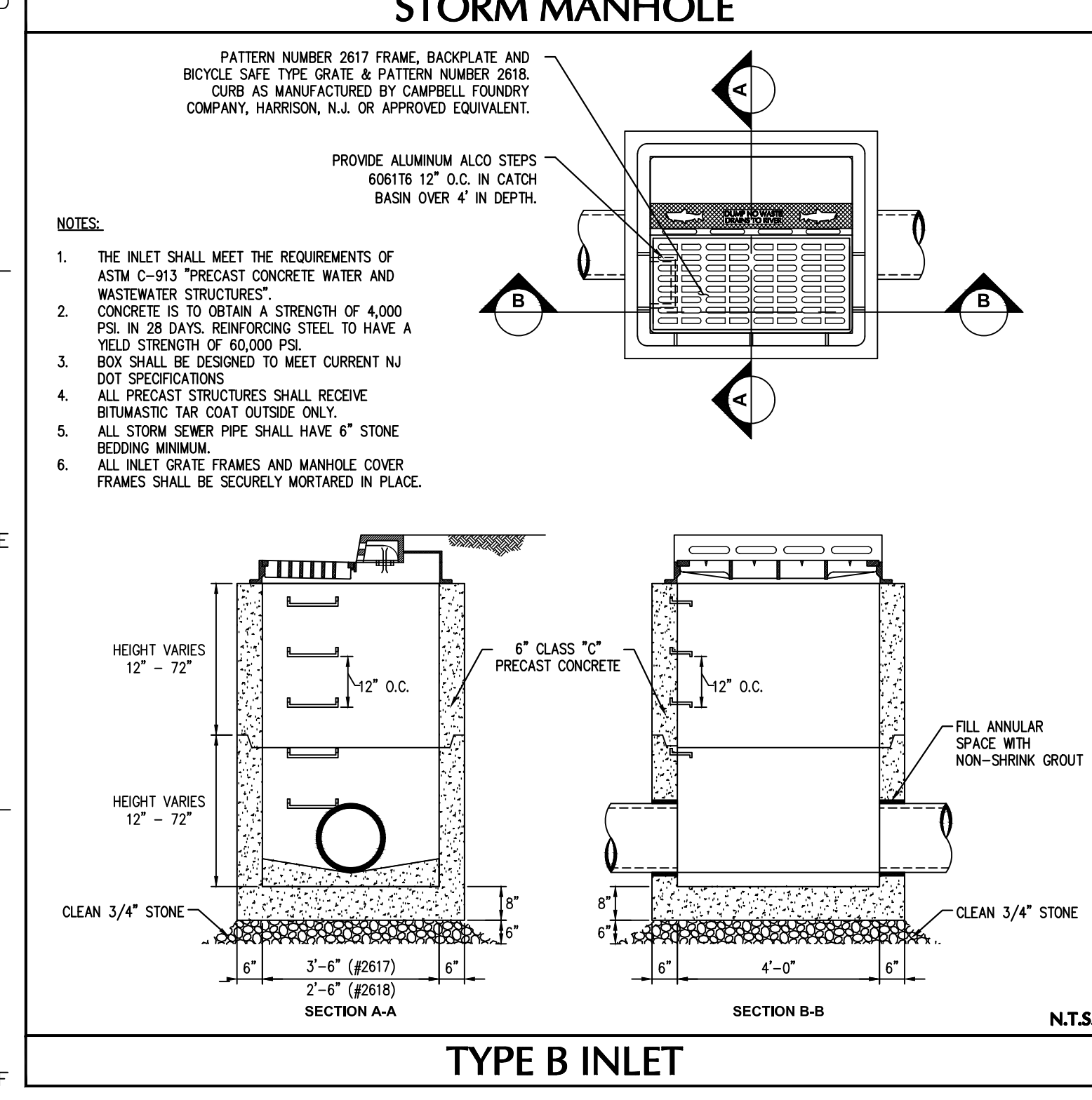
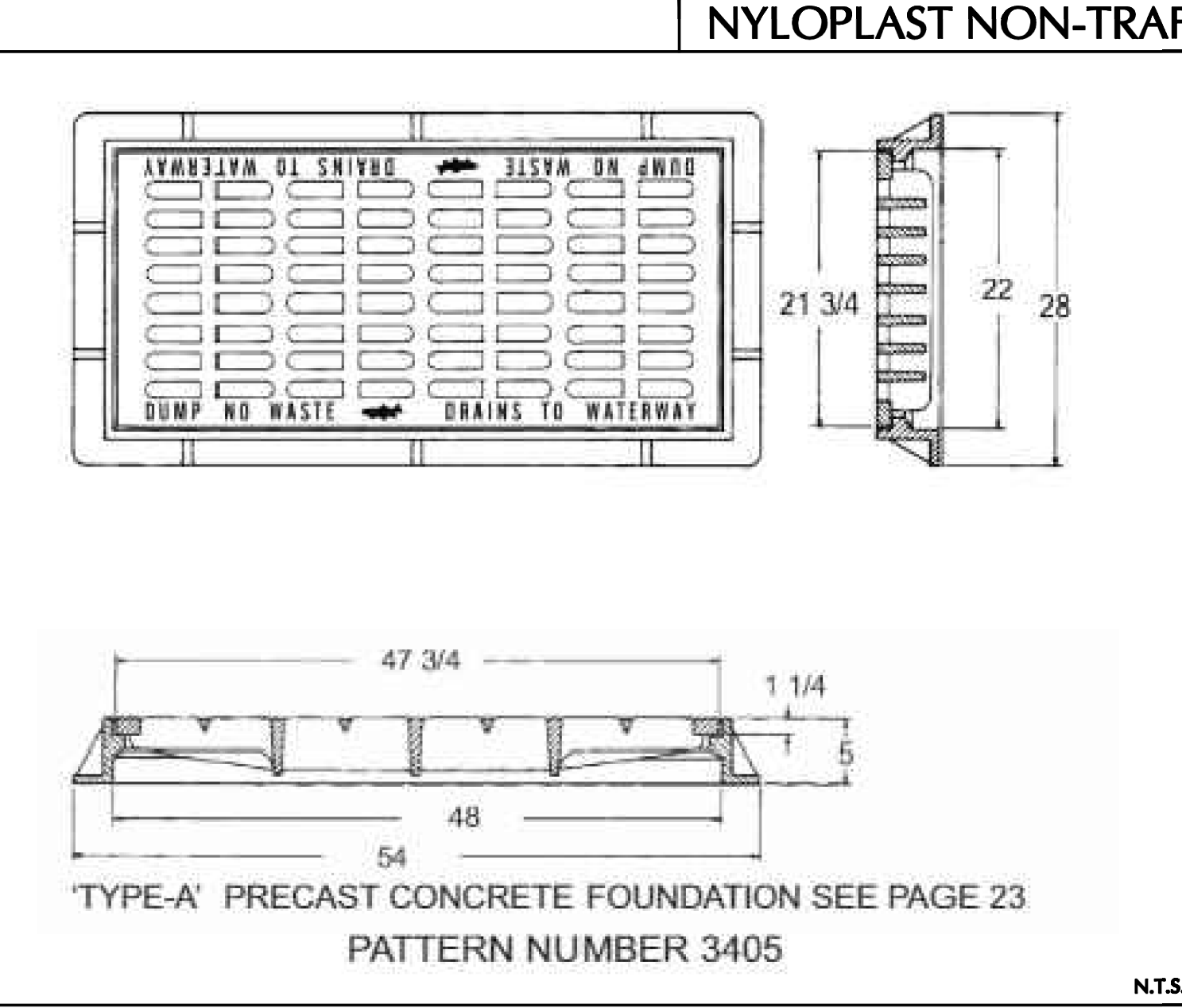
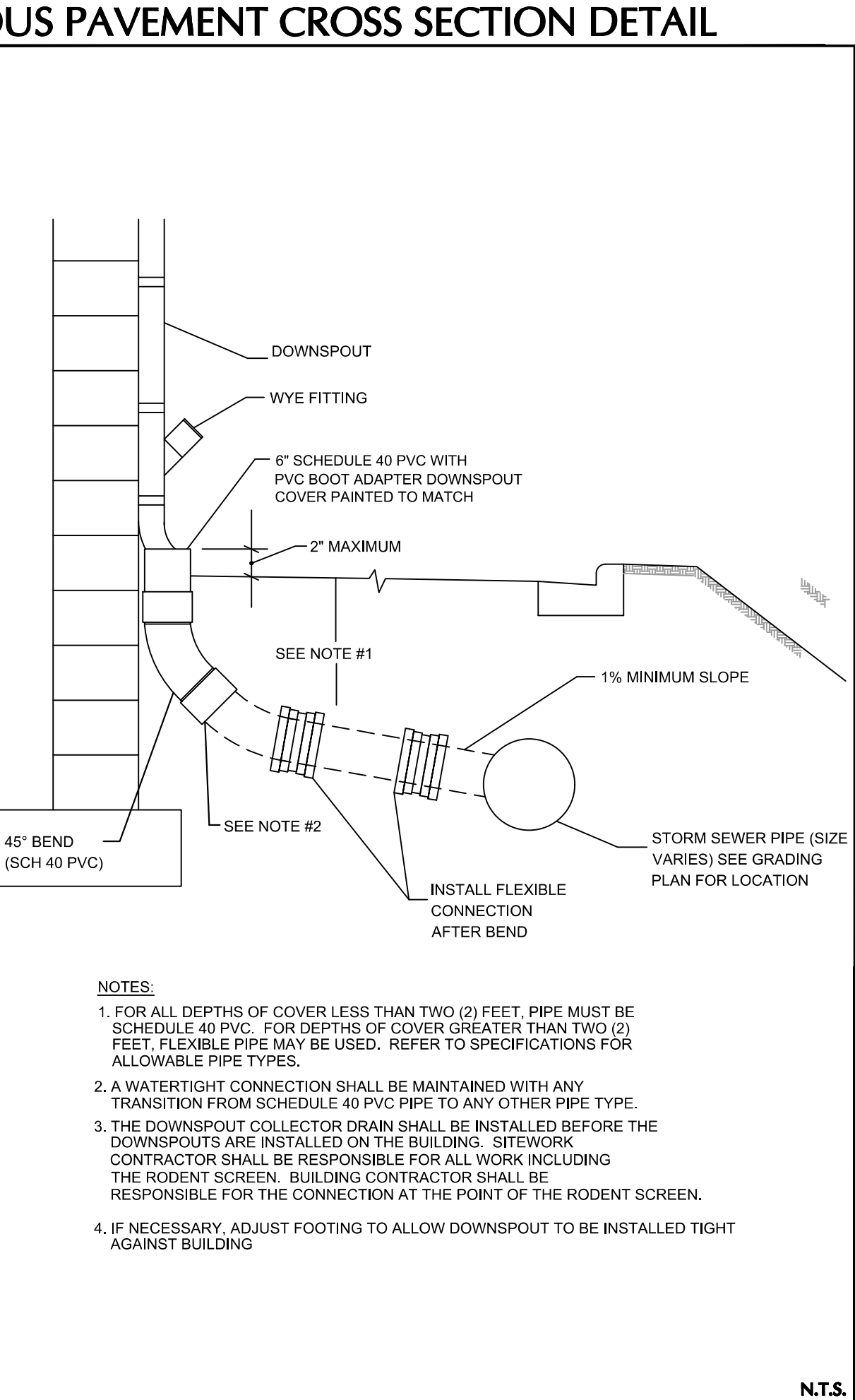
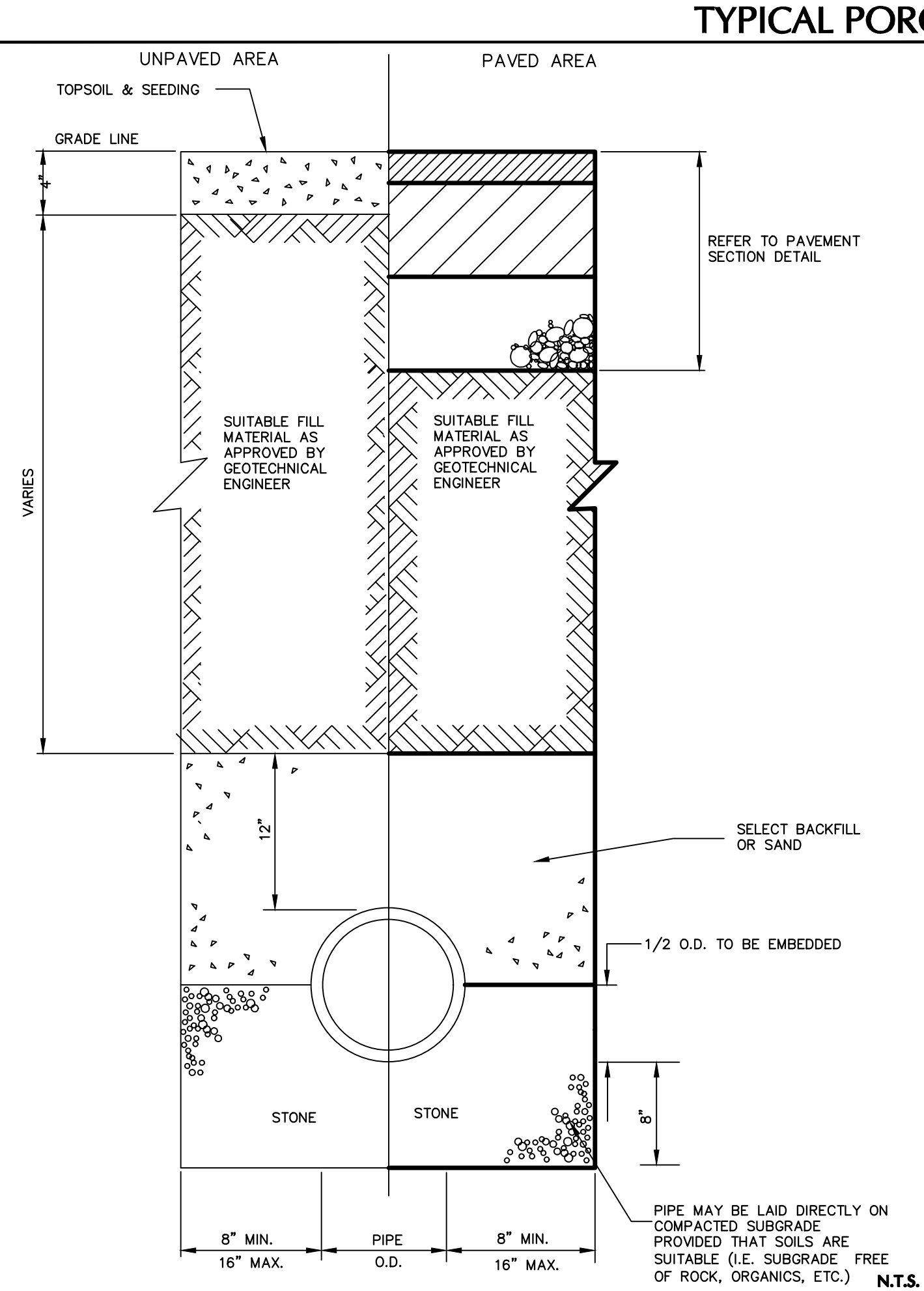
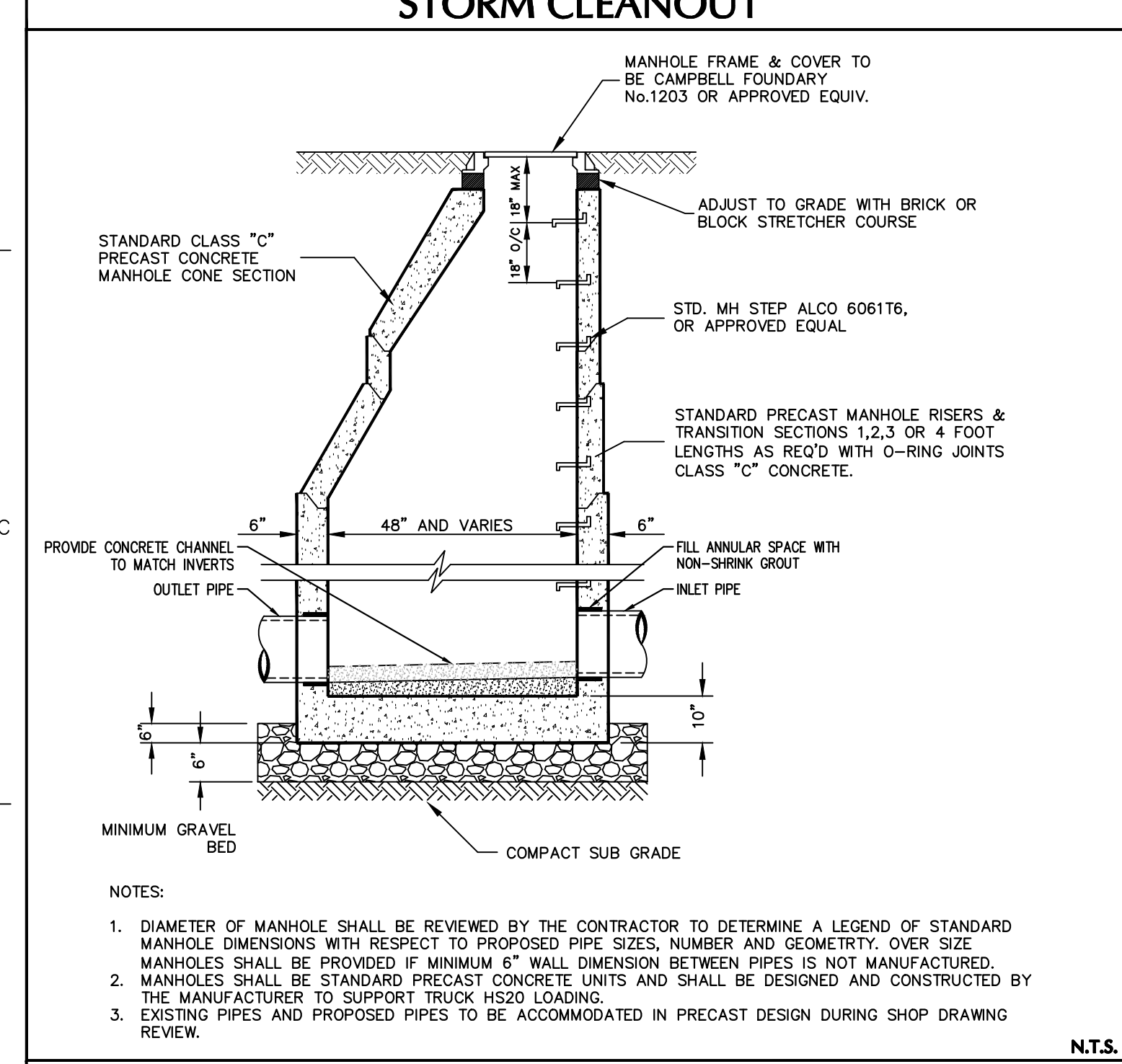
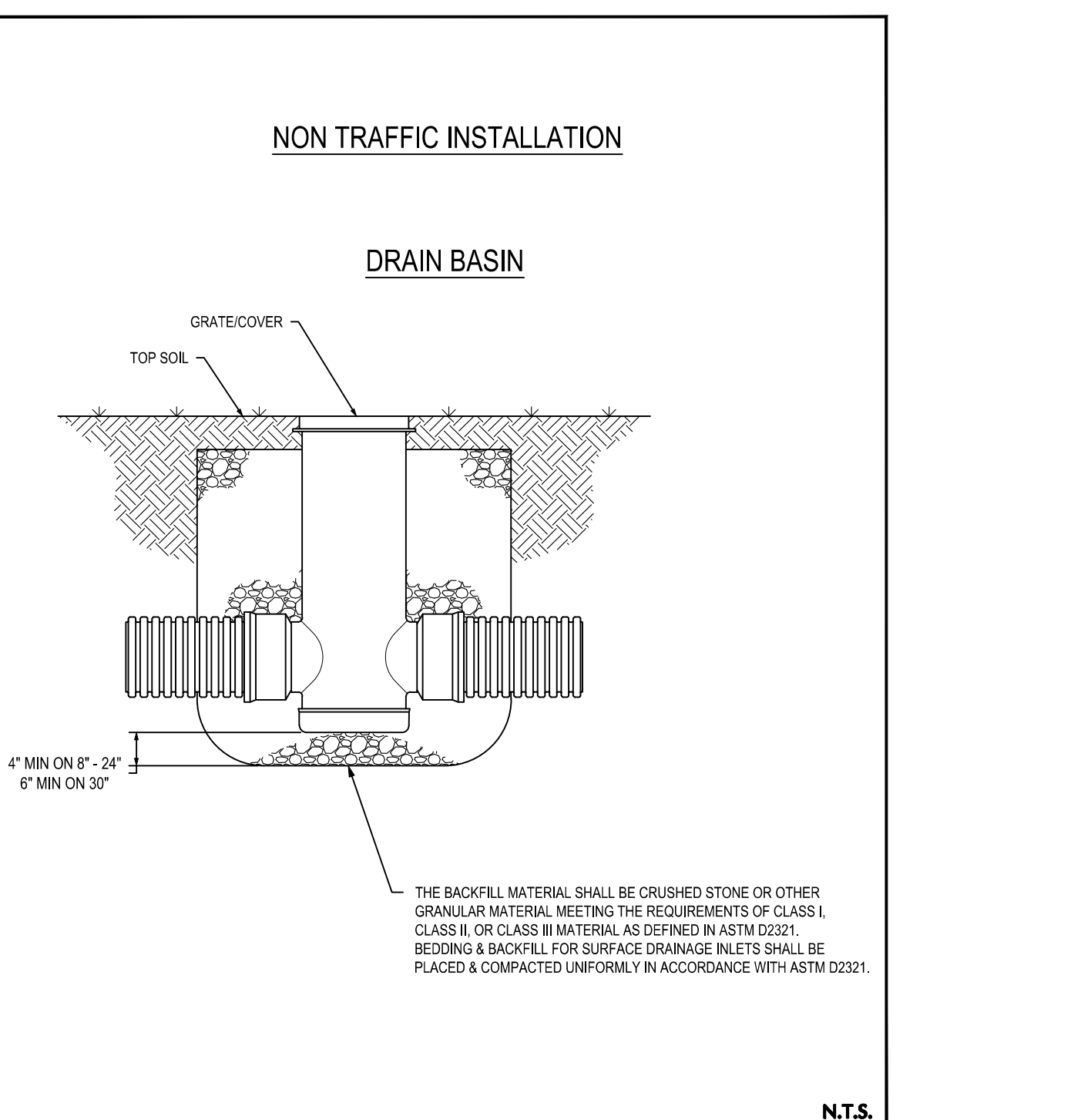
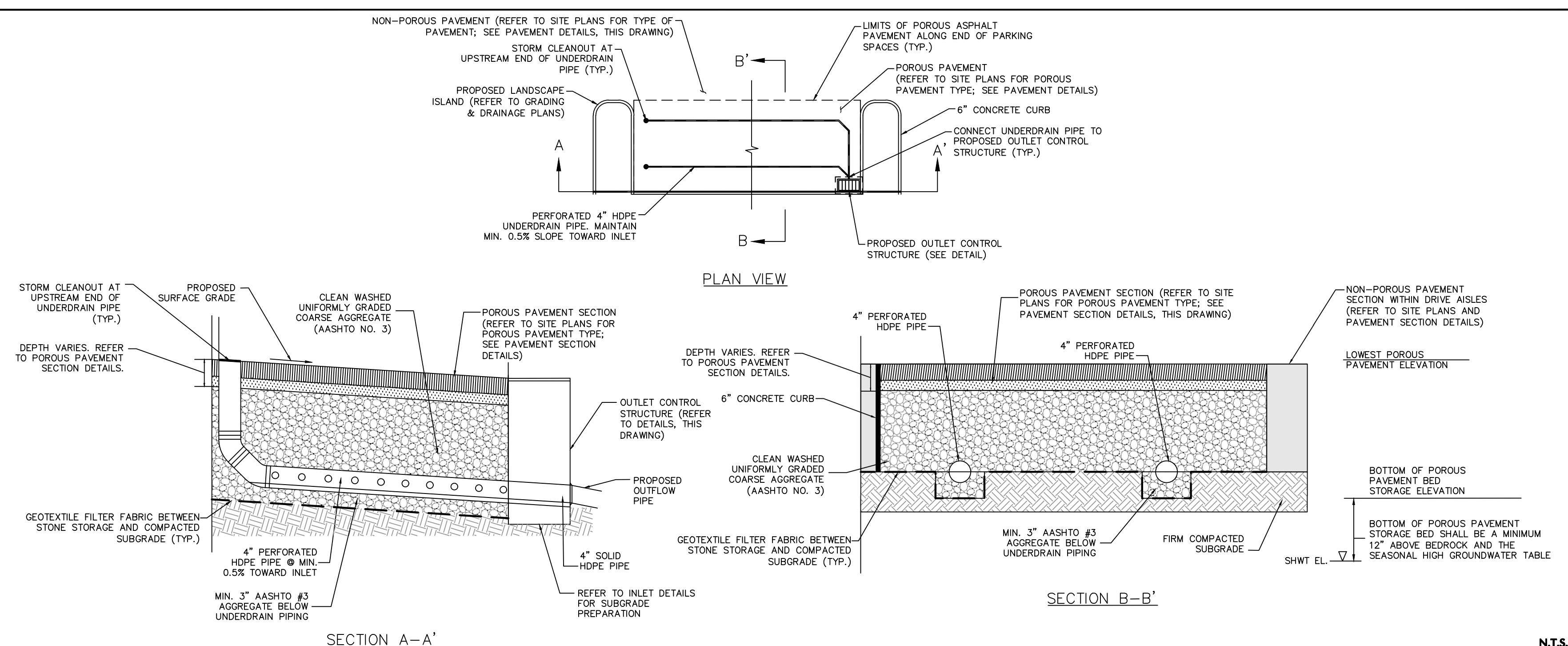
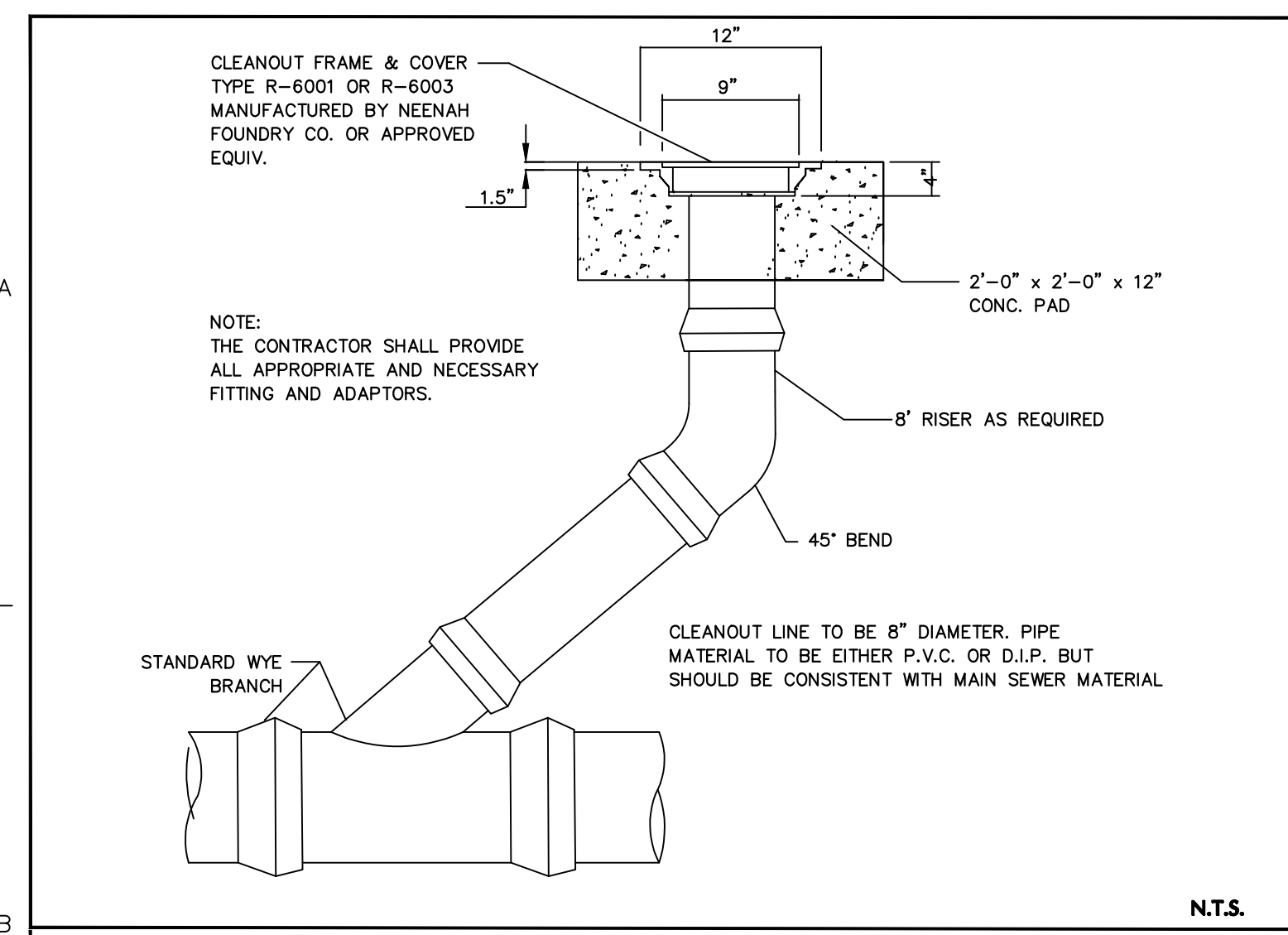
- GENERAL NOTES:**
- BACKGROUND BOUNDARY AND TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM PLAN TITLED "BOUNDARY, TOPOGRAPHIC & UTILITY SURVEY", PREPARED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC., DATED DECEMBER 8, 2022.
 - ELEVATIONS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) DERIVED USING SURVEY-GRADE GNSS EQUIPMENT.
 - THE SITE IS LOCATED OUTSIDE OF THE 100-YEAR FLOOD HAZARD AREA (ZONE X) PER FEMA FIRM PANEL #34039C0008F, DATED SEPTEMBER 20, 2006.


