Industry Standards for Underground Storm Water Chamber Systems

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MN, WI, ND

MECA

StormTech®

Detention • Retention • Water Quality

Division of ADS

- 5 reasons to go underground
- Industry Standard Specifications
- Water Quality Expectations
- Recent Projects

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Review of Chambers

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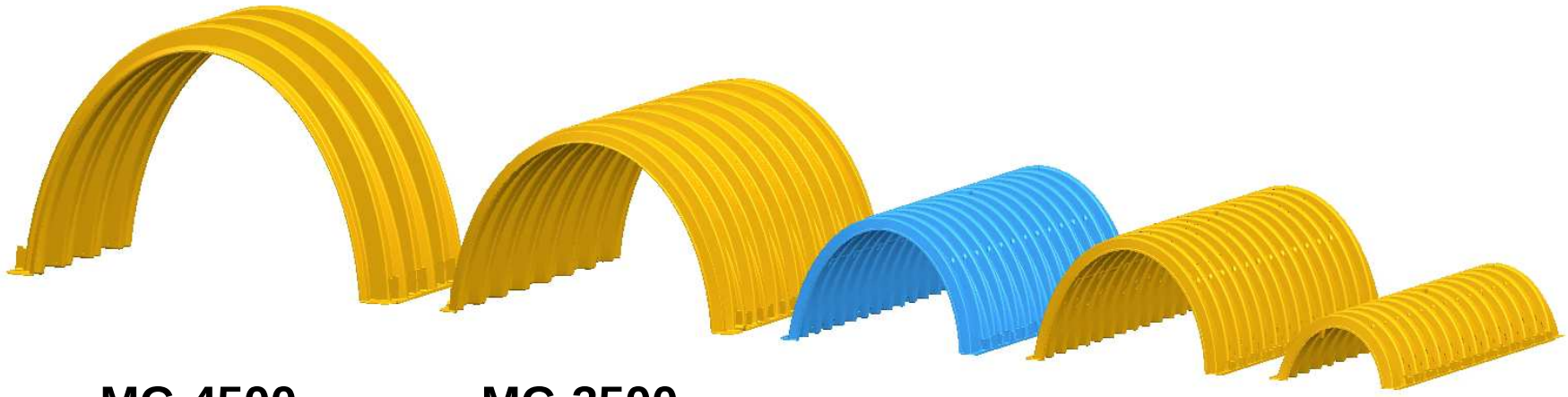
Review of Chambers

The Complete Family of Products