LEGEND

	EXISTING	PROPOSED
PROPERTY LINE/ROW	—	—
CONTOUR	120	118
SPOT ELEVATION	122.53	124.68
STORM MANHOLE	○	●
SANITARY MANHOLE	○	●
CATCH BASIN	□	■
STORM SEWER	—	—
SANITARY SEWER	—	—
RETAINING WALL	—	—



Date	Description	No.
Revisions		
Digitally signed by John C Cote Date: 2024.02.22 08:38:39-05'00'		
SIGNATURE		DATE
JOHN COTE		
PROFESSIONAL ENGINEER NJ Lic. No.		
24GE03705800		
Langan Engineering and Environmental Services, Inc. 300 Kimball Drive Parsippany, NJ 07054 T: 973.560.4900 F: 973.560.4901 www.langan.com NJ CERTIFICATE OF AUTHORIZATION NO. 24GA27996400		
Project		
BEACON UNITARIAN UNIVERSALIST CHURCH SUMMIT NEW JERSEY		
Drawing Title		
DRAINAGE PLAN		
Project No.	Drawing No.	
101007201	CG102	
Date	FEBRUARY 9, 2024	
Drawn By	SM	
Checked By	TH	
	Sheet 8 of 19	



Date	Description	No.
Revisions		
 Digitally signed by John C Cote Date: 2024.02.22 08:38:51-05'00'		
SIGNATURE	JOHN COTE PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800	DATE

LANGAN

Langan Engineering and Environmental Services, Inc.

300 Kimball Drive
Parlispappan, NJ 07054

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NJ CERTIFICATE OF AUTHORIZATION NO. 24GA27996400

Project

BEACON UNITARIAN UNIVERSALIST CHURCH

SUMMIT NEW JERSEY

Drawing Title	
DRAINAGE DETAILS	
Project No.	Drawing No.
101007201	CG501
Date	
FEBRUARY 9, 2024	
Drawn By	
SM	
Checked By	
TH	
Sheet 9 of 19	

TRASH RACK INFORMATION

RAK WIDTH (D) (IN)	
RAK HEIGHT (H) (IN)	
RAK DEPTH (D) (IN)	
BAR DIAMETER (1/2" OR 3/4")	
BAR CENTERLINE SPACING	
STRUCTURE OPENING W	
STRUCTURE OPENING H	
WEIR EXTENDS TO TOP?	
FASTENERS (QTY)	
WIRE MESH?	

NOTES:
 1. ALL MATERIALS TO BE ALUMINUM 6061-T6 ALLOY.
 2. WELD ALL INTERSECTIONS.
 3. FASTEN TO CONCRETE STRUCTURE WITH 3/8 in. x 3 in. STAINLESS STEEL CONCRETE WEDGE ANCHORS AT 18 in. MAX. SPACING. MINIMUM OF (4).
 4. DEPTH TO O.D. OF RACK. IF THE CONCRETE WEIR EXTENDS TO THE TOP OF THE STRUCTURE, THE DEPTH OF THE TOP BARS WILL EXTEND TO MEET TOP GRATING OR FRAME OF STRUCTURE SO THERE IS NO GAP.
 5. OVERALL RACK WIDTH = (W) + 4 INCHES
 6. OVERALL RACK HEIGHT = (H) + BAR DIAMETER + 2 INCHES
 7. OPTIONAL - 10g STAINLESS STEEL WIRE MESH WITH 1 in. GRID TO COVER RACK.

NOTES:
 1. MAX OPENING BETWEEN PARALLEL BARS TO BE 3"
 2. ROCK SCREEN TO EXTEND MIN. 12" IN BOTH DIRECTIONS BEYOND WIDTH OF RECTANGULAR WEIR, MIN 6" BELOW RECTANGULAR WEIR INVERT, AND MIN. 12" OUT FROM FACE OF OUTLET CONTROL STRUCTURE

POROUS PAVEMENT OUTLET CONTROL STRUCTURE ALUMINUM ROCK SCREEN

N.T.S.

	ORIFICE "A"		ORIFICE "B"		RECT. WEIR		INLET PIPE		OUTLET PIPE		GRATE EL.
	SIZE	INVERT	SIZE	INVERT	LENGTH	CREST EL.	SIZE	INVERT	SIZE	INVERT	
OC52-1	2.5" DIA.	354.10	5"x6"	354.95	-	-	N/A	N/A	15" HDPE	353.05	356.60
OC52-2	2.5" DIA.	355.10	3"x6"	355.75	-	-	15" HDPE	353.48	15" HDPE	353.48	358.10
OC52-3	2.5" DIA.	354.10	5"x6"	354.90	-	-	N/A	N/A	15" HDPE	354.04	357.31

NOTES:
 1. REFER TO PARTIAL DRAINAGE PLANS FOR WHICH INLET FRAME AND GRATE STYLE TO UTILIZE
 2. REFER TO TYPE B AND TYPE E INLET DETAILS FOR FRAME AND GRATE SPECIFICATIONS
 3. REFER TO TYPE B/TYP E INLET DETAILS FOR PRECAST STRUCTURE SPECIFICATIONS
 4. PROVIDE 6" THICK CLEAN 3/4" STONE SUBBASE
 5. REFER TO TYPE B/TYP E INLET DETAILS FOR PRECAST STRUCTURE SPECIFICATIONS
 6. PROVIDE 6" THICK CLEAN 3/4" STONE SUBBASE
 7. INLET AND OUTLET PIPES (LOCATIONS VARY, REFER TO PARTIAL DRAINAGE PLANS)
 8. UNDERDRAIN PIPE CONNECTION

POROUS PAVEMENT SYSTEM OUTLET CONTROL STRUCTURE

N.T.S.

	INLET PIPE(S)		OUTLET PIPE		ORIFICE		ORIFICE		RECT. WEIR		RIM EL. A	RIM EL. B
	SIZE	INVERT	SIZE	INVERT	SIZE	INVERT	SIZE	INVERT	SIZE	CREST EL.		
OC51-1	24" HDPE	348.50	15" HDPE	348.50	2.5" DIA.	348.75	4"x4" RECT.	349.50	1' RECT.	350.60	354.17	354.00
OC51-2	36" HDPE	344.50	15" HDPE	344.50	2.5" DIA.	344.55	5"x3" RECT.	345.50	1.5" RECT.	347.50	352.75	351.00

NOTES:
 1. SURFACE ELEVATION VARIES (SEE DRAWINGS CG102)
 2. STORMWATER MANAGEMENT STONE BED SHALL BE 2-INCH TO 1-INCH UNIFORMLY GRADED COARSE AGGREGATE, WITH A WASH LOSS OF NO MORE THAN 0.5% AASHTO SIZE NUMBER 3 PER AASHTO SPECIFICATIONS, PART 1, 19TH ED., 1998, OR LATER AND SHALL HAVE VOIDS 40% AS MEASURED BY ASTM-C29.
 3. SEE DRAWING FOR PIPE LAYOUT, CONNECTIONS AND CLEAN-OUTS.
 4. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF THE STORMWATER SYSTEM TO THE DESIGN ENGINEER FOR REVIEW PRIOR TO ORDERING / CONSTRUCTION. THIS SUBMITTAL MUST INCLUDE THE WITHDRAWAL STRUCTURES AND CONNECTION TO THE UNDERGROUND STORMWATER SYSTEM.
 5. EXISTING SUBGRADE UNDER THE INFILTRATION BMP'S SHALL NOT BE COMPACTED OR SUBJECT TO EXCESSIVE CONSTRUCTION EQUIPMENT TRAFFIC PRIOR TO CONSTRUCTION OF THE INFILTRATION BMP. SHOULD INFILTRATION BMP AREAS RECEIVE EXCESSIVE CONSTRUCTION TRAFFIC OR SUBJECT TO COMPACTION, ADDITIONAL INFILTRATION TESTS MUST BE PERFORMED.
 6. PRIOR TO CONSTRUCTION, INFILTRATION AREAS SHALL BE MARKED OFF IN THE FIELD. THE AREAS SHALL BE DELINEATED WITH CONSTRUCTION FENCING OR TAPE IN SUCH A MANNER AS TO PREVENT THE PARKING OF OR REPEATED MOVEMENT OF CONSTRUCTION EQUIPMENT ACROSS THE INFILTRATION AREAS.

UNDERGROUND INFILTRATION BASIN OUTLET CONTROL STRUCTURES

N.T.S.

NOTES:
 1. SURFACE ELEVATION VARIES (SEE DRAWINGS CG102)
 2. STORMWATER MANAGEMENT STONE BED SHALL BE 2-INCH TO 1-INCH UNIFORMLY GRADED COARSE AGGREGATE, WITH A WASH LOSS OF NO MORE THAN 0.5% AASHTO SIZE NUMBER 3 PER AASHTO SPECIFICATIONS, PART 1, 19TH ED., 1998, OR LATER AND SHALL HAVE VOIDS 40% AS MEASURED BY ASTM-C29.
 3. SEE DRAWING FOR PIPE LAYOUT, CONNECTIONS AND CLEAN-OUTS.
 4. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF THE STORMWATER SYSTEM TO THE DESIGN ENGINEER FOR REVIEW PRIOR TO ORDERING / CONSTRUCTION. THIS SUBMITTAL MUST INCLUDE THE WITHDRAWAL STRUCTURES AND CONNECTION TO THE UNDERGROUND STORMWATER SYSTEM.
 5. EXISTING SUBGRADE UNDER THE INFILTRATION BMP'S SHALL NOT BE COMPACTED OR SUBJECT TO EXCESSIVE CONSTRUCTION EQUIPMENT TRAFFIC PRIOR TO CONSTRUCTION OF THE INFILTRATION BMP. SHOULD INFILTRATION BMP AREAS RECEIVE EXCESSIVE CONSTRUCTION TRAFFIC OR SUBJECT TO COMPACTION, ADDITIONAL INFILTRATION TESTS MUST BE PERFORMED.
 6. PRIOR TO CONSTRUCTION, INFILTRATION AREAS SHALL BE MARKED OFF IN THE FIELD. THE AREAS SHALL BE DELINEATED WITH CONSTRUCTION FENCING OR TAPE IN SUCH A MANNER AS TO PREVENT THE PARKING OF OR REPEATED MOVEMENT OF CONSTRUCTION EQUIPMENT ACROSS THE INFILTRATION AREAS.

UNDERGROUND INFILTRATION BASIN 1-1 SECTION

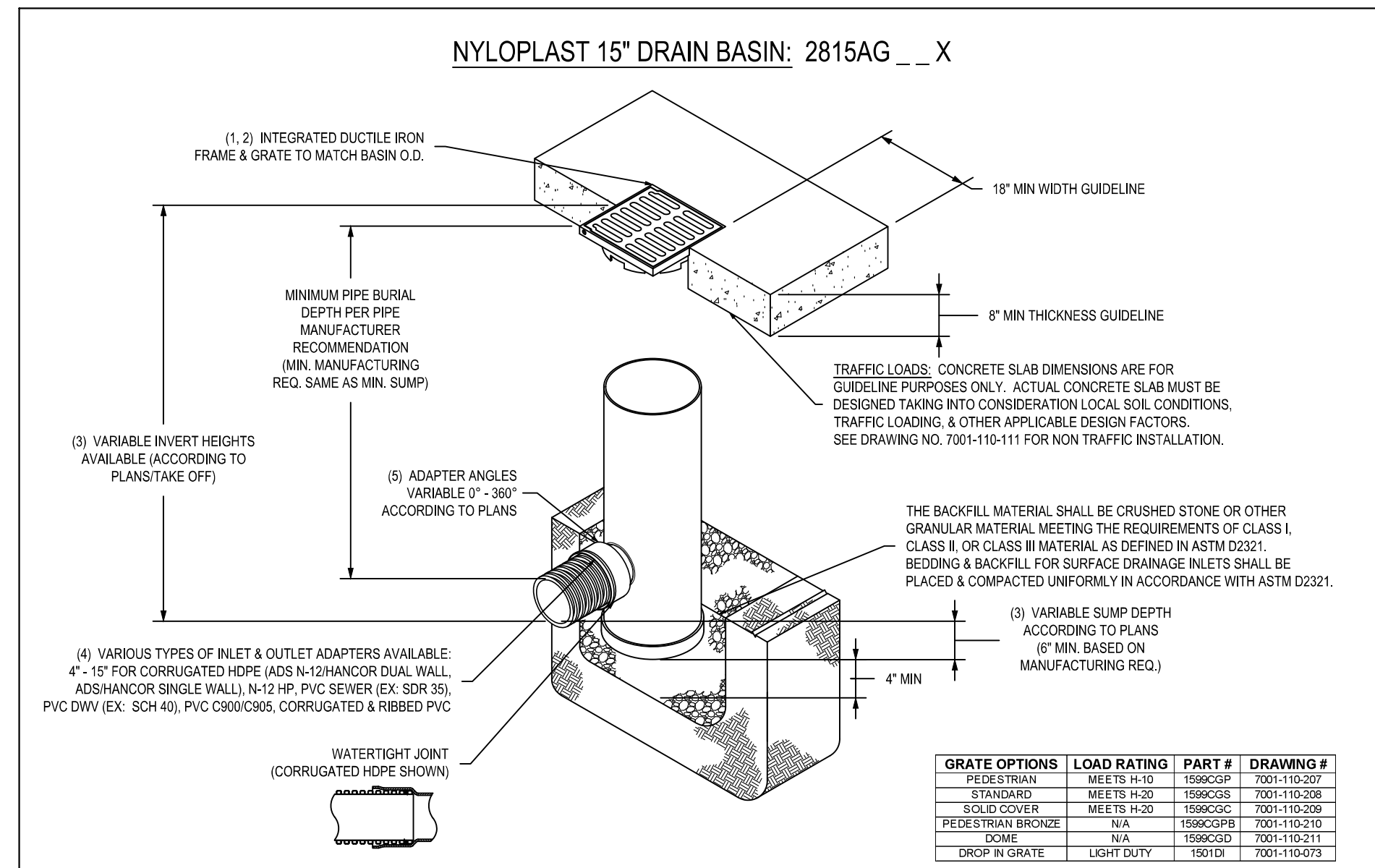
N.T.S.

NOTES:
 1. MATERIAL: GRAY CAST IRON ASTM A48-83, CLASS 30B.
 2. AASHTO HS-25 LOADING.
 3. SUPPLIED WITHOUT SURFACE COATING.
 4. GRATE TO BE CAMPBELL FOUNDRY #2618 OR APPROVED EQUAL.

TYPE B INLET BICYCLE SAFE GRATE WITH TYPE "N-ECO" CURB PIECE

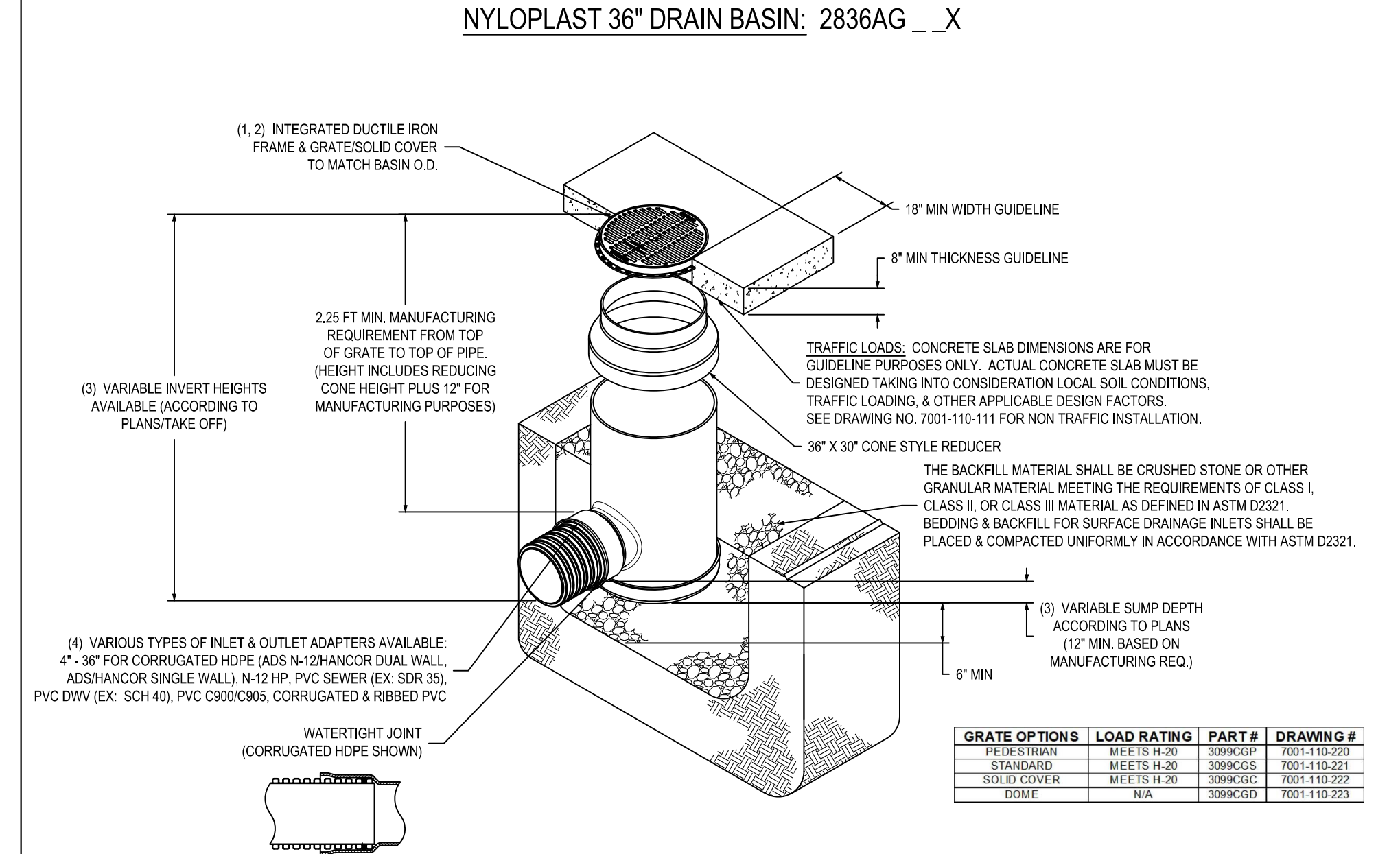
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Revisions		
 Digitally signed by John C Cote Date: 2024.02.22 08:39:05-05'00'		
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 Langan Engineering and Environmental Services, Inc. 300 Kimball Drive Parsippany, NJ 07054 T: 973.560.4900 F: 973.560.4901 www.langan.com NJ CERTIFICATE OF AUTHORIZATION NO. 24GA27996400		
Project BEACON UNITARIAN UNIVERSALIST CHURCH SUMMIT NEW JERSEY		
Drawing Title DRAINAGE DETAILS		
Project No.	101007201	Drawing No.
Date	FEBRUARY 9, 2024	
Drawn By	SM	
Checked By	TH	
Sheet 10 of 19		



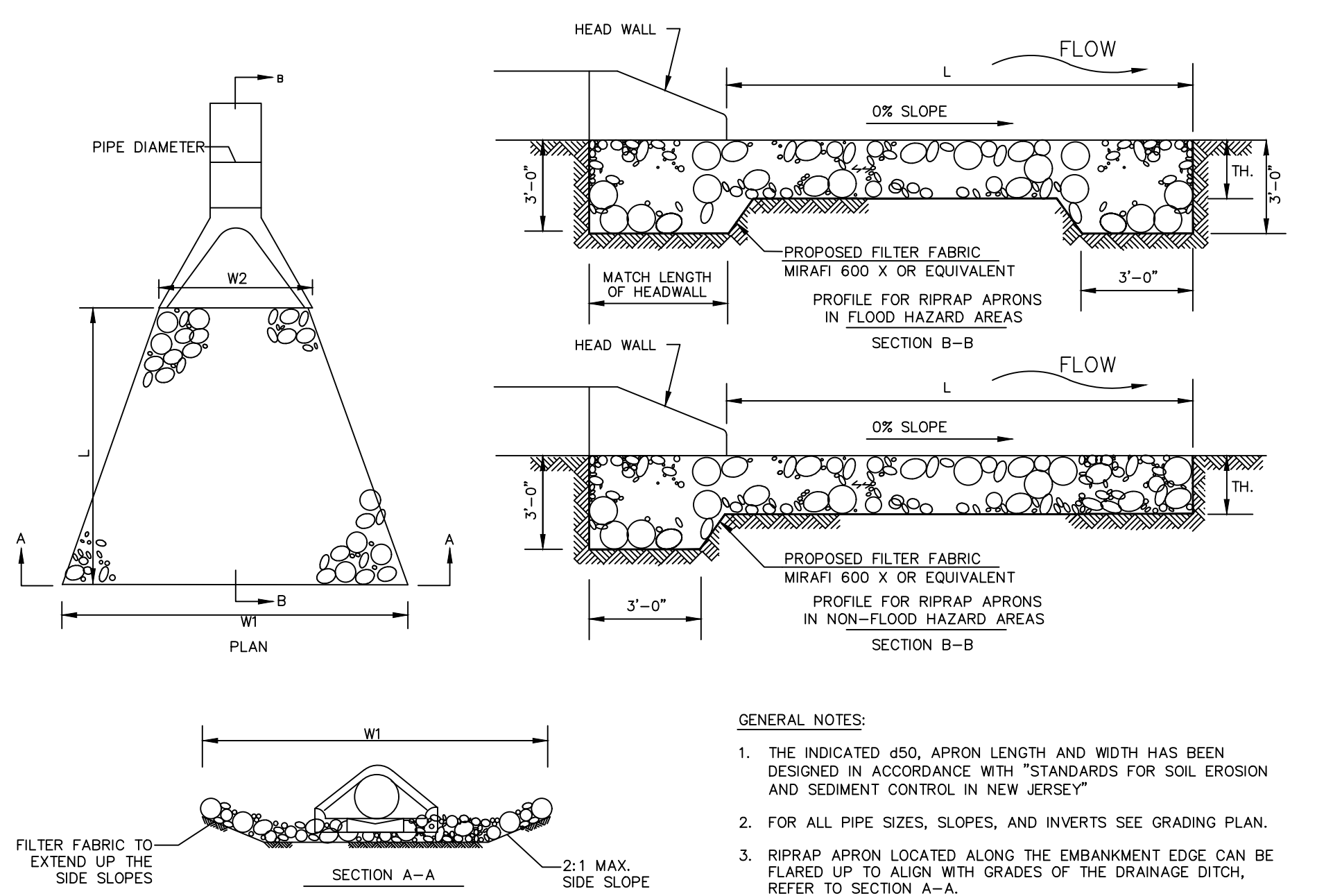
GRATE OPTIONS	LOAD RATING	PART #	DRAWING #
PEDESTRIAN	MEETS H-20	3096GDP	7001-110-207
STANDARD	MEETS H-20	3096GSP	7001-110-208
SOLID COVER	MEETS H-20	3096GSC	7001-110-209
PEDESTRIAN BRIDGE	N/A	3096GFB	7001-110-210
DOME	N/A	3096GDD	7001-110-211
CRIP N GRATE	LIGHT DUTY	1551G	7001-110-212

1. GRATES/SOLID COVER SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05, WITH THE EXCEPTION OF THE BRIDGE GRATE.
 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 8\"/>



GRATE OPTIONS	LOAD RATING	PART #	DRAWING #
PEDESTRIAN	MEETS H-20	3096GDP	7001-110-220
STANDARD	MEETS H-20	3096GSP	7001-110-221
SOLID COVER	MEETS H-20	3096GSC	7001-110-222
DOME	N/A	3096GDD	7001-110-223

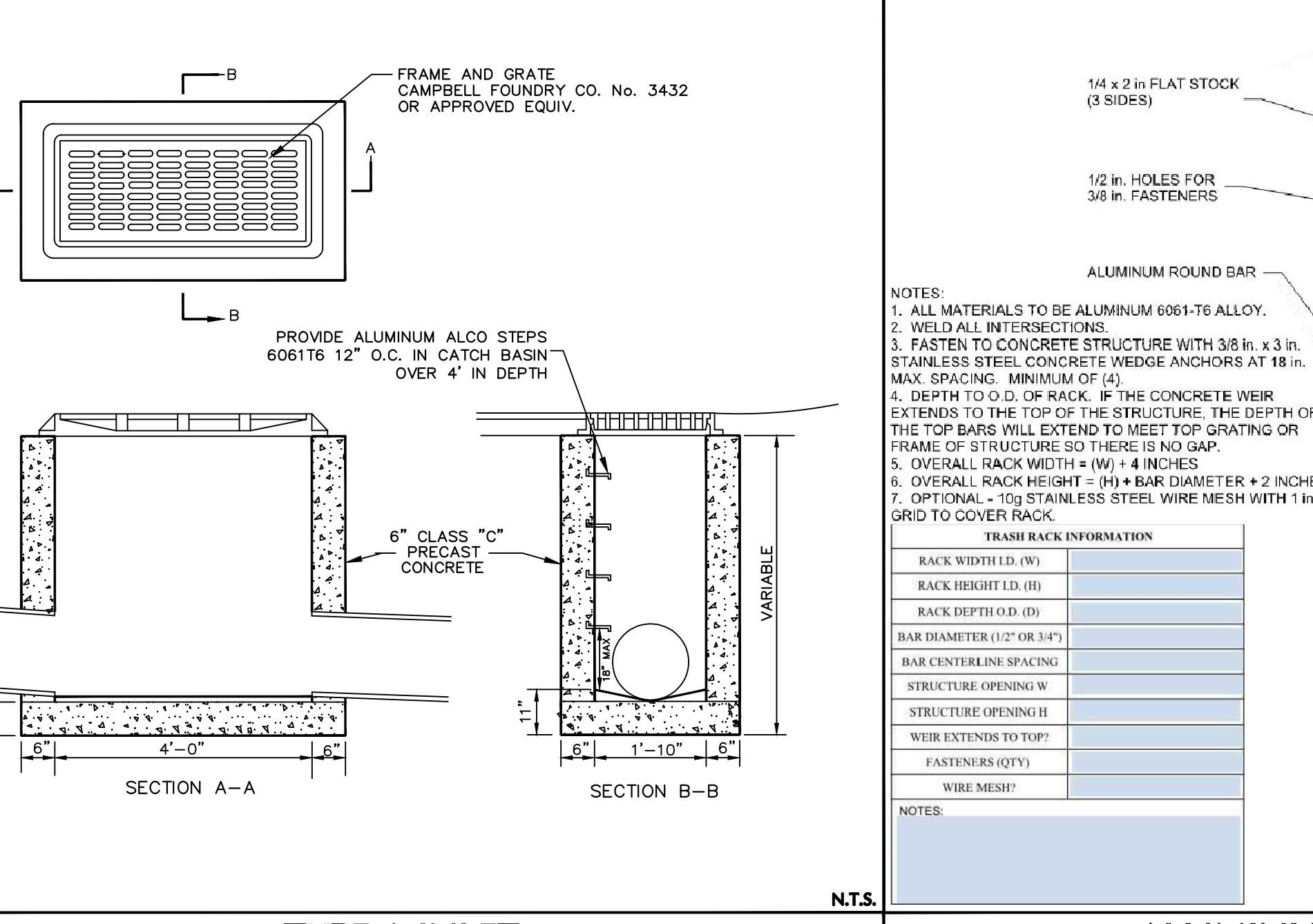
1. GRATES/SOLID COVER SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
 2. FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
 3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS. RISERS ARE NEEDED FOR BASIN BODIES OVER 8\"/>



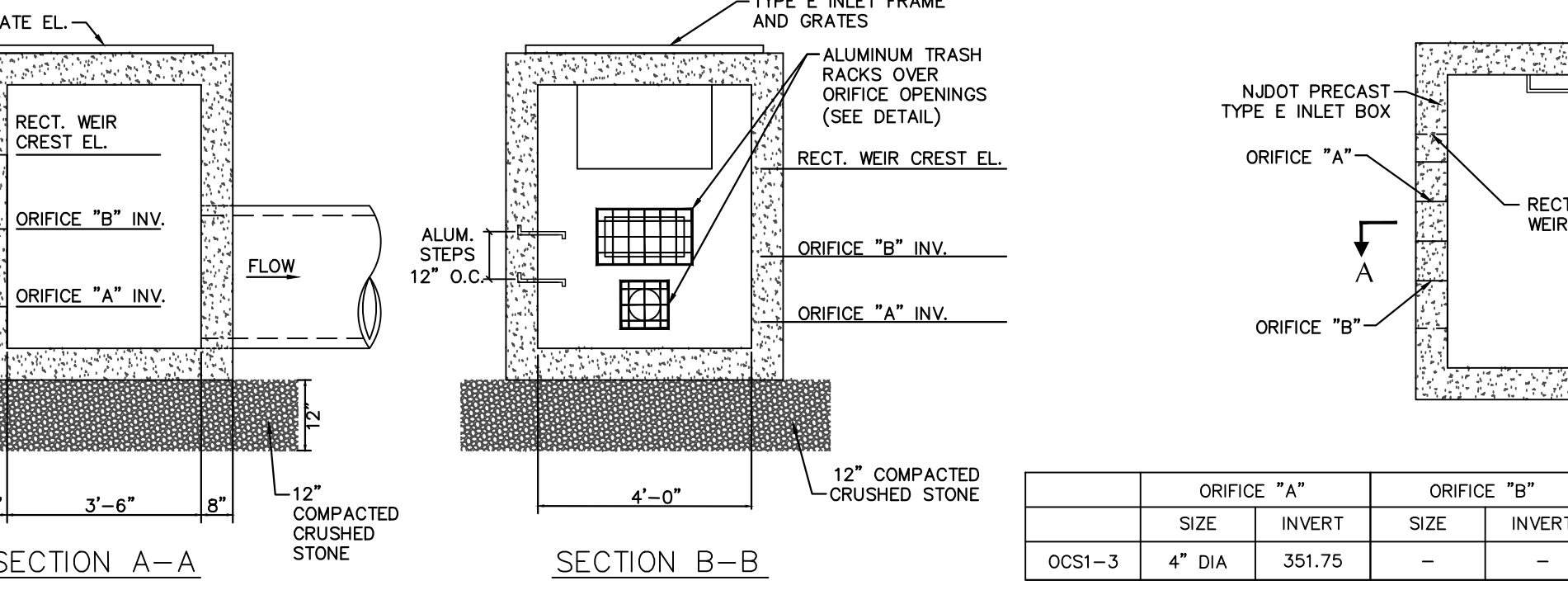
OUTLET	LENGTH	d50	W1	W2	THICKNESS
HW2-1	13.0'	3.0"	17.0'	3.75'	6"

1. THE INDICATED d50, APRON LENGTH AND WIDTH HAS BEEN DESIGNED IN ACCORDANCE WITH "STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL IN NEW JERSEY"
 2. FOR ALL PIPE SIZES, SLOPES, AND INVERTS SEE GRADING PLAN.
 3. RIPRAP APRON LOCATED ALONG THE EMBANKMENT EDGE CAN BE FLARED UP TO ALIGN WITH GRADES OF THE DRAINAGE DITCH, REFER TO SECTION A-A.

NYLOPLAST YARD INLET



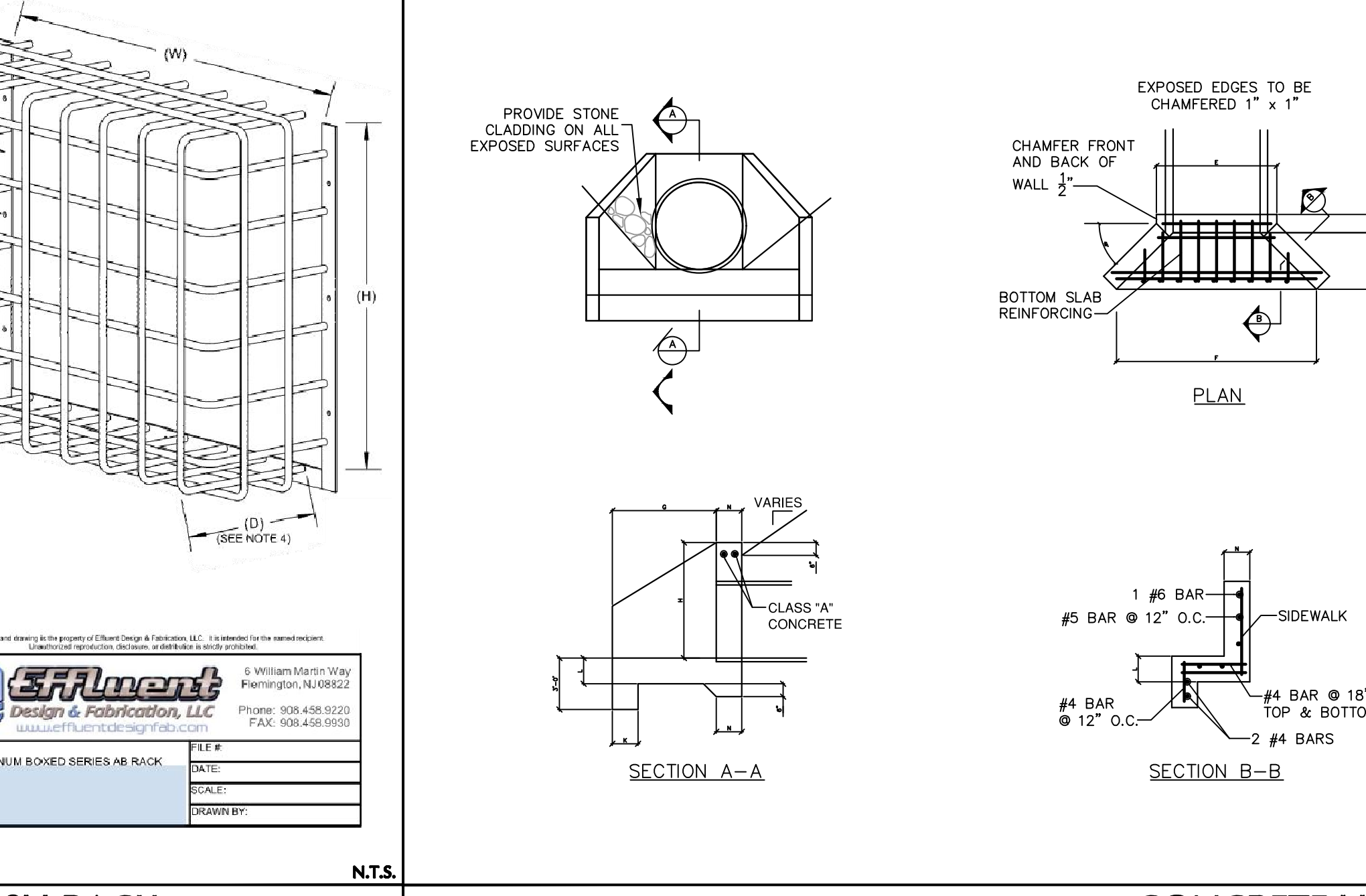
TYPE A INLET



RAIN GARDEN OUTLET CONTROL STRUCTURE

ORIFICE "A"	ORIFICE "B"	RECT. WEIR	OUTLET PIPE	GRATE EL.
SIZE	INVERT	SIZE	INVERT	LENGTH
4" DIA	351.75	-	-	15" HDPE
				347.49
				356.00

NYLOPLAST STORM MANHOLE



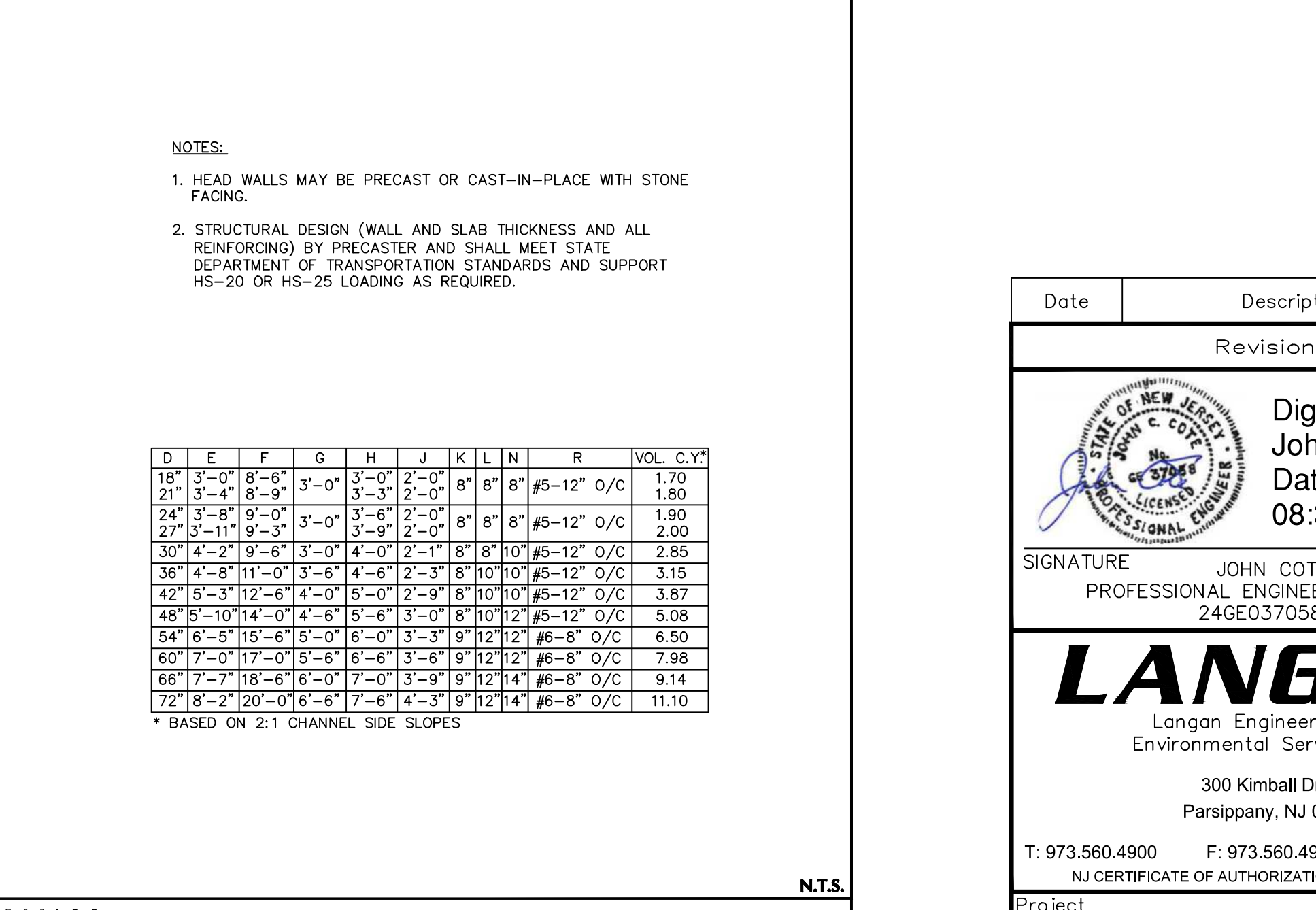
ALUMINUM TRASH RACK



CONCRETE HEADWALL



RIPRAP APRON



TYPE B INLET



CONCRETE HEADWALL



Date	Description	No.
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Digitally signed by John C. Cote Date: 2024.02.22 08:39:21-05'00' SIGNATURE: JOHN COTE DATE: 24GE03705800 PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800		
Langan Engineering and Environmental Services, Inc. 300 Kimball Drive Parsippany, NJ 07054 T: 973.560.4900 F: 973.560.4901 www.langan.com NJ CERTIFICATE OF AUTHORIZATION NO. 24GA27996400		

Project
BEACON UNITARIAN UNIVERSALIST CHURCH
 SUMMIT NEW JERSEY
 Drawing Title

DRAINAGE DETAILS

Project No.	Drawing No.
101007201	CG503
Date	FEBRUARY 9, 2024
Drawn By	SS
Checked By	TH
Sheet 11 of 19	

CULTEC RECHARGER® 360HD PRODUCT SPECIFICATIONS

GENERAL
CULTEC RECHARGER® 360HD CHAMBERS ARE DESIGNED FOR UNDERGROUND STORMWATER MANAGEMENT. THE CHAMBERS MAY BE USED FOR RETENTION, RECHARGING, DETENTION OR CONTROLLING THE FLOW OF ON-SITE STORMWATER RUNOFF.

CHAMBER PARAMETERS
1. THE CHAMBERS SHALL BE MANUFACTURED IN THE U.S.A. OR CANADA BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)

2. THE CHAMBERS SHALL BE DESIGNED AND TESTED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". THE LOAD CONFIGURATION SHALL INCLUDE:
A. INSTANTANEOUS AASHTO DESIGN TRUCK LIVE LOAD AT MINIMUM COVER
B. MAXIMUM PERMANENT (50-YEAR) COVER LOAD
C. 1-WEEK PARKED AASHTO DESIGN TRUCK LOAD

3. THE CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F3430-20 "STANDARD SPECIFICATION FOR CELLULAR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".

4. THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12, WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS. THE STRUCTURAL DESIGN OF THE CHAMBERS SHALL INCLUDE THE FOLLOWING:
A. THE CREEP MODULUS SHALL BE 50-YEAR AS SPECIFIED IN ASTM F3430
B. THE MINIMUM SAFETY FACTOR FOR LIVE LOADS SHALL BE 1.75
C. THE MINIMUM SAFETY FACTOR FOR DEAD LOADS SHALL BE 1.95

5. THE CHAMBER SHALL BE STRUCTURAL FOAM INJECTION MOLDED OF BLUE VIRGIN HIGH MOLECULAR WEIGHT IMPACT-MODIFIED POLYPROPYLENE.

6. THE CHAMBER SHALL BE ARCHED IN SHAPE.

7. THE CHAMBER SHALL BE OPEN-BOTTOMED.

8. THE CHAMBER SHALL BE JOINED USING AN INTERLOCKING OVERLAPPING RIB METHOD. CONNECTIONS MUST BE FULLY SHOULDERED OVERLAPPING RIBS, HAVING NO SEPARATE COUPLINGS.

9. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC RECHARGER® 360HD SHALL BE 36 INCHES (915 mm) TALL, 60 INCHES (1525 mm) WIDE AND 20 INCHES (508 mm) LONG. THE INSTALLED LENGTH OF A JOINED RECHARGER® 360HD SHALL BE 3.67 FEET (1.12 m).

10. MULTIPLE CHAMBERS MAY BE CONNECTED TO FORM DIFFERENT LENGTH ROWS. EACH ROW SHALL BEGIN AND END WITH A SEPARATELY FORMED CULTEC RECHARGER® 360HD END CAP. MAXIMUM INLET OPENING ON THE END CAP IS 24 INCH (600 mm) HDPE OR 30 INCH (750mm) PVC.

11. THE CHAMBER SHALL HAVE TWO SIDE PORTALS TO ACCEPT CULTEC HVLV™ FC-48 FEED CONNECTORS TO CREATE AN INTERNAL MANIFOLD. MAXIMUM ALLOWABLE PIPE SIZE IN THE SIDE PORTAL IS 10 INCH (250mm) HDPE OR 12 INCH (300mm) PVC.

12. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC HVLV™ FC-48 FEED CONNECTOR SHALL BE 12 INCHES (305 mm) TALL, 16 INCHES (406 mm) WIDE AND 49 INCHES (1243 mm) LONG.

13. THE NOMINAL STORAGE VOLUME OF THE RECHARGER® 360HD CHAMBER SHALL BE 10.0 FT³ / FT (1.528 m³ / m) WITHOUT STORAGE VOLUME OF A JOINED RECHARGER® 360HD CHAMBER. THE NOMINAL STORAGE VOLUME OF A JOINED RECHARGER® 360HD CHAMBER SHALL BE 36.66 FT³ / UNIT (1.038 m³ / UNIT) - WITHOUT STONE.

14. THE NOMINAL STORAGE VOLUME OF THE HVLV™ FC-48 FEED CONNECTOR SHALL BE 0.913 FT³ / FT (0.085 m³ / m) - WITHOUT STONE.

15. THE RECHARGER® 360HD CHAMBER SHALL HAVE 7 CORRUGATIONS.

16. THE CHAMBER SHALL BE MANUFACTURED IN A FACILITY EMPLOYING CULTEC'S QUALITY CONTROL AND ASSURANCE PROCEDURES.

17. MAXIMUM ALLOWABLE COVER OVER THE TOP OF THE CHAMBER SHALL BE 12.0 FEET (3.66 m).

END CAP PARAMETERS
1. THE CULTEC RECHARGER® 360HD END CAP (REFERRED TO AS "END CAP") SHALL BE MANUFACTURED IN THE U.S.A. OR CANADA BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)

2. THE END CAP SHALL BE STRUCTURAL FOAM INJECTION MOLDED OF BLUE VIRGIN HIGH MOLECULAR WEIGHT IMPACT-MODIFIED POLYPROPYLENE.

3. THE END CAP SHALL BE ARCHED IN SHAPE.

4. THE END CAP SHALL BE OPEN-BOTTOMED.

5. THE END CAP SHALL BE JOINED AT THE BEGINNING AND END OF EACH ROW OF CHAMBERS USING AN INTERLOCKING OVERLAPPING RIB METHOD. CONNECTIONS MUST BE FULLY SHOULDERED OVERLAPPING RIBS, HAVING NO SEPARATE COUPLINGS.

6. THE END CAP SHALL HAVE 5 CORRUGATIONS.

7. THE NOMINAL DIMENSIONS OF THE END CAP SHALL BE 36.5 INCHES (927 mm) TALL, 60 INCHES (1525 mm) WIDE AND 18 INCHES (457 mm) LONG. WHEN JOINED WITH A RECHARGER 360HD CHAMBER, THE INSTALLED LENGTH OF THE END CAP SHALL BE 15 INCHES (381 mm).

8. THE NOMINAL STORAGE VOLUME OF THE END CAP SHALL BE 5.17 FT³ / FT (0.48 m³ / m) - WITHOUT STONE. THE NOMINAL STORAGE VOLUME OF AN INTERLOCKED END CAP SHALL BE 5.46 FT³ / UNIT (0.183 m³ / UNIT) - WITHOUT STONE.

9. MAXIMUM INLET OPENING ON THE END CAP IS 24 INCH (600 mm) HDPE OR 30 INCH (750mm) PVC.

10. THE CHAMBER SHALL BE MANUFACTURED IN A FACILITY EMPLOYING CULTEC'S QUALITY CONTROL AND ASSURANCE PROCEDURES.

11. THE END CAP SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12.

CULTEC HVLV FC-48 FEED CONNECTOR PRODUCT SPECIFICATIONS

GENERAL
CULTEC HVLV FC-48 FEED CONNECTORS ARE DESIGNED TO CREATE AN INTERNAL MANIFOLD FOR CULTEC RECHARGER MODEL 360HD STORMWATER CHAMBERS.

FEED CONNECTOR PARAMETERS
1. THE FEED CONNECTOR SHALL BE MANUFACTURED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)

2. THE FEED CONNECTOR SHALL BE VACUUM THERMOFORMED OF BLACK HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE (HMWHDPE).

3. THE FEED CONNECTOR SHALL BE ARCHED IN SHAPE.

4. THE FEED CONNECTOR SHALL BE OPEN-BOTTOMED.

5. THE NOMINAL DIMENSIONS OF THE CULTEC HVLV FC-48 FEED CONNECTOR SHALL BE 12 INCHES (305 mm) TALL, 16 INCHES (406 mm) WIDE AND 49 INCHES (1243 mm) LONG.

6. THE NOMINAL STORAGE VOLUME OF THE HVLV FC-48 FEED CONNECTOR SHALL BE 0.913 FT³ / FT (0.085 m³ / m) - WITHOUT STONE.

7. THE HVLV FC-48 FEED CONNECTOR SHALL HAVE 4 CORRUGATIONS.

8. THE HVLV FC-48 FEED CONNECTOR MUST BE FORMED AS A WHOLE UNIT HAVING TWO OPEN END WALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS. THE UNIT SHALL FIT INTO THE SIDE PORTALS OF THE CULTEC RECHARGER STORMWATER CHAMBER AND ACT AS CROSS FEED CONNECTIONS CREATING AN INTERNAL MANIFOLD.

9. THE FEED CONNECTOR SHALL BE DESIGNED TO WITHSTAND AASHTO HS-25 DEFINED LOADS WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.

10. THE FEED CONNECTOR SHALL BE MANUFACTURED IN AN ISO 9001:2008 CERTIFIED FACILITY.

CULTEC NO. 410™ NON-WOVEN GEOTEXTILE
CULTEC NO. 410™ NON-WOVEN GEOTEXTILE MAY BE USED WITH CULTEC CONTACTOR® AND RECHARGER® STORMWATER INSTALLATIONS TO PROVIDE A BARRIER THAT PREVENTS SOIL INTRUSION INTO THE STONE.

GEOTEXTILE PARAMETERS
1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)

2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.

3. THE GEOTEXTILE SHALL HAVE A TYPICAL WEIGHT OF 4.5 OZ/SY (142 G/M).

4. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH VALUE OF 120 LBS (533 N) PER ASTM D4632 TESTING METHOD.

5. THE GEOTEXTILE SHALL HAVE AN ELONGATION @ BREAK VALUE OF 50% PER ASTM D4632 TESTING METHOD.

6. THE GEOTEXTILE SHALL HAVE A MULLEN BURST VALUE OF 225 PSI (1551 KPA) PER ASTM D3786 TESTING METHOD.

7. THE GEOTEXTILE SHALL HAVE A PUNCTURE STRENGTH VALUE OF 65 LBS (289 N) PER ASTM D4833 TESTING METHOD.

8. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE VALUE OF 340 LBS (1513 N) PER ASTM D6241 TESTING METHOD.

9. THE GEOTEXTILE SHALL HAVE A TRAPEZOIDAL TEAR VALUE OF 50 LBS (222 N) PER ASTM D4533 TESTING METHOD.

10. THE GEOTEXTILE SHALL HAVE A ADS VALUE OF 70 U.S. SIEVE (0.212 MM) PER ASTM D4751 TESTING METHOD.

11. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY VALUE OF 1.7 SEC-1 PER ASTM D4491 TESTING METHOD.

12. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATE VALUE OF 135 GAL/MIN/SF (500 L/MIN/SQ) PER ASTM D4491 TESTING METHOD.

13. THE GEOTEXTILE SHALL HAVE A UV STABILITY @ 500 HOURS VALUE OF 70% PER ASTM D4355 TESTING METHOD.

CULTEC NO. 4800™ WOVEN GEOTEXTILE
CULTEC NO. 4800 WOVEN GEOTEXTILE IS DESIGNED AS A UNDERLAYMENT TO PREVENT SCOURING CAUSED BY WATER MOVEMENT WITHIN THE CULTEC CHAMBERS AND FEED CONNECTORS UTILIZING THE CULTEC MANIFOLD FEATURE. IT MAY ALSO BE USED AS A COMPONENT OF THE CULTEC SEPARATOR ROW TO ACT AS A BARRIER TO PREVENT SOIL/CONTAMINANT INTRUSION INTO THE STONE WHILE ALLOWING FOR MAINTENANCE.

GEOTEXTILE PARAMETERS
1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)

2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.

3. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH OF 550 X 550 LBS (2,448 X 2,448 N) PER ASTM D4632 TESTING METHOD.

4. THE GEOTEXTILE SHALL HAVE A ELONGATION @ BREAK RESISTANCE OF 20 X 20% PER ASTM D4632 TESTING METHOD.

5. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE OF 5,070 X 5,070 LBS/FT (74 X 74 KN/M) PER ASTM D4595 TESTING METHOD.

6. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 2% STRAIN OF 960 X 1,096 LBS/FT (14 X 16 KN/M) PER ASTM D4595 TESTING METHOD.

7. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 5% STRAIN OF 2,740 X 2,740 LBS/FT (40 X 40 KN/M) PER ASTM D4595 TESTING METHOD.

8. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 10% STRAIN OF 4,800 X 4,800 LBS/FT (70 X 70 KN/M) PER ASTM D4595 TESTING METHOD.

9. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE RESISTANCE OF 1,700 LBS (7,560 N) PER ASTM D6241 TESTING METHOD.

10. THE GEOTEXTILE SHALL HAVE A TRAPEZOIDAL TEAR RESISTANCE OF 180 X 180 LBS (801 X 801 N) PER ASTM D4533 TESTING METHOD.

11. THE GEOTEXTILE SHALL HAVE AN APPARENT OPENING SIZE OF 40 US STD. SIEVE (0.425 MM) PER ASTM D4751 TESTING METHOD.

12. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY RATING OF 0.15 SEC-1 PER ASTM D4491 TESTING METHOD.

13. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATING OF 11.5 GPM/FT² (470 LPM/M²) PER ASTM D4491 TESTING METHOD.

14. THE GEOTEXTILE SHALL HAVE A UV RESISTANCE OF 80% @ 500 HRS. PER ASTM D4355 TESTING METHOD.

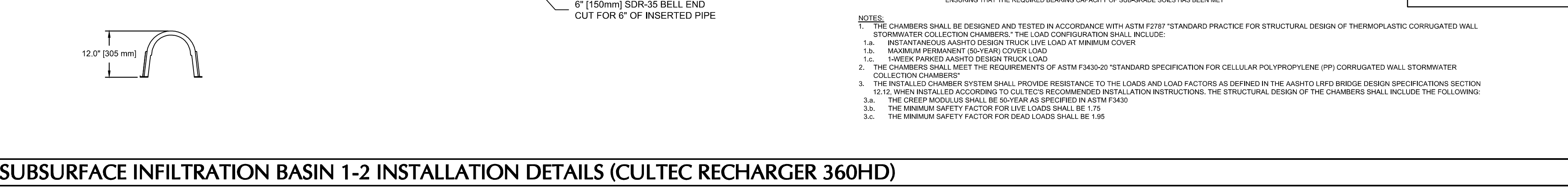
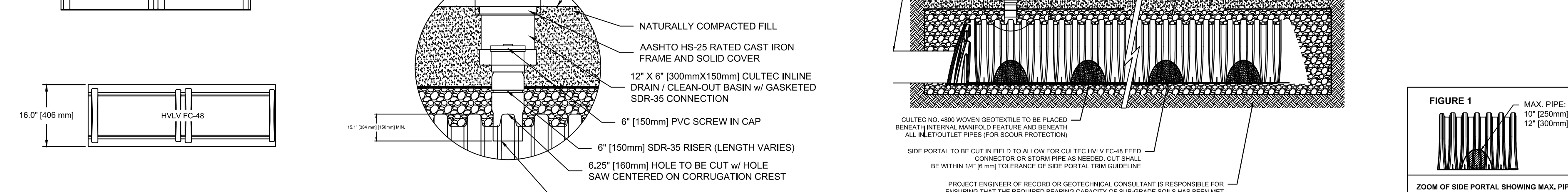
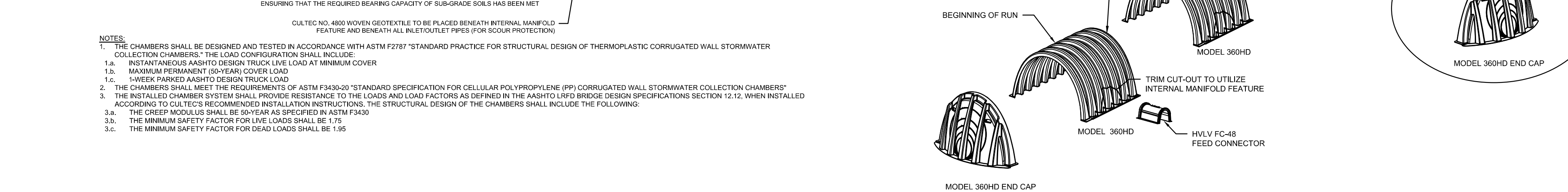
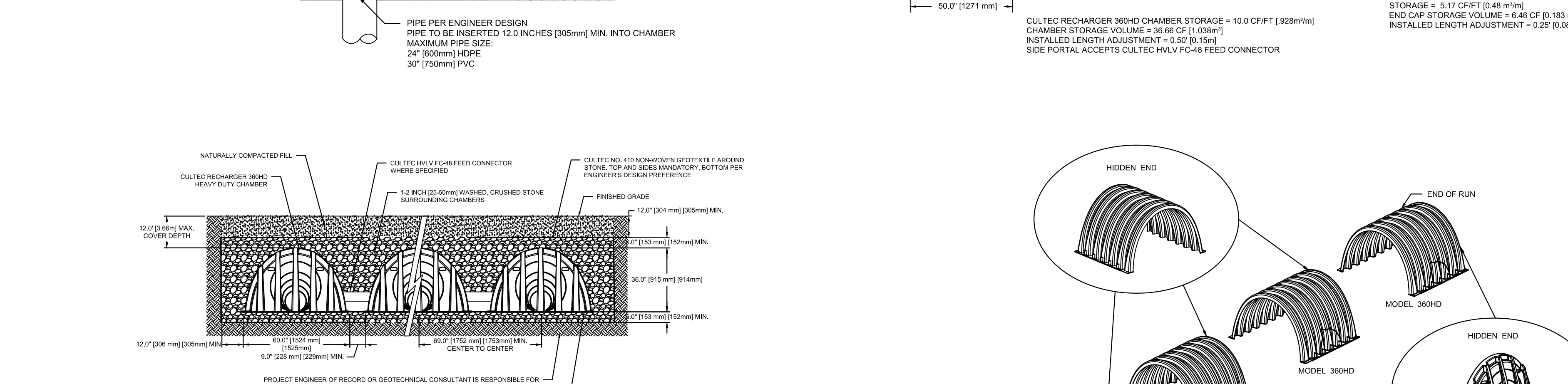
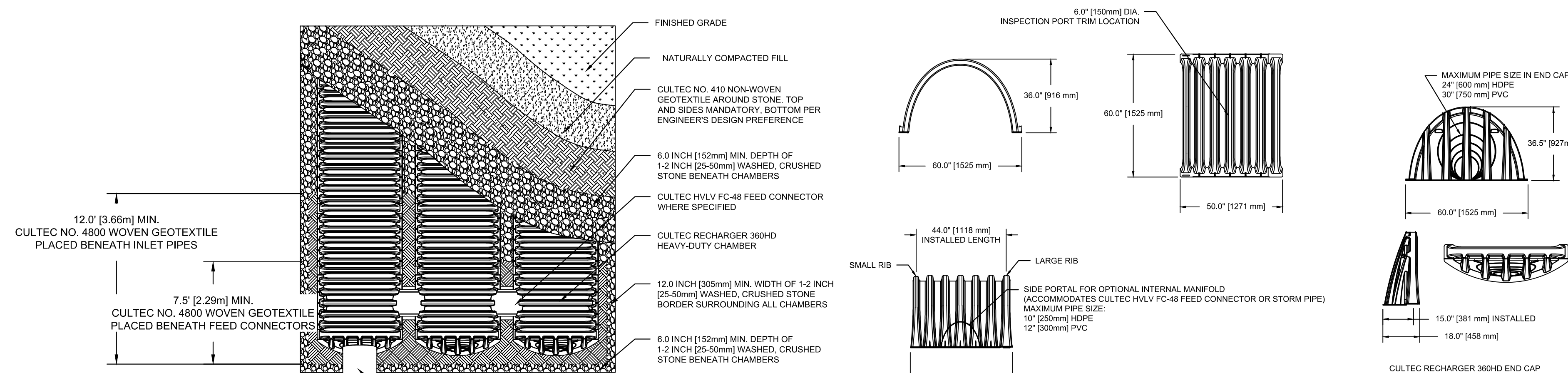


Table with 3 columns: PIPE, A, B. It lists dimensions for various pipe sizes from 6 inches to 24 inches.

*THE TYPICAL INVERT TABLE ABOVE IS BASED ON THE INSIDE DIAMETER OF STANDARD CORRUGATED PLASTIC PIPE. THE HEAVY DUTY END CAP HAS PRE-MARKED TRIM LINES FOR PIPE DIAMETERS 12" (300mm), 15" (375mm), 18" (450mm) AND 24" (600mm). PIPES OF ANY SIZE AND MATERIAL UP TO 24" (600mm) MAY BE PLACED AT CUSTOM LOCATIONS AND CUSTOM INVERTS. 30" (750 mm) SMOOTH-WALL SDR-35 PVC PIPE MAY BE USED AT THE BOTTOM OF THE END CAP. THE CROWN OF THE PIPE MUST REMAIN A MINIMUM OF 3" (75mm) FROM THE EDGE OF THE HEAVY DUTY END CAP.

SMALL SCALE SUBSURFACE INFILTRATION BASIN 1-2 INSTALLATION DETAILS (CULTEC RECHARGER 360HD)

Date Description No.
Revisions
Digitally signed by John C Cote
Date: 2024.02.22 08:39:36-05'00'
SIGNATURE JOHN COTE DATE
PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

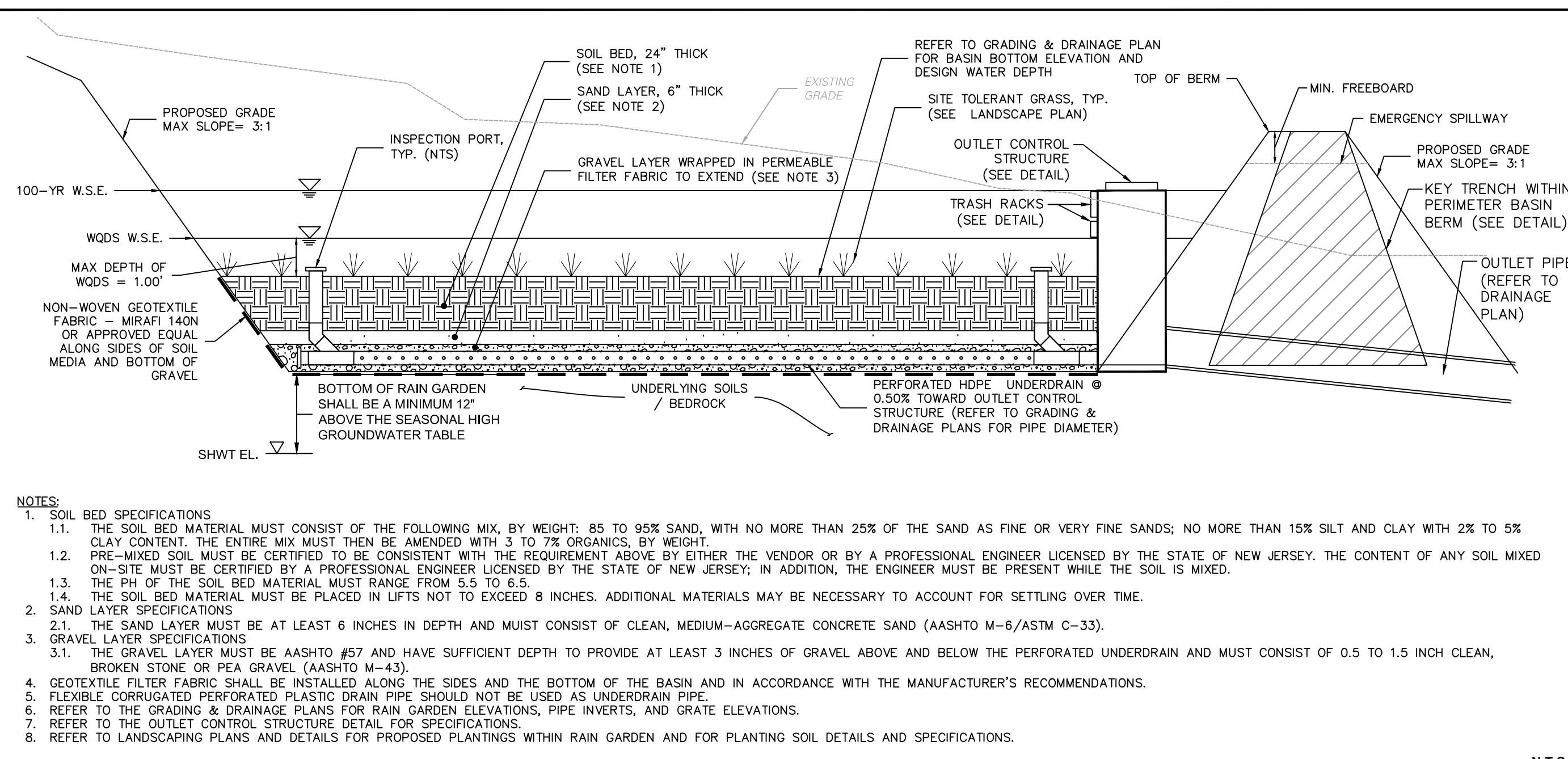
LANGAN
Langan Engineering and Environmental Services, Inc.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION NO. 24GA27996400

Project BEACON UNITARIAN UNIVERSALIST CHURCH
SUMMIT NEW JERSEY

Union County Drawing Title

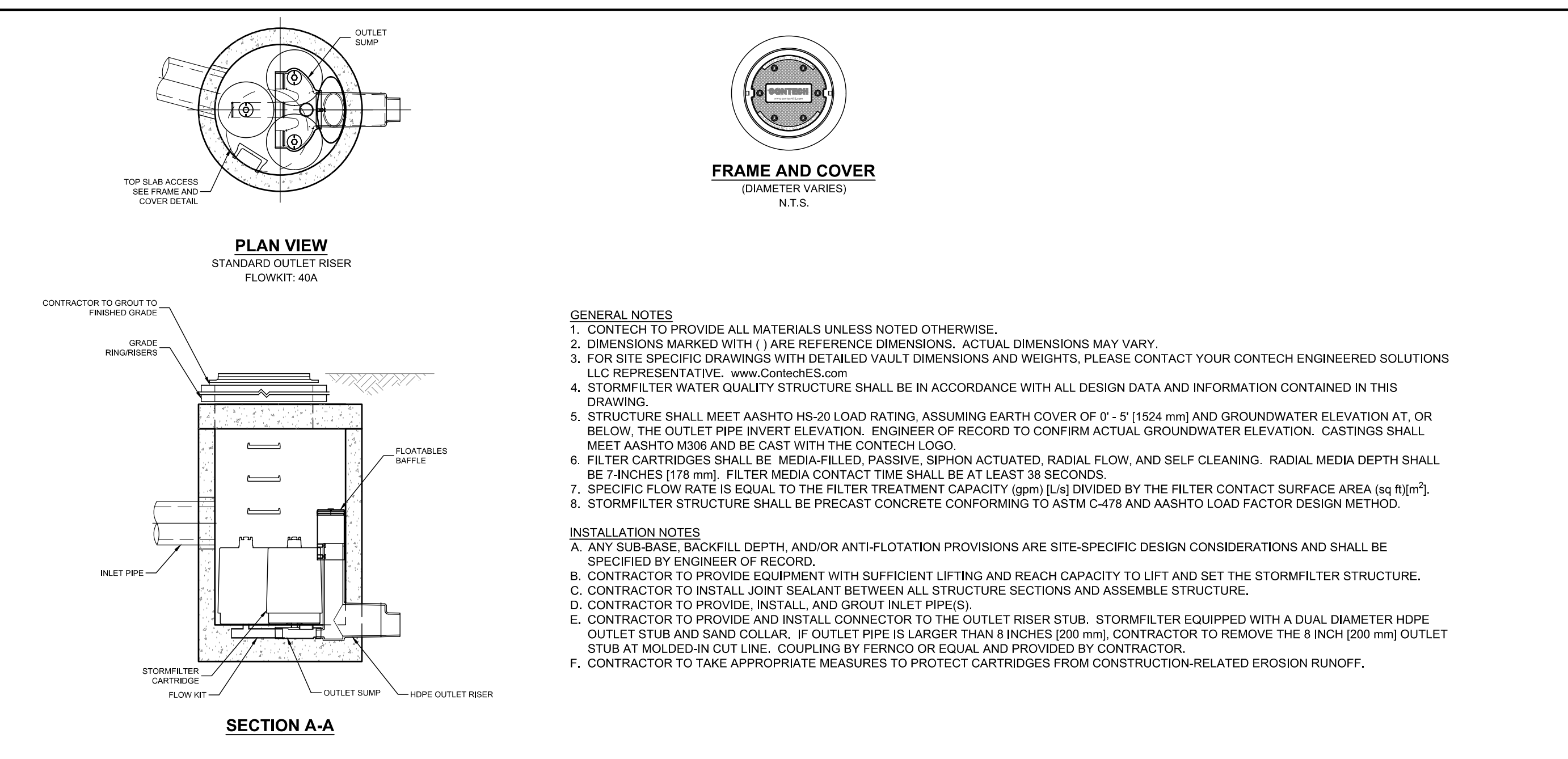
DRAINAGE DETAILS

Project No. 101007201 Drawing No. CG504
Date FEBRUARY 9, 2024
Drawn By SS
Checked By TH
Sheet 12 of 19



- NOTES:**
- SOIL BED SPECIFICATIONS
 - THE SOIL BED MATERIAL MUST CONSIST OF THE FOLLOWING MIX, BY WEIGHT: 85 TO 95% SAND, WITH NO MORE THAN 25% OF THE SAND AS FINE OR VERY FINE SANDS; NO MORE THAN 15% SILT AND CLAY WITH 2% TO 5% CLAY CONTENT. THE ENTIRE MIX MUST THEN BE AMENDED WITH 3 TO 7% ORGANICS, BY WEIGHT.
 - PRE-MIXED SOIL MUST BE CERTIFIED TO BE CONSISTENT WITH THE REQUIREMENT ABOVE BY EITHER THE VENDOR OR BY A PROFESSIONAL ENGINEER LICENSED BY THE STATE OF NEW JERSEY. THE CONTENT OF ANY SOIL MIXED ON-SITE MUST BE CERTIFIED BY A PROFESSIONAL ENGINEER LICENSED BY THE STATE OF NEW JERSEY. IN ADDITION, THE ENGINEER MUST BE PRESENT WHILE THE SOIL IS MIXED.
 - THE PH OF THE SOIL BED MATERIAL MUST RANGE FROM 5.5 TO 6.5.
 - THE SOIL BED MATERIAL MUST BE PLACED IN LIFTS NOT TO EXCEED 8 INCHES. ADDITIONAL MATERIALS MAY BE NECESSARY TO ACCOUNT FOR SETTLING OVER TIME.
 - SAND LAYER SPECIFICATIONS
 - THE SAND LAYER MUST BE AT LEAST 6 INCHES IN DEPTH AND MUST CONSIST OF CLEAN, MEDIUM-AGGREGATE CONCRETE SAND (AASHTO M-6/ASTM C-33).
 - GRAVEL LAYER SPECIFICATIONS
 - THE GRAVEL LAYER MUST BE AASHTO #57 AND HAVE SUFFICIENT DEPTH TO PROVIDE AT LEAST 3 INCHES OF GRAVEL ABOVE AND BELOW THE PERFORATED UNDERDRAIN AND MUST CONSIST OF 0.5 TO 1.5 INCH CLEAN, BROKEN STONE OR PEA GRAVEL (AASHTO M-43).
 - GEOTEXTILE FILTER FABRIC SHALL BE INSTALLED ALONG THE SIDES AND THE BOTTOM OF THE BASIN AND IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
 - FLEXIBLE CORRUGATED PERFORATED PLASTIC DRAIN PIPE SHOULD NOT BE USED AS UNDERDRAIN PIPE.
 - REFER TO THE GRADING & DRAINAGE PLANS FOR RAIN GARDEN ELEVATIONS, PIPE INVERTS, AND GRATE ELEVATIONS.
 - REFER TO THE OUTLET CONTROL STRUCTURE DETAIL FOR SPECIFICATIONS.
 - REFER TO LANDSCAPING PLANS AND DETAILS FOR PROPOSED PLANTINGS WITHIN RAIN GARDEN AND FOR PLANTING SOIL DETAILS AND SPECIFICATIONS.

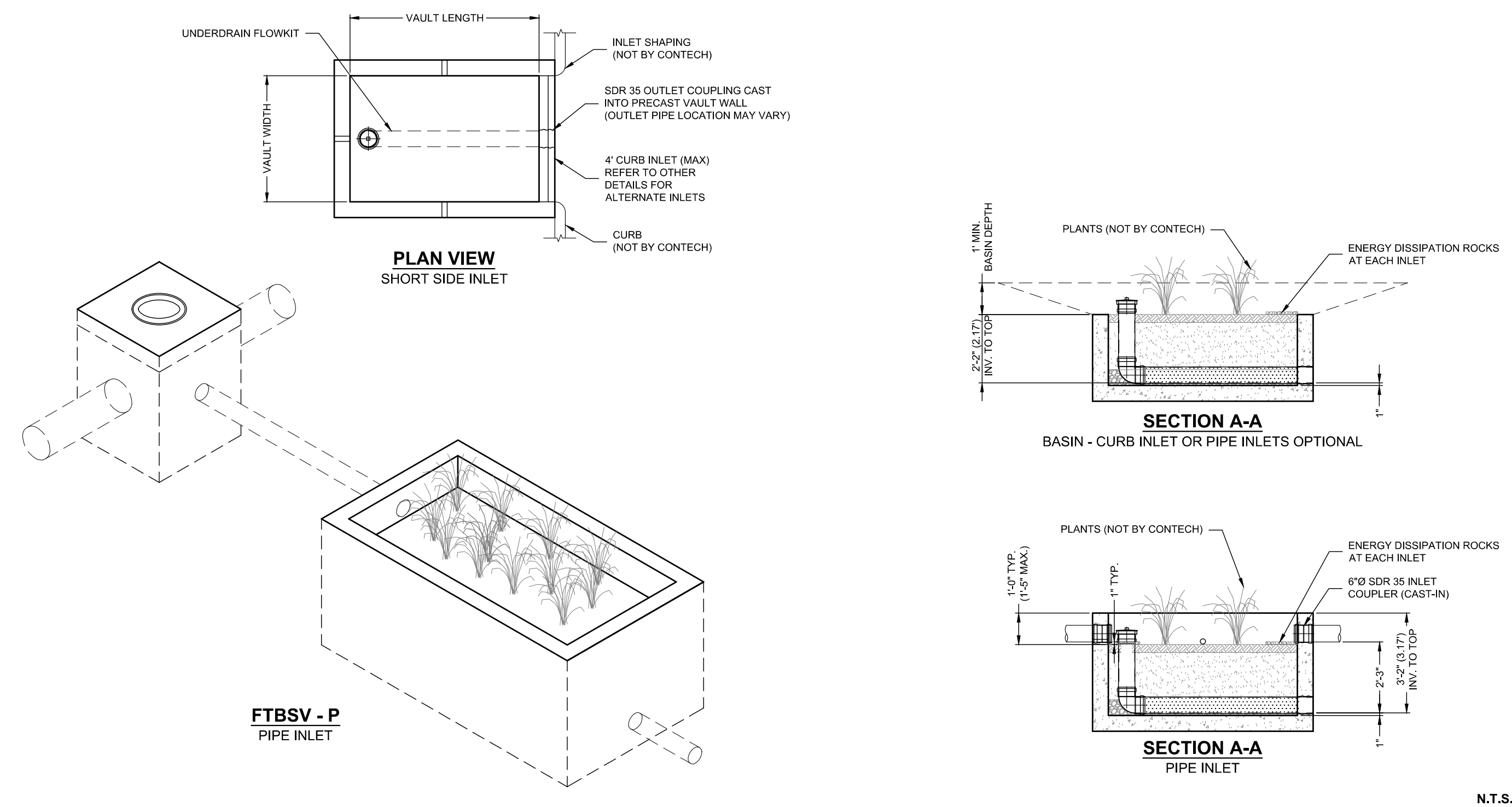
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- GENERAL NOTES**
- CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
 - DIMENSIONS MARKED WITH () ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
 - FOR SITE SPECIFIC DRAWINGS WITH DETAILED VAULT DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
 - STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
 - STRUCTURE SHALL MEET AASHTO HS-20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' (1524 mm) AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
 - FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. RADIAL MEDIA DEPTH SHALL BE 7-INCHES (178 mm). FILTER MEDIA CONTACT TIME SHALL BE AT LEAST 38 SECONDS.
 - SPECIFIC FLOW RATE IS EQUAL TO THE FILTER TREATMENT CAPACITY (gpm) [L/s] DIVIDED BY THE FILTER CONTACT SURFACE AREA (sq ft) [m²].
 - STORMFILTER STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.
- INSTALLATION NOTES**
- ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
 - CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE.
 - CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLY STRUCTURE.
 - CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET PIPE(S).
 - CONTRACTOR TO PROVIDE AND INSTALL CONNECTOR TO THE OUTLET RISER STUB. STORMFILTER EQUIPPED WITH A DUAL DIAMETER HDPE OUTLET STUB AND SAND COLLAR. IF OUTLET PIPE IS LARGER THAN 8 INCHES (200 mm), CONTRACTOR TO REMOVE THE 8 INCH (200 mm) OUTLET STUB AT MOLDED-IN OUTLINE. COUPLINGS BY FERROD OR EQUAL AND PROVIDED BY CONTRACTOR.
 - CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.

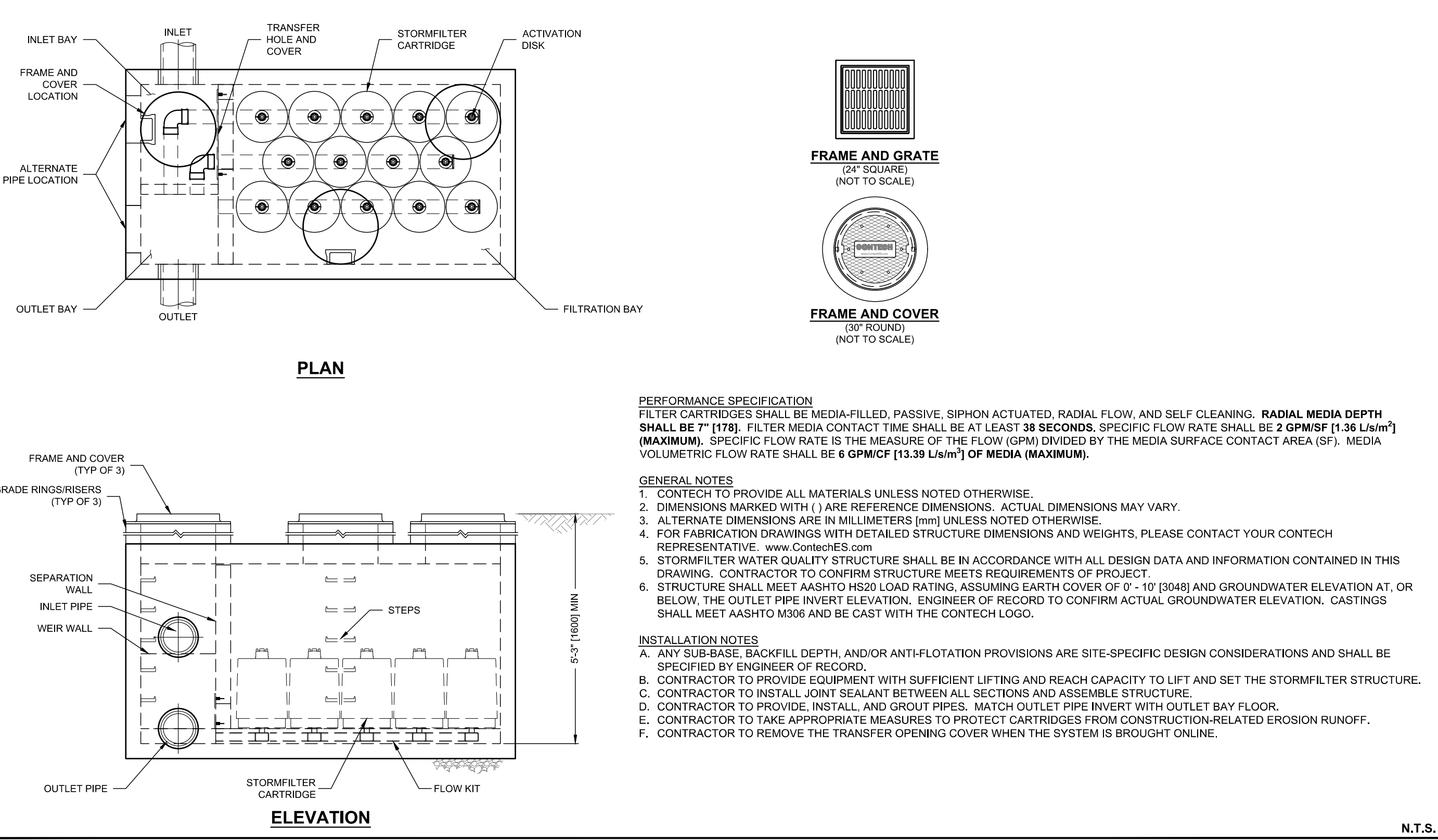
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UNDERDRAINED RAIN GARDEN TYPICAL CROSS SECTION



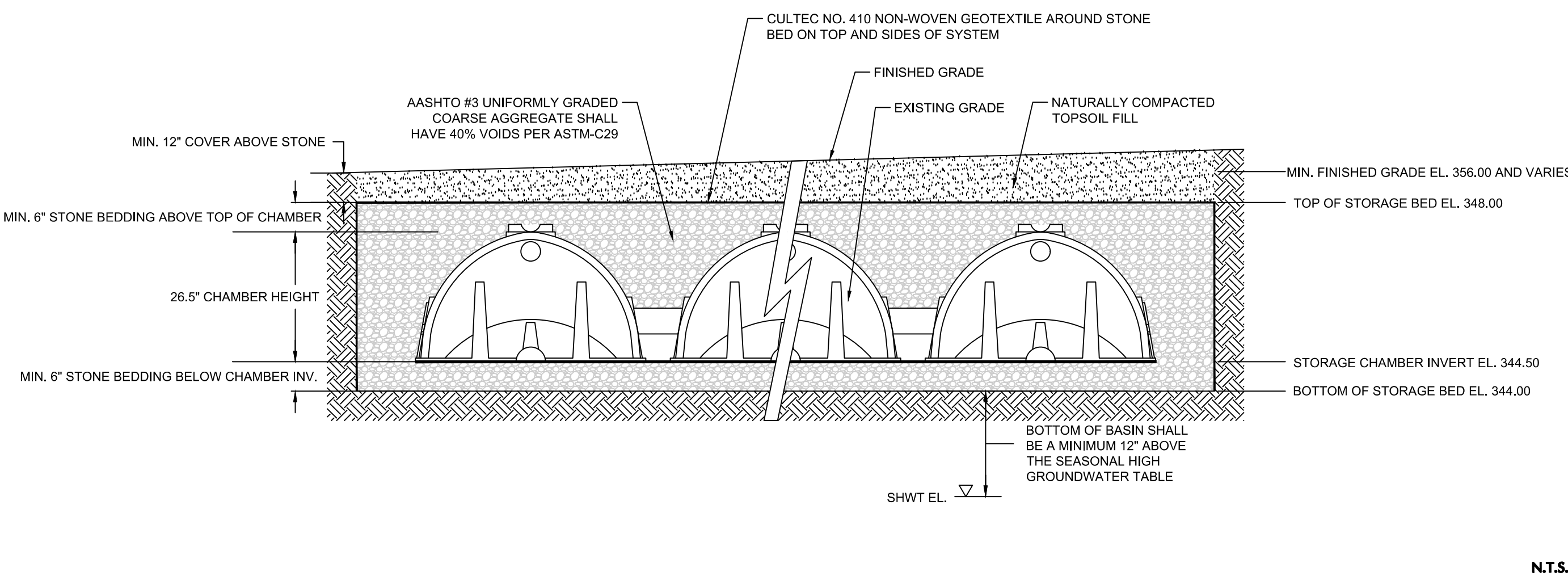
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CONTECH STORMFILTER 48\"/>



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CONTECH FILTERRA



N.T.S.

CONTECH STORMFILTER PEAK DIVERSION 6' X 12'



N.T.S.

Date	Description	No.
Revisions		
 Digitally signed by John C Cote Date: 2024.02.22 08:39:49-05'00'		
SIGNATURE	JOHN COTE	DATE
	PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800	
 Langan Engineering and Environmental Services, Inc. 300 Kimball Drive Parsippany, NJ 07054 T: 973.560.4900 F: 973.560.4901 www.langan.com NJ CERTIFICATE OF AUTHORIZATION NO. 24GA27996400		
Project		
BEACON UNITARIAN UNIVERSALIST CHURCH SUMMIT NEW JERSEY		
Drawing Title		
DRAINAGE DETAILS		
Project No.	Drawing No.	
101007201	CG505	
Date	FEBRUARY 9, 2024	
Drawn By	SS	
Checked By	TH	
	Sheet 13 of 19	

APPENDIX A

Stormwater Management Facilities – Inspection Checklist

Inspection Checklist for Stormwater Management Facilities

Name of Facility: _____

Location: _____

	O.K	Routine	Urgent	Comments
1. Rain Garden				
A. Standing Water				
B. Trash & Debris				
C. Sediment				
D. Other				

	O.K	Routine	Urgent	Comments
2. Outlet Control Structures & Manufactured Treatment Devices				
A. Condition of Structure				
B. Trash & Debris				
C. Sediment				
D. Condition of Trash Racks				
E. Other				

	O.K	Routine	Urgent	Comments
3. Inlet Structures				
A. Condition of Structure				
B. Trash & Debris				
C. Sediment				
D. Other				

	O.K	Routine	Urgent	Comments
4. Manhole Structures				
A. Condition of Structure				
B. Trash & Debris				
C. Sediment				
D. Other				

5. Underground Infiltration Basins				
A. Standing Water				
B. Trash & Debris				
C. Sediment				
D. Other				

6. Porous Pavement				
A. Condition of Outlet Structures				
B. Trash & Debris				
C. Sediment within Porous Asphalt				
D. Condition of Trash Racks on Outlets				
E. Condition of Underdrain Piping				

	O.K	Routine	Urgent	Comments
7. Miscellaneous				
A. Effectiveness of Exist. Maint. Program				
B. Potential Mosquito Habitats				
C. Potential Rodent Habitats				

APPENDIX B

Stormwater Management Facilities – Maintenance Log

Maintenance Log for Stormwater Facilities

Name of Facility: _____

Location: _____

Preventative Maintenance:

Date:

Work Item:

--	--	--	--

(X) - Completed

1	Trash and Debris Removal				
	A. Rain Garden				
	B. Outlet Control Structures				
	C. Inlets/Manholes				
	D. Conveyance Pipes				
	E. Underground Infiltration Basins				
	F. Riprap aprons				
	G. Manufactured Treatment Devices				
	H. Porous Pavement				

2	Sediment				
	A. Rain Garden				
	B. Outlet Control Structures				
	C. Inlets/Manholes				
	D. Conveyance Pipes				
	E. Underground Infiltration Basins				
	F. Riprap aprons				
	G. Manufactured Treatment Devices				
	H. Porous Pavement				

3	Elimination of Potential Insect and Rodent Habitats				
	A. Potential Mosquito Habitats - Eliminate Standing Water				
	B. Potential Rodent Habitats - Fill Burrows and Remove Debris				

4	Other Preventative Maintenance				
	A.				

Corrective Maintenance:

Date:

Work Item:

--	--	--	--

(X) - Completed

1	Removal of Debris and Sediment				
2	Structural Repairs				
3	Dewatering				
4	Erosion Repair				
5	Elimination of Trees, Brush, Roots & Animal Burrows				
6	Snow & Ice Removal				
7	Other				

APPENDIX C

Manufactured Treatment Device Maintenance Recommendations

StormFilter Inspection and Maintenance Procedures



Maintenance Guidelines

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

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

Maintenance Procedures

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

1. Inspection

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

2. Maintenance

- Cartridge replacement
- Sediment removal

Inspection and Maintenance Timing

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

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

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

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

Maintenance Frequency

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

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

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

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





Inspection Procedures

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

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

To conduct an inspection:

Important: Inspection should be performed by a person who is familiar with the operation and configuration of the StormFilter treatment unit and the unit's role, relative to detention or retention facilities onsite.

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

Maintenance Decision Tree

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

Please note Stormwater Management StormFilter devices installed downstream of, or integrated within, a stormwater storage facility typically have different operational parameters (i.e. draindown time). In these cases, the inspector must understand the relationship between the retention/detention facility and the treatment system by evaluating site specific civil engineering plans, or contacting the engineer of record, and make adjustments to the below guidance as necessary. Sediment deposition depths and patterns within the StormFilter are likely to be quite different compared to systems without upstream storage and therefore shouldn't be used exclusively to evaluate a need for maintenance.

1. Sediment loading on the vault floor.
 - a. If >4" of accumulated sediment, maintenance is required.
2. Sediment loading on top of the cartridge.
 - a. If >1/4" of accumulation, maintenance is required.
3. Submerged cartridges.
 - a. If >4" of static water above cartridge bottom for more than 24 hours after end of rain event, maintenance is required. (Catch basins have standing water in the cartridge bay.)
4. Plugged media.
 - a. While not required in all cases, inspection of the media within the cartridge may provide valuable additional information.
 - b. If pore space between media granules is absent, maintenance is required.
5. Bypass condition.
 - a. If inspection is conducted during an average rain fall event and StormFilter remains in bypass condition (water over the internal outlet baffle wall or submerged cartridges), maintenance is required.
6. Hazardous material release.
 - a. If hazardous material release (automotive fluids or other) is reported, maintenance is required.
7. Pronounced scum line.
 - a. If pronounced scum line (say $\geq 1/4$ " thick) is present above top cap, maintenance is required.

Maintenance

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

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

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

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

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

To conduct cartridge replacement and sediment removal maintenance:

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

Method 1:

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

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

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



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

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

Method 2:

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

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

Related Maintenance Activities - Performed on an as-needed basis

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

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

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

Material Disposal

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

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



Inspection Report

Date: _____ Personnel: _____

Location: _____ System Size: _____ Months in Service: _____

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

Sediment Thickness in Forebay: _____ Date: _____

Sediment Depth on Vault Floor: _____

Sediment Depth on Cartridge Top(s): _____

Structural Damage: _____

Estimated Flow from Drainage Pipes (if available): _____

Cartridges Submerged: Yes No Depth of Standing Water: _____

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

Trash and Debris Removal: _____

Minor Structural Repairs: _____

Drainage Area Report _____

Excessive Oil Loading: Yes No Source: _____

Sediment Accumulation on Pavement: Yes No Source: _____

Erosion of Landscaped Areas: Yes No Source: _____

Items Needing Further Work: _____

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

Other Comments:

Review the condition reports from the previous inspection visits.

StormFilter Maintenance Report

Date: _____ Personnel: _____

Location: _____ System Size: _____

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

List Safety Procedures and Equipment Used: _____

System Observations

Months in Service: _____

Oil in Forebay (if present): Yes No

Sediment Depth in Forebay (if present): _____

Sediment Depth on Vault Floor: _____

Sediment Depth on Cartridge Top(s): _____

Structural Damage: _____

Drainage Area Report

Excessive Oil Loading: Yes No Source: _____

Sediment Accumulation on Pavement: Yes No Source: _____

Erosion of Landscaped Areas: Yes No Source: _____

StormFilter Cartridge Replacement Maintenance Activities

Remove Trash and Debris: Yes No Details: _____

Replace Cartridges: Yes No Details: _____

Sediment Removed: Yes No Details: _____

Quantity of Sediment Removed (estimate?): _____

Minor Structural Repairs: Yes No Details: _____

Residuals (debris, sediment) Disposal Methods: _____

Notes:



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Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater and earth stabilization products. For information on other Contech division offerings, visit www.ContechES.com or call 800.338.1122.

Support

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

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Filterra Vault

Owner's Manual

(Precast Vault Configurations)



filterra[®]

Bioretention Systems

C **NTECH**[®]
ENGINEERED SOLUTIONS

This Owner's Manual applies to all precast Filterra Configurations,
including Filterra Bioscape Vault and Filterra HC.





Table of Contents

Introduction	4
Activation Overview	4
Filtererra Plant Selection Overview	6
Warranty Overview	6
Routine Maintenance Guidelines.....	6
Maintenance Visit Procedure.....	9
Plant Care	11
Appendix 1 – Activation Package	12
Appendix 2 – Filtererra Tree Grate Opening Expansion Procedure.....	19



Introduction

Thank you for your purchase of the Filterra® Bioretention System. Filterra is a specially engineered stormwater treatment system incorporating high performance biofiltration media to remove pollutants from stormwater runoff. The system’s biota (vegetation and soil microorganisms) then further breakdown and absorb captured pollutants. All components of the system work together to provide a sustainable long-term solution for treating stormwater runoff.

The Filterra system has been delivered to you with protection in place to resist intrusion of construction related sediment which can contaminate the biofiltration media and result in inadequate system performance. These protection devices are intended as a best practice and cannot fully prevent contamination. It is the purchaser’s responsibility to provide adequate measures to prevent construction related runoff from entering the Filterra system.

Included with your purchase is Activation of the Filterra system by the manufacturer as well as a 1-year warranty from delivery of the system and a final site assessment of unit condition (mulch replacement, debris removal, and pruning of vegetation) scheduled between 6 and 12 months after activation, upon request.

Design and Installation

Each project presents different scopes for the use of Filterra systems. Information and help may be provided to the design engineer during the planning process. Correct Filterra box sizing (by rainfall region) is essential to predict pollutant removal rates for a given area. The engineer shall submit calculations for approval by the local jurisdiction. The contractor is responsible for the correct installation of Filterra units as shown in approved plans. A comprehensive installation manual is available at www.ContechES.com.

Activation Overview

Activation of the Filterra system is a procedure completed by the manufacturer to place the system into working condition. This involves the following items:

- Removal of construction runoff protection devices.
- Planting of the system’s vegetation (provided by the purchaser).
- Placement of pretreatment mulch layer using mulch acceptable for use in Filterra systems.

Activation MUST be provided by the manufacturer to ensure proper site conditions are met for Activation, proper installation of the vegetation, and use of pretreatment mulch acceptable for use in Filterra systems. More information is available in the Filterra Activation Package.



Minimum Requirements

The minimum requirements for Filterra Activation are as follows:

1. The purchaser must have procured vegetation meeting the requirements outlined in the Filterra Activation Package.

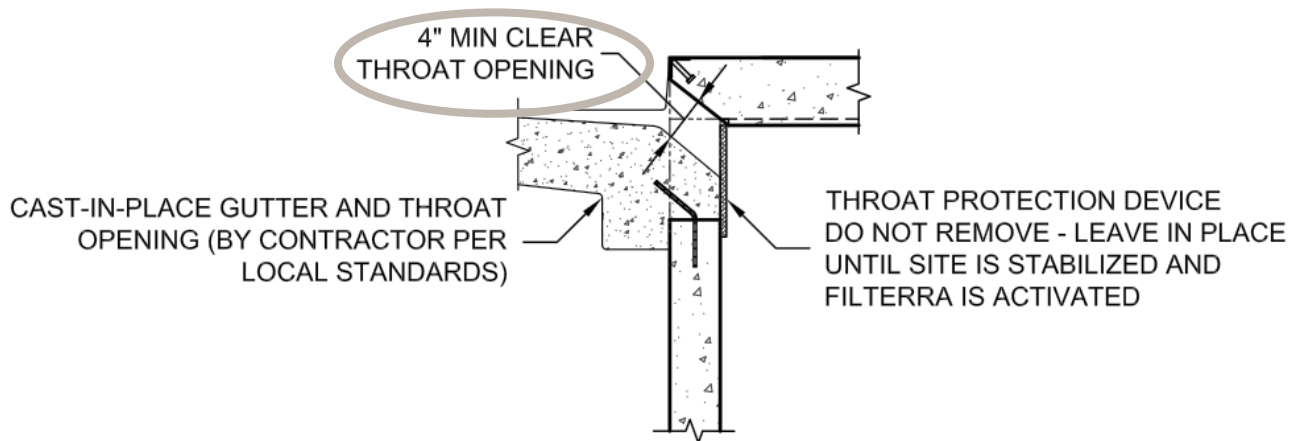
2. The site landscaping must be fully stabilized, i.e. full landscaping installed and some grass cover (not just straw and seed) is required to reduce sediment transport. Construction debris and materials should be removed from surrounding area.



3. Final paving must be completed. Final paving ensures that paving materials will not enter and contaminate the Filterra system during the paving process, and that the plant will receive runoff from the drainage area, assisting with plant survival for the Filterra system.



4. Filterra throat opening should be at least 4" in order to ensure adequate capacity for inflow and debris.



The Filterra Activation Package is available on the Contech website (www.ContechES.com/filterra) and ensures that the proper conditions are met for Contech to perform the Activation service. Vegetation meeting Contech's requirements must be provided at time of Activation. If the site does not meet the conditions required for Activation, or acceptable vegetation is not provided by the purchaser at time of Activation, a charge of \$1,500 will be invoiced to the purchaser.

Filterra Plant Selection Overview

A Plant List is available on the Contech website highlighting recommended plants for Filterra systems in your area. Keep in mind that plants are subject to availability due to seasonality and required minimum size for the Filterra system. Plants installed in the Filterra system are container plants (max 15 gallon) from nursery stock and will be immature in height and spread at Activation.

It is the responsibility of the owner to provide adequate irrigation when necessary to the plant of the Filterra system.

More information is available in the Filterra Activation Package.

Warranty Overview

Refer to the Contech Engineered Solutions LLC Stormwater Treatment System LIMITED WARRANTY for further information. The following conditions may void the Filterra system's warranty and waive the manufacturer provided Activation and Final Site Assessment services:

- Unauthorized activation or performance of any of the items listed in the activation overview
- Any tampering, modifications or damage to the Filterra system or runoff protection devices
- Removal of any Filterra system components
- Failure to prevent construction related runoff from entering the Filterra system
- Failure to properly store and protect any Filterra components (including media and underdrain stone) that may be shipped separately from the vault

Final Site Assessment

With proper routine maintenance, the biofiltration media within the Filterra system should last as long as traditional bioretention media. A final site assessment is included by the manufacturer, upon request, on all Filterra systems between 6 and 12 months after activation. This includes a final assessment of unit condition, debris removal, mulch replacement, and pruning of vegetation. More information is provided in the Operations and Maintenance Guidelines. Some Filterra systems also contain pretreatment or outlet bays. Depending on site pollutant loading, these bays may require periodic removal of debris, however this is not included in the final site assessment, and would likely not be required within the first year of operation.

These services, as well as routine maintenance outside of the included first year, can be provided by certified maintenance providers listed on the Contech website. Training can also be provided to other stormwater maintenance or landscape providers.



Why Maintain?

All stormwater treatment systems require maintenance for effective operation. This necessity is often incorporated in your property's permitting process as a legally binding BMP maintenance agreement. Other reasons to maintain are:

- Avoiding legal challenges from your jurisdiction's maintenance enforcement program.
- Prolonging the expected lifespan of your Filterra media.
- Avoiding more costly media replacement.
- Helping reduce pollutant loads leaving your property.

Simple maintenance of the Filterra is required to continue effective pollutant removal from stormwater runoff before discharge into downstream waters. This procedure will also extend the longevity of the living biofilter system. The unit will recycle and accumulate pollutants within the biomass, but is also subjected to other materials entering the inlet. This may include trash, silt and leaves etc. which will be contained above the mulch layer. Too much silt may inhibit the Filterra's flow rate, which is the reason for site stabilization before activation. Regular replacement of the mulch stops accumulation of such sediment.

When to Maintain?

Maintenance visits are scheduled seasonally; the spring visit aims to clean up after winter loads including salts and sands while the fall visit helps the system by removing excessive leaf litter.

It has been found that in regions which receive between 30-50 inches of annual rainfall, (2) two visits are generally required; in regions with less rainfall often only (1) one visit per annum is sufficient. Varying land uses can affect maintenance frequency. Contributing drainage areas which are subject to new development wherein the recommended erosion and sediment control measures have not been implemented may require additional maintenance visits.

Some sites may be subjected to extreme sediment or trash loads, requiring more frequent maintenance visits. This is the reason for detailed notes of maintenance actions per unit, helping the Supplier and Owner predict future maintenance frequencies, reflecting individual site conditions.

Owners must promptly notify the maintenance provider of any damage to the plant(s), which constitute(s) an integral part of the bioretention technology.



Exclusion of Services

Clean up due to major contamination such as oils, chemicals, toxic spills, etc. will result in additional costs and are not included as part of the final site assessment. Should a major contamination event occur the Owner must block off the outlet pipe of the Filterra (where the cleaned runoff drains to, such as drop inlet) and block off the throat of the Filterra. The Supplier should be informed immediately.

Maintenance Visit Summary

Each maintenance visit consists of the following simple tasks (detailed instructions below).

1. Inspection of Filterra and surrounding area
2. Removal of tree grate and erosion control stones
3. Removal of debris, trash and mulch
4. Mulch replacement
5. Plant health evaluation and pruning or replacement as necessary
6. Clean area around Filterra
7. Complete paperwork

Maintenance Tools, Safety Equipment and Supplies

Ideal tools include: camera, bucket, shovel, broom, pruners, hoe/rake, and tape measure. Appropriate Personal Protective Equipment (PPE) should be used in accordance with local or company procedures. This may include impervious gloves where the type of trash is unknown, high visibility clothing and barricades when working in close proximity to traffic and also safety hats and shoes. A T-Bar or crowbar should be used for moving the tree grates (up to 170 lbs ea.). Most visits require minor trash removal and a full replacement of mulch. See below for actual number of bagged mulch that is required in each media bay size. Mulch should be a double shredded, hardwood variety. Some visits may require additional Filterra engineered soil media available from the Supplier.

Box Length	Box Width	Filter Surface Area (ft ²)	Volume at 3" (ft ³)	# of 2 ft ³ Mulch Bags
4	4	16	4	2
6	4	24	6	3
8	4	32	8	4
6	6	36	9	5
8	6	48	12	6
10	6	60	15	8
12	6	72	18	9
13	7	91	23	12

Other sizes not listed - 1 bag per 8 ft² of media.

Maintenance Visit Procedure

Keep sufficient documentation of maintenance actions to predict location specific maintenance frequencies and needs. An example Maintenance Report is included in this manual.



1. Inspection of Filterra and surrounding area

- Record individual unit before maintenance with photograph (numbered). Record on Maintenance Report (see example in this document) the following:

Record on Maintenance Report the following:

Standing Water	yes		no
Damage to Box Structure	yes		no
Damage to Grate	yes		no
Is Bypass Clear	yes		no

If yes answered to any of these observations, record with close-up photograph (numbered).



2. Removal of tree grate and erosion control stones

- Remove cast iron grates for access into Filterra box.
- Dig out silt (if any) and mulch and remove trash & foreign items.

3. Removal of debris, trash and mulch

Record on Maintenance Report the following:

Silt/Clay	yes		no
Cups/ Bags	yes		no
Leaves	yes		no
Buckets Removed	_____		



- After removal of mulch and debris, measure distance from the top of the Filterra engineered media soil to the top of the top slab. Compare the measured distance to the distance shown on the approved Contract Drawings for the system. Add Filterra media (not top soil or other) to bring media up as needed to distance indicated on drawings.

Record on Maintenance Report the following:

Distance to Top of Top Slab (inches)	_____
Inches of Media Added	_____



4. Mulch replacement

- Add double shredded mulch evenly across the entire unit to a depth of 3".
- Refer to Filterra Mulch Specifications for information on acceptable sources.
- Ensure correct repositioning of erosion control stones by the Filterra inlet to allow for entry of trash during a storm event.
- Replace Filterra grates correctly using appropriate lifting or moving tools, taking care not to damage the plant.

5. Plant health evaluation and pruning or replacement as necessary

- Examine the plant's health and replace if necessary.
- Prune as necessary to encourage growth in the correct directions



Record on Maintenance Report the following:

Height above Grate	_____	(ft)
Width at Widest Point	_____	(ft)
Health	healthy unhealthy	
Damage to Plant	yes no	
Plant Replaced	yes no	



6. Clean area around Filterra

- Clean area around unit and remove all refuse to be disposed of appropriately.



7. Complete paperwork

- Deliver Maintenance Report.
- Some jurisdictions may require submission of maintenance reports in accordance with approvals. It is the responsibility of the Owner to comply with local regulations.

Plant Care for Filterra® Systems

After Activation, the Contractor is responsible for proper care of the vegetation until the site is handed over to the Owner. After that, it is the Site Owner's responsibility to care for the vegetation. Contech recommends the following care for the plants:

1. To prevent transplant shock (especially if planting takes place in the hot season), it may be necessary to prune some of the foliage to compensate for reduced root uptake capacity. This is accomplished by pruning away some of the smaller secondary branches or a main scaffold branch if there are too many. Too much foliage relative to the root ball can dehydrate and damage the plant.
2. Plant staking may be required.
3. With all trees/shrubs, remove dead, diseased, crossed/rubbing, sharply crotched branches or branches growing excessively long or in wrong direction compared to majority of branches.
4. Contech recommends irrigation of the Filterra® Vegetation. The following guidance will help to ensure the vegetation is properly irrigated.

Irrigation Recommendations:

- Each Filterra® system must receive adequate irrigation to ensure survival of the living system during periods of drier weather.
- Irrigation sources include rainfall runoff from downspouts and/or gutter flow, applied water through the tree grate or in some cases from an irrigation system with emitters installed during construction.
- At Activation: Apply about one (cool climates) to two (warm climates) gallons of water per inch of trunk diameter over the root ball.
- During Establishment: In common with all plants, each Filterra® plant will require more frequent watering during the establishment period. One inch of applied water per week for the first three months is recommended for cooler climates (2 to 3 inches for warmer climates). If the system is receiving rainfall runoff from the drainage area, then irrigation may not be needed. Inspection of the soil moisture content can be evaluated by gently brushing aside the mulch layer and feeling the soil. Be sure to replace the mulch when the assessment is complete. Irrigate as needed**.
- Established Plants: Established plants have fully developed root systems and can access the entire water column in the media. Therefore irrigation is less frequent but requires more applied water when performed. For a mature system assume 3.5 inches of available water within the media matrix. Irrigation demand can be estimated as 1" of irrigation demand per week. Therefore if dry periods exceed 3 weeks, irrigation may be required.

*** Five gallons per square yard approximates 1 inch of water. Therefore for a 6' x 6 foot Filterra® approximately 20-60 gallons of applied water is needed. To ensure even distribution of water it needs to be evenly sprinkled over the entire surface of the filter bed, with special attention to make sure the root ball is completely wetted. NOTE: if needed, measure the time it takes to fill a five gallon bucket to estimate the applied water flow rate. Then calculate the time needed to irrigate the Filterra®, For example if the flow rate of the sprinkler is 5 gallons/minute then it would take 12 minutes to irrigate a 6'x6' filter.*

Plant Replacement:

In some cases, plants will require replacement. Please follow the procedures below to ensure a properly functioning Filterra® system.

1. Remove the existing plant, and leave as much of the Filterra® media in place as possible.
2. Select a replacement per the Filterra® Activation Package.
3. Prior to removing the plant from the container, ensure the soil moisture is sufficient to maintain the integrity of the root ball. If needed, pre-wet the container plant.
4. Cut away any roots which are growing out of the container drain holes.
5. Plant(s) should be carefully removed from the pot by gently pounding on the sides of the container with the fist to loosen root ball. Then carefully slide out. Do not lift plant(s) by trunk as this can break roots and cause soil to fall off. Extract the root ball in a horizontal position and support it to prevent it from breaking apart. Alternatively, the pot can be cut away to minimize root ball disturbance.
6. Excavate a hole with a diameter 4" greater than the root ball, gently place the plant(s).
7. Plant the tree/shrub/grass with the top of the root ball 1" above surrounding media to allow for settling.
8. All plants should have the main stem centered in the tree grate (where applicable) upon completion of installation.
9. Reinstall or add mulch to a depth of 3" per Contech's mulch specifications for Filterra® systems.

Maintenance Checklist

Drainage System Failure	Problem	Conditions to Check	Condition that Should Exist	Actions
Inlet	Excessive sediment or trash accumulation.	Accumulated sediments or trash impair free flow of water into Filterra.	Inlet should be free of obstructions allowing free distributed flow of water into Filterra.	Sediments and/or trash should be removed.
Mulch Cover	Trash and floatable debris accumulation.	Excessive trash and/or debris accumulation.	Minimal trash or other debris on mulch cover.	Trash and debris should be removed and mulch cover raked level. Ensure bark nugget mulch is not used.
Mulch Cover	"Ponding" of water on mulch cover.	"Ponding" in unit could be indicative of clogging due to excessive fine sediment accumulation or spill of petroleum oils.	Stormwater should drain freely and evenly through mulch cover.	Recommend contact manufacturer and replace mulch as a minimum.
Vegetation	Plants not growing or in poor condition.	Soil/mulch too wet, evidence of spill. Incorrect plant selection. Pest infestation. Vandalism to plants.	Plants should be healthy and pest free.	Contact manufacturer for advice.
Vegetation	Plant growth excessive.	Plants should be appropriate to the species and location of Filterra.		Trim/prune plants in accordance with typical landscaping and safety needs.
Structure	Structure has visible cracks.	Cracks wider than 1/2 inch or evidence of soil particles entering the structure through the cracks.		Vault should be repaired.

Maintenance is ideally to be performed twice annually.

Filterra Inspection & Maintenance Log

Filterra System Size/Model: _____ Location: _____

Date	Mulch & Debris Removed	Depth of Mulch Added	Mulch Brand	Height of Vegetation Above Grate	Vegetation Species	Issues with System	Comments
1/1/17	5 – 5 gal Buckets	3"	Lowe's Premium Brown Mulch	4'	Galaxy Magnolia	- Standing water in downstream structure	- Removed blockage in downstream structure

Appendix 1 – Filterra® Vault Activation Package

FILTERRA® VAULT ACTIVATION PACKAGE



The Filterra system will be (or has been) delivered to you with protection in place to resist intrusion of construction related sediment which can contaminate the biofiltration media and result in inadequate system performance. These protection devices are intended as a best practice and cannot fully prevent contamination. It is the purchaser's responsibility to provide adequate measures to prevent construction related runoff from entering the Filterra system.

Included with your purchase is Activation of the Filterra system by the manufacturer as well as a 1-year warranty from delivery of the system and a Final Site Assessment (assessment of unit condition, mulch replacement, debris removal, and pruning of vegetation) scheduled between 6 months and 1 year after Activation, upon request.

Activation of the Filterra system is a procedure completed by the manufacturer to place the system into working condition. This involves the following items:

- Removal of construction runoff protection devices
- Planting of the system's vegetation (provided by the purchaser)
- Placement of pretreatment mulch layer using mulch acceptable for use in Filterra systems.

Activation MUST be provided by the manufacturer to ensure proper site conditions are met for Activation, proper installation of the vegetation, and use of pretreatment mulch acceptable for use in Filterra systems. The purchaser should request Activation from Contech after the site is stabilized, but prior to turning over the site to the owner. Please allow 1-2 weeks to schedule Activation.

The purchaser must ensure that the site is acceptable for Filterra Activation. A checklist (included as page 3 of this document) must be completed and submitted to the Contech Activation Coordinator. The minimum 4 requirements for Filterra Activation are as follows:

1. The purchaser must have sourced vegetation meeting the requirements outlined in "Plant Selection for Filterra Systems" starting on page 4 of this document.



* UNPREPARED SITE FEE NOTE: A charge of \$1500.00 will be invoiced for each activation visit requested by customer where Contech determines that the site does not meet the conditions required for Activation AND/OR acceptable plants are not provided by the contractor. ONLY Contech authorized representatives can perform Activation of Filterra systems; unauthorized activations will void the system warranty and waive manufacturer supplied activation and final inspection.



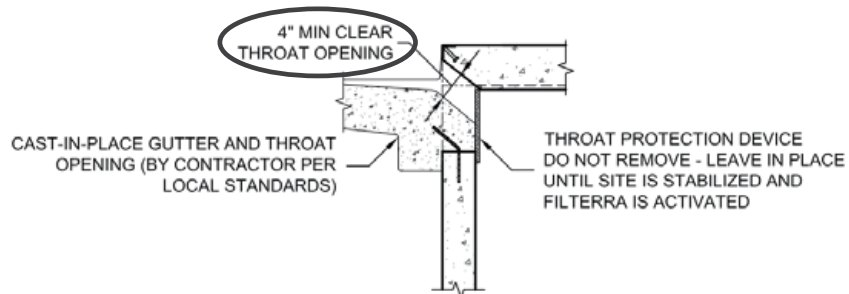
2. The site landscaping must be fully stabilized, i.e. full landscaping installed and some grass cover (not just straw and seed) is required to reduce sediment transport. Construction debris and materials should be removed from surrounding area.



3. Final paving must be completed. Final paving ensures that paving materials will not enter and contaminate the Filterra system during the paving process, and that the plant will receive runoff from the drainage area, assisting with plant survival for the Filterra system.



4. Where curb inlets are included as part of the Filterra system, Filterra throat opening should be at least 4" clear in order to ensure adequate capacity for inflow and debris.



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Filterra® Vault Activation Checklist



Project Name: _____ Company: _____

Site Contact Name: _____ Site Contact Phone/Email: _____

Site Owner/End User Name: _____ Site Owner/End User Phone/Email: _____

Preferred Activation Date: _____ (provide 2 weeks minimum from date this form is submitted)

Site Designation	Top Opening Type	Final Pavement Complete	Landscaping Complete / Grass Emerging	Construction materials / Piles / Debris Removed	Throat Opening Measures 4" Min. Height (where applicable)	Vegetation Sourced by Contractor
	<input type="checkbox"/> Tree Grate <input type="checkbox"/> Full Grate (No tree opening) <input type="checkbox"/> Bioscape Vault (Open Planter)	<input type="checkbox"/> Verified	<input type="checkbox"/> Verified	<input type="checkbox"/> Verified	<input type="checkbox"/> Verified	<input type="checkbox"/> Species on FT Plant List <input type="checkbox"/> Container Grown (15 gal. max) <input type="checkbox"/> 4' Tall Min. (Tree grate units only) _____ Qty provided
	<input type="checkbox"/> Tree Grate <input type="checkbox"/> Full Grate (No tree opening) <input type="checkbox"/> Bioscape Vault (Open Planter)	<input type="checkbox"/> Verified	<input type="checkbox"/> Verified	<input type="checkbox"/> Verified	<input type="checkbox"/> Verified	<input type="checkbox"/> Species on FT Plant List <input type="checkbox"/> Container Grown (15 gal. max) <input type="checkbox"/> 4' Tall Min. (Tree grate units only) _____ Qty provided
	<input type="checkbox"/> Tree Grate <input type="checkbox"/> Full Grate (No tree opening) <input type="checkbox"/> Bioscape Vault (Open Planter)	<input type="checkbox"/> Verified	<input type="checkbox"/> Verified	<input type="checkbox"/> Verified	<input type="checkbox"/> Verified	<input type="checkbox"/> Species on FT Plant List <input type="checkbox"/> Container Grown (15 gal. max) <input type="checkbox"/> 4' Tall Min. (Tree grate units only) _____ Qty provided
	<input type="checkbox"/> Tree Grate <input type="checkbox"/> Full Grate (No tree opening) <input type="checkbox"/> Bioscape Vault (Open Planter)	<input type="checkbox"/> Verified	<input type="checkbox"/> Verified	<input type="checkbox"/> Verified	<input type="checkbox"/> Verified	<input type="checkbox"/> Species on FT Plant List <input type="checkbox"/> Container Grown (15 gal. max) <input type="checkbox"/> 4' Tall Min. (Tree grate units only) _____ Qty provided

Attach additional sheets as necessary.

NOTE: A charge of \$1500.00 will be invoiced for each activation visit requested by customer where Contech determines that the site does not meet the conditions required for activation AND/OR acceptable plants are not provided by the contractor. ONLY Contech authorized representatives can perform activation of Filterra systems; unauthorized activations will void the system warranty and waive manufacturer supplied activation and final inspection.

Signature Date

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Planting Selection for Filterra® Vault Systems

All Filterra systems require vegetation for proper long-term performance. As indicated in the Activation Package, the Contractor is responsible for sourcing the proper vegetation prior to Activation. Contech or a Contech representative will install the vegetation during the Activation process.

Contractors should identify the Top Opening style for each Filterra requiring Activation on the Activation Checklist. Contech offers three types, which are detailed on page 5 of this document:

- Vault with Tree Grate
- Vault with Full Grate
- Bioscape / Open Planter

Contractors must ensure the vegetation meets the following 4 requirements:

1. Select plant(s) as specified in the engineering plans and specifications AND that are listed on Contech’s Configuration Specific Plant Lists**.
2. All plants MUST be container-grown in nursery containers no larger than 15 gallons. Crated and/or Ball/Burlap plants are NOT permitted.
3. For Vaults with Tree Grates, plant height must be 4’ Minimum, from soil surface to top of plant.
4. Provide plant quantities per the following guidance:
 - Vault with Tree Grate – 1 per Tree Grate
 - Vault with Full Grate – 4-5 Small or Extra Small Grasses per Full Grate
 - Bioscape – Quantities should be selected based on plant palette options found starting on page 6 of this document.



If Contech or Contech’s representative shows up for Activation and any of the 4 requirements above are not met, Activation cannot be performed and the Contractor will be billed a \$1,500 Unprepared Site fee*.

Some additional vegetation recommendations for the best possible Activation and Installation are as follows:

- Select plant(s) with full root development but not to the point where root bound.
- For Filterra systems with a Tree Grate, select plants with taller trunks. Lower branches can be pruned away provided there are sufficient branches above the grate for tree or shrub development.
- For Filterra systems with a Tree Grate, plant(s) should have a single trunk at installation.
- Plant species shall not have a mature height greater than 30 feet.

** In some cases, Contech may consider alternate plant species as approved by the Product Manager. Please list the plant name in the space below and submit this sheet to your Contech Activation Coordinator. If the plant species is approved, either the Product Manager or the Activation Coordinator will sign the form and return to you for inclusion with your Activation Checklist.

Requested Plant Species: _____ Approved: _____

Date: _____

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Filterra® Top Opening Examples

Filterra® Vault with Tree Grate

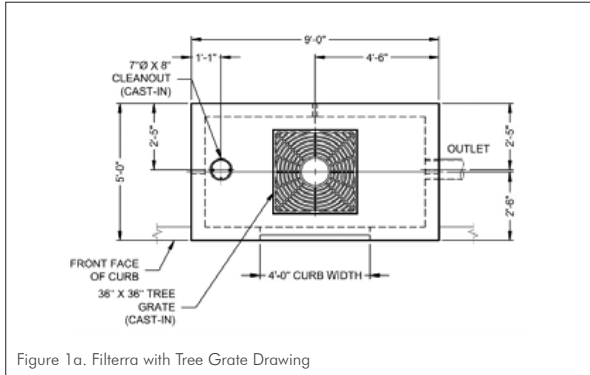


Figure 1a. Filterra with Tree Grate Drawing



Figure 1b. Filterra with Tree Grate Photo (not yet planted)

Filterra® Vault with Full Grate

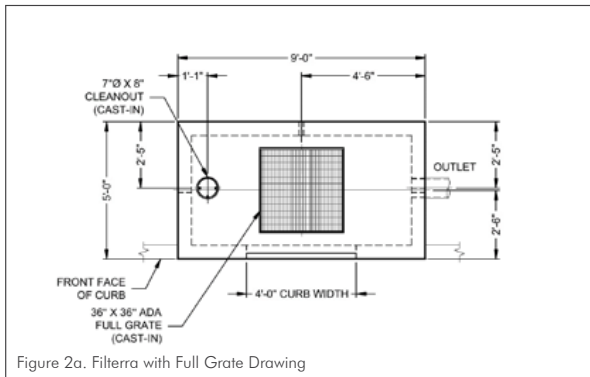


Figure 2a. Filterra with Full Grate Drawing



Figure 2b. Filterra with Full Grate Photo

Filterra® Bioscape Vault

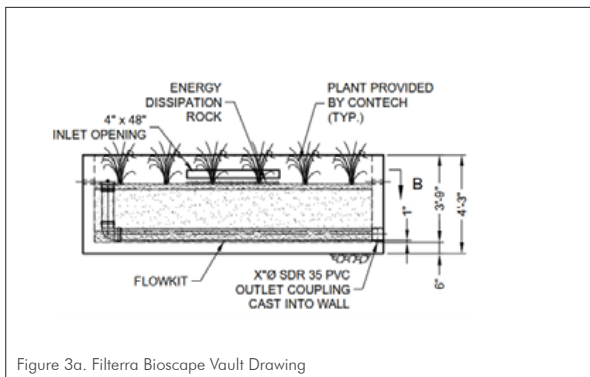


Figure 3a. Filterra Bioscape Vault Drawing







Figure 3b. Filterra Bioscape Vault Photo

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Filterra® Bioscape Vault Plant Palettes























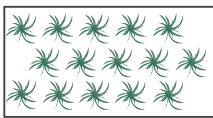

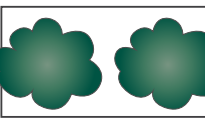




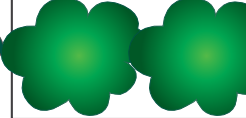
KEY: (refer to plant lists for species sizing)

	A. EXTRA SMALL GRASS
	<ul style="list-style-type: none"> • Up to 2' mature spread • 1-2 gallon typical (1 gal. minimum)
	B. SMALL GRASS/SHRUB
	<ul style="list-style-type: none"> • 2'-4' mature spread • 1-7 gallon typical
	C. MEDIUM SHRUB
	<ul style="list-style-type: none"> • 4'-6' mature spread • 1-7 gallon typical
	D. LARGE SHRUB OR EXTRA LARGE SHRUB OR TREE
	<ul style="list-style-type: none"> • 6' mature spread and greater, 30' max. mature height • Up to 15 gallon maximum

NOTE: For larger vaults and in-ground Filterra Bioscape systems, palettes can be scaled (i.e. Qty 6 of the 22x8 Palette can be used for a 1056 sf Filterra Bioscape).

MIX & MATCH SUBSTITUTION OPTIONS:

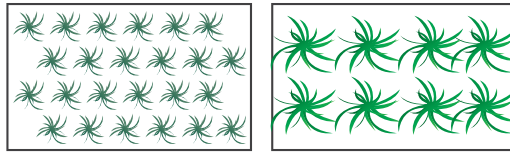
- 1 Large Shrub or Extra Large Shrub or Tree
 - 2 Medium Shrubs
 - 4 Small Grass/SHrubs
 - 12 Extra Small Grasses
- 1 Medium Shrub
 - 2 Small Grass/SHrubs
 - 6 Extra Small Grasses
- 1 Small Grass/SHrub
 - 3 Extra Small Grasses

4x4 Media Bay	A. 	B. 	C. 			
4x6/6x4 Media Bay	A. 	B. 	C. 			
4x8/8x4 & 4.5x7.83/7.83x4.5 Media Bay	A. 	B. 	C. 	D. 		
6x6 Media Bay	A. 	B. 	C. 	D. 		
6x8/8x6 Media Bay	A. 	B. 	C. 	D. 		
6x10/10x6 & 8x8 Media Bay	A. 	B. 	C. 	D. 		
6x12/12x6 Media Bay	A. 	B. 	C. 	D. 		
7x13/13x7/12x8 & 14x8 Media Bay						
	A. 20	B. 6	C. 3	D. 2		

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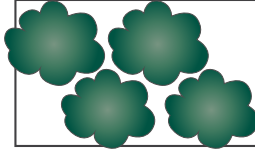


16x8 & 15x9
Media Bay

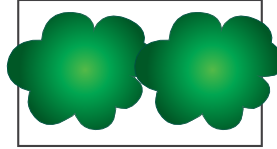


A. 24

B. 8

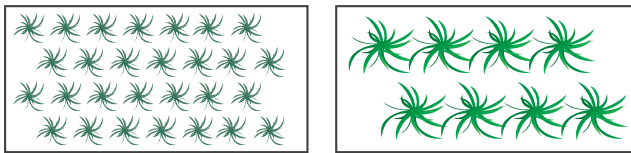


C. 4



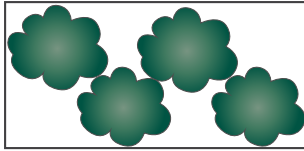
D. 2

18x8 Media Bay

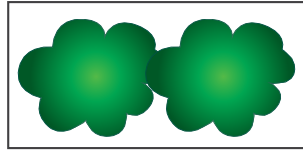


A. 28

B. 8

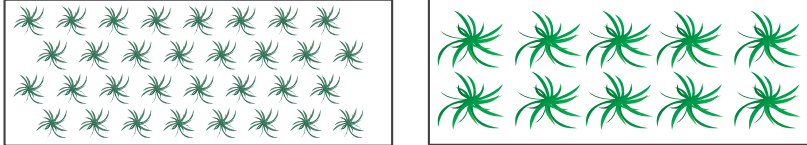


C. 4



D. 2

20x8 Media Bay



A. 32

B. 10

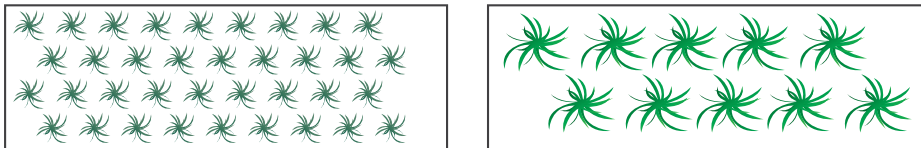


C. 5



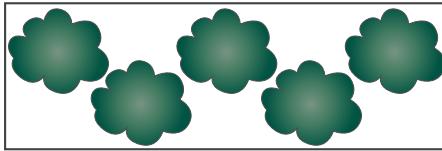
D. 3

22x8 Media Bay

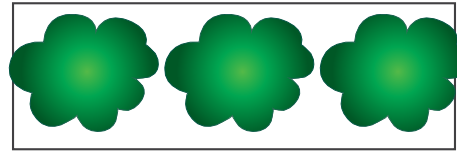


A. 36

B. 10



C. 5



D. 3

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Appendix 2 – Filterra® Tree Grate Opening Expansion Procedure

The standard grates used on all Filterra configurations that employ Tree Grates are fabricated with a 6" opening that is designed with a breakaway section that can be removed, allowing the grate opening to be expanded to 12" as the tree matures and the trunk widens.

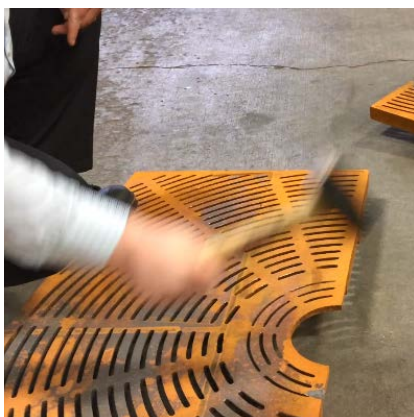
The following tools are required to expand the opening:

- Mini sledgehammer (3 lb. or greater)
- Safety Glasses / Goggles

The following guidelines should be followed to properly expand the tree opening from 6" to 12":



1. Remove the grate from the Filterra frame, place it flat on a hard surface, and support the grate by stepping on the edge or using other weighted items such as a few mulch bags if this is being done during a Filterra maintenance event. Put on safety glasses/goggles. Align the mini sledgehammer as shown in the figure to the left. The head of the sledgehammer should be aimed just inside the wide cast iron bar between the larger grate section and the breakaway section.



2. Repeatedly hit the grate at this spot with the mini sledgehammer.



3. After several hits, the breakaway section should snap cleanly off of the larger grate section. Reinstall the grate into the Filterra grate frame. Recycle or dispose of the breakaway section per local guidelines.



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Filterra[®] Maintenance Steps



1. Inspection of Filterra and surrounding area



2. Removal of tree grate and erosion control stones



3. Removal of debris, trash and mulch



4. Mulch replacement



5. Clean area around Filterra

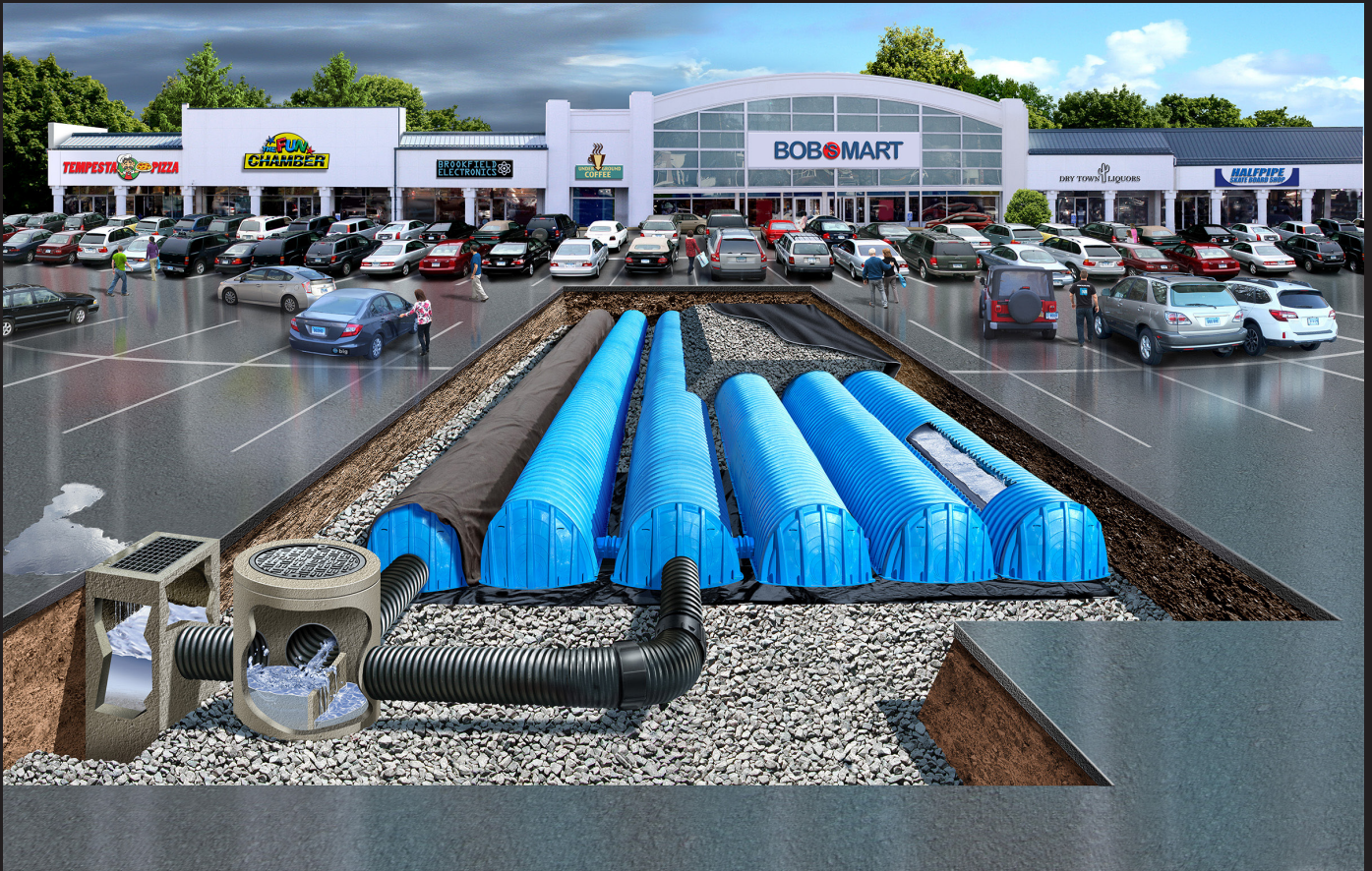


6. Complete paperwork and record plant height and width

Contech has created a network of Certified Maintenance Providers (CCMP's) to provide maintenance on Filterra systems. To find a CCMP in your area please visit www.conteches.com/maintenance

CONTACTOR® & RECHARGER®

STORMWATER MANAGEMENT SOLUTIONS



OPERATION & MAINTENANCE GUIDELINES FOR CULTEC STORMWATER MANAGEMENT SYSTEMS



OPERATIONS AND MAINTENANCE GUIDELINES

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Contact Information:

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For technical support, please call (203)775-4416 ext. 203 or e-mail CT-Tech@cultec.com.

Visit www.cultec.com/downloads.html for Product Downloads and CAD details.

Doc ID: CLT057 11-23

November 2023

These instructions are for single-layer traffic applications only. For multi-layer applications, contact CULTEC. All illustrations and photos shown herein are examples of typical situations. Be sure to follow the engineer's drawings. Actual designs may vary.

This manual contains guidelines recommended by CULTEC and may be used in conjunction with, but not to supersede, local regulations or regulatory authorities. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Introduction

The CULTEC Subsurface Stormwater Management System is a high-density polyethylene (HDPE) chamber system arranged in parallel rows surrounded by washed stone. The CULTEC chambers create arch-shaped voids within the washed stone to provide stormwater detention, retention, infiltration, and reclamation. Filter fabric is placed between the native soil and stone interface to prevent the intrusion of fines into the system. In order to minimize the amount of sediment which may enter the CULTEC system, a sediment collection device (stormwater pretreatment device) is recommended upstream from the CULTEC chamber system. Examples of pretreatment devices include, but are not limited to, an appropriately sized catch basin with sump, pretreatment catchment device, oil grit separator, or baffled distribution box. Manufactured pretreatment devices may also be used in accordance with CULTEC chambers. Installation, operation, and maintenance of these devices shall be in accordance with manufacturer's recommendations. Almost all of the sediment entering the stormwater management system will be collected within the pretreatment device.

Best Management Practices allow for the maintenance of the preliminary collection systems prior to feeding the CULTEC chambers. The pretreatment structures shall be inspected for any debris that will restrict inlet flow rates. Outfall structures, if any, such as outlet control must also be inspected for any obstructions that would restrict outlet flow rates. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Operation and Maintenance Requirements

I. Operation

CULTEC stormwater management systems shall be operated to receive only stormwater run-off in accordance with applicable local regulations. CULTEC subsurface stormwater management chambers operate at peak performance when installed in series with pretreatment. Pretreatment of suspended solids is superior to treatment of solids once they have been introduced into the system. The use of pretreatment is adequate as long as the structure is maintained and the site remains stable with finished impervious surfaces such as parking lots, walkways, and pervious areas are properly maintained. If there is to be an unstable condition, such as improvements to buildings or parking areas, all proper silt control measures shall be implemented according to local regulations.

II. Inspection and Maintenance Options

- A. The CULTEC system may be equipped with an inspection port located on the inlet row. The inspection port is a circular cast box placed in a rectangular concrete collar. When the lid is removed, a 6-inch (150 mm) pipe with a screw-in plug will be exposed. Remove the plug. This will provide access to the CULTEC Chamber row below. From the surface, through this access, the sediment may be measured at this location. A stadia rod may be used to measure the depth of sediment if any in this row. If the depth of sediment is in excess of 3 inches (76 mm), then this row should be cleaned with high pressure water through a culvert cleaning nozzle. This would be carried out through an upstream manhole or through the CULTEC StormFilter Unit (or other pretreatment device). CCTV inspection of this row can be deployed through this access port to determine if any sediment has accumulated in the inlet row.
- B. If the CULTEC bed is not equipped with an inspection port, then access to the inlet row will be through an upstream manhole or the CULTEC StormFilter.
 1. **Manhole Access**
This inspection should only be carried out by persons trained in confined space entry and sewer inspection services. After the manhole cover has been removed a gas detector must be lowered into the manhole to ensure that there are not high concentrations of toxic gases present. The inspector should be lowered into the manhole with the proper safety equipment as per OSHA requirements. The inspector may be able to observe sediment from this location. If this is not possible, the inspector will need to deploy a CCTV robot to permit viewing of the sediment.

2. StormFilter Access

Remove the manhole cover to allow access to the unit. Typically a 30-inch (750 mm) pipe is used as a riser from the StormFilter to the surface. As in the case with manhole access, this access point requires a technician trained in confined space entry with proper gas detection equipment. This individual must be equipped with the proper safety equipment for entry into the StormFilter. The technician will be lowered onto the StormFilter unit. The hatch on the unit must be removed. Inside the unit are two filters which may be removed according to StormFilter maintenance guidelines. Once these filters are removed the inspector can enter the StormFilter unit to launch the CCTV camera robot.

- C. The inlet row of the CULTEC system is placed on a polyethylene liner to prevent scouring of the washed stone beneath this row. This also facilitates the flushing of this row with high pressure water through a culvert cleaning nozzle. The nozzle is deployed through a manhole or the StormFilter and extended to the end of the row. The water is turned on and the inlet row is back-flushed into the manhole or StormFilter. This water is to be removed from the manhole or StormFilter using a vacuum truck.

III. Maintenance Guidelines

The following guidelines shall be adhered to for the operation and maintenance of the CULTEC stormwater management system:

- A. The owner shall keep a maintenance log which shall include details of any events which would have an effect on the system's operational capacity.
- B. The operation and maintenance procedure shall be reviewed periodically and changed to meet site conditions.
- C. Maintenance of the stormwater management system shall be performed by qualified workers and shall follow applicable occupational health and safety requirements.
- D. Debris removed from the stormwater management system shall be disposed of in accordance with applicable laws and regulations.

IV. Suggested Maintenance Schedules

A. Minor Maintenance

The following suggested schedule shall be followed for routine maintenance during the regular operation of the stormwater system:

Frequency	Action
Monthly in first year	Check inlets and outlets for clogging and remove any debris, as required.
Spring and Fall	Check inlets and outlets for clogging and remove any debris, as required.
One year after commissioning and every third year following	Check inlets and outlets for clogging and remove any debris, as required.

B. Major Maintenance

The following suggested maintenance schedule shall be followed to maintain the performance of the CULTEC stormwater management chambers. Additional work may be necessary due to insufficient performance and other issues that might be found during the inspection of the stormwater management chambers. (See table on next page)

	Frequency	Action
Inlets and Outlets	Every 3 years	<ul style="list-style-type: none"> Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.
	Spring and Fall	<ul style="list-style-type: none"> Check inlet and outlets for clogging and remove any debris as required.
CULTEC Stormwater Chambers	2 years after commissioning	<ul style="list-style-type: none"> Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.
	9 years after commissioning every 9 years following	<ul style="list-style-type: none"> Clean stormwater management chambers and feed connectors of any debris. Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
	45 years after commissioning	<ul style="list-style-type: none"> Clean stormwater management chambers and feed connectors of any debris. Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. Attain the appropriate approvals as required. Establish a new operation and maintenance schedule.
Surrounding Site	Monthly in 1 st year	<ul style="list-style-type: none"> Check for depressions in areas over and surrounding the stormwater management system.
	Spring and Fall	<ul style="list-style-type: none"> Check for depressions in areas over and surrounding the stormwater management system.
	Yearly	<ul style="list-style-type: none"> Confirm that no unauthorized modifications have been performed to the site.

For additional information concerning the maintenance of CULTEC Subsurface Stormwater Management Chambers, please contact CULTEC at 1-800-428-5832.

WQMP Operation & Maintenance (O&M) Plan

Project Name: _____

Prepared for:

Project Name: _____

Address: _____

City, State Zip: _____

Prepared on:

Date: _____

This O&M Plan describes the designated responsible party for implementation of this WQMP, including: operation and maintenance of all the structural BMP(s), conducting the training/educational program and duties, and any other necessary activities. The O&M Plan includes detailed inspection and maintenance requirements for all structural BMPs, including copies of any maintenance contract agreements, manufacturer’s maintenance requirements, permits, etc.

8.1.1 Project Information

Project name	
Address	
City, State Zip	
Site size	
List of structural BMPs, number of each	
Other notes	

8.1.2 Responsible Party

The responsible party for implementation of this WQMP is:

Name of Person or HOA Property Manager	
Address	
City, State Zip	
Phone number	
24-Hour Emergency Contact number	
Email	

8.1.3 Record Keeping

Parties responsible for the O&M plan shall retain records for at least 5 years.

All training and educational activities and BMP operation and maintenance shall be documented to verify compliance with this O&M Plan. A sample Training Log and Inspection and Maintenance Log are included in this document.

8.1.4 Electronic Data Submittal

This document along with the Site Plan and Attachments shall be provided in PDF format. AutoCAD files and/or GIS coordinates of BMPs shall also be submitted to the City.

Appendix ____

BMP SITE PLAN

Site plan is preferred on minimum 11" by 17" colored sheets, as long as legible.



Minor Maintenance

Frequency		Action
Monthly in first year		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
<input type="checkbox"/> Month 1	Date:	
<input type="checkbox"/> Month 2	Date:	
<input type="checkbox"/> Month 3	Date:	
<input type="checkbox"/> Month 4	Date:	
<input type="checkbox"/> Month 5	Date:	
<input type="checkbox"/> Month 6	Date:	
<input type="checkbox"/> Month 7	Date:	
<input type="checkbox"/> Month 8	Date:	
<input type="checkbox"/> Month 9	Date:	
<input type="checkbox"/> Month 10	Date:	
<input type="checkbox"/> Month 11	Date:	
<input type="checkbox"/> Month 12	Date:	
Spring and Fall		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
One year after commissioning and every third year following		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
<input type="checkbox"/> Year 1	Date:	
<input type="checkbox"/> Year 4	Date:	
<input type="checkbox"/> Year 7	Date:	
<input type="checkbox"/> Year 10	Date:	
<input type="checkbox"/> Year 13	Date:	
<input type="checkbox"/> Year 16	Date:	
<input type="checkbox"/> Year 19	Date:	
<input type="checkbox"/> Year 22	Date:	

Major Maintenance

Frequency		Action
Inlets and Outlets	Every 3 years	
	Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.	
	Notes	
	<input type="checkbox"/> Year 1	Date:
	<input type="checkbox"/> Year 4	Date:
	<input type="checkbox"/> Year 7	Date:
	<input type="checkbox"/> Year 10	Date:
	<input type="checkbox"/> Year 13	Date:
	<input type="checkbox"/> Year 16	Date:
	<input type="checkbox"/> Year 19	Date:
	<input type="checkbox"/> Year 22	Date:
	Spring and Fall	
	Check inlet and outlets for clogging and remove any debris, as required.	
	Notes	
	<input type="checkbox"/> Spring	Date:
	<input type="checkbox"/> Fall	Date:
	<input type="checkbox"/> Spring	Date:
	<input type="checkbox"/> Fall	Date:
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
<input type="checkbox"/> Spring	Date:	
<input type="checkbox"/> Fall	Date:	
CULTEC Stormwater Chambers	2 years after commissioning	
	<input type="checkbox"/> Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. <input type="checkbox"/> Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.	
	Notes	
<input type="checkbox"/> Year 2	Date:	

Major Maintenance

Frequency		Action	
CULTEC Stormwater Chambers	9 years after commissioning every 9 years following		
	<ul style="list-style-type: none"> <input type="checkbox"/> Clean stormwater management chambers and feed connectors of any debris. <input type="checkbox"/> Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. <input type="checkbox"/> Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended. 		
	Notes		
	<input type="checkbox"/> Year 9	Date:	
	<input type="checkbox"/> Year 18	Date:	
	<input type="checkbox"/> Year 27	Date:	
	<input type="checkbox"/> Year 36	Date:	
45 years after commissioning			
<ul style="list-style-type: none"> <input type="checkbox"/> Clean stormwater management chambers and feed connectors of any debris. <input type="checkbox"/> Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. <input type="checkbox"/> Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. <input type="checkbox"/> Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. <input type="checkbox"/> Attain the appropriate approvals as required. <input type="checkbox"/> Establish a new operation and maintenance schedule. 			
Notes			
<input type="checkbox"/> Year 45	Date:		

Major Maintenance

Frequency		Action	
Surrounding Site	Monthly in 1st year		
	<input type="checkbox"/> Check for depressions in areas over and surrounding the stormwater management system.		
	Notes		
	<input type="checkbox"/> Month 1	Date:	
	<input type="checkbox"/> Month 2	Date:	
	<input type="checkbox"/> Month 3	Date:	
	<input type="checkbox"/> Month 4	Date:	
	<input type="checkbox"/> Month 5	Date:	
	<input type="checkbox"/> Month 6	Date:	
	<input type="checkbox"/> Month 7	Date:	
	<input type="checkbox"/> Month 8	Date:	
	<input type="checkbox"/> Month 9	Date:	
	<input type="checkbox"/> Month 10	Date:	
	<input type="checkbox"/> Month 11	Date:	
	<input type="checkbox"/> Month 12	Date:	
	Spring and Fall		
	<input type="checkbox"/> Check for depressions in areas over and surrounding the stormwater management system.		
	Notes		
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	<input type="checkbox"/> Spring	Date:	
	<input type="checkbox"/> Fall	Date:	
	Yearly		
	<input type="checkbox"/> Confirm that no unauthorized modifications have been performed to the site.		
Notes			
<input type="checkbox"/> Year 1	Date:		
<input type="checkbox"/> Year 2	Date:		
<input type="checkbox"/> Year 3	Date:		
<input type="checkbox"/> Year 4	Date:		
<input type="checkbox"/> Year 5	Date:		
<input type="checkbox"/> Year 6	Date:		
<input type="checkbox"/> Year 7	Date:		



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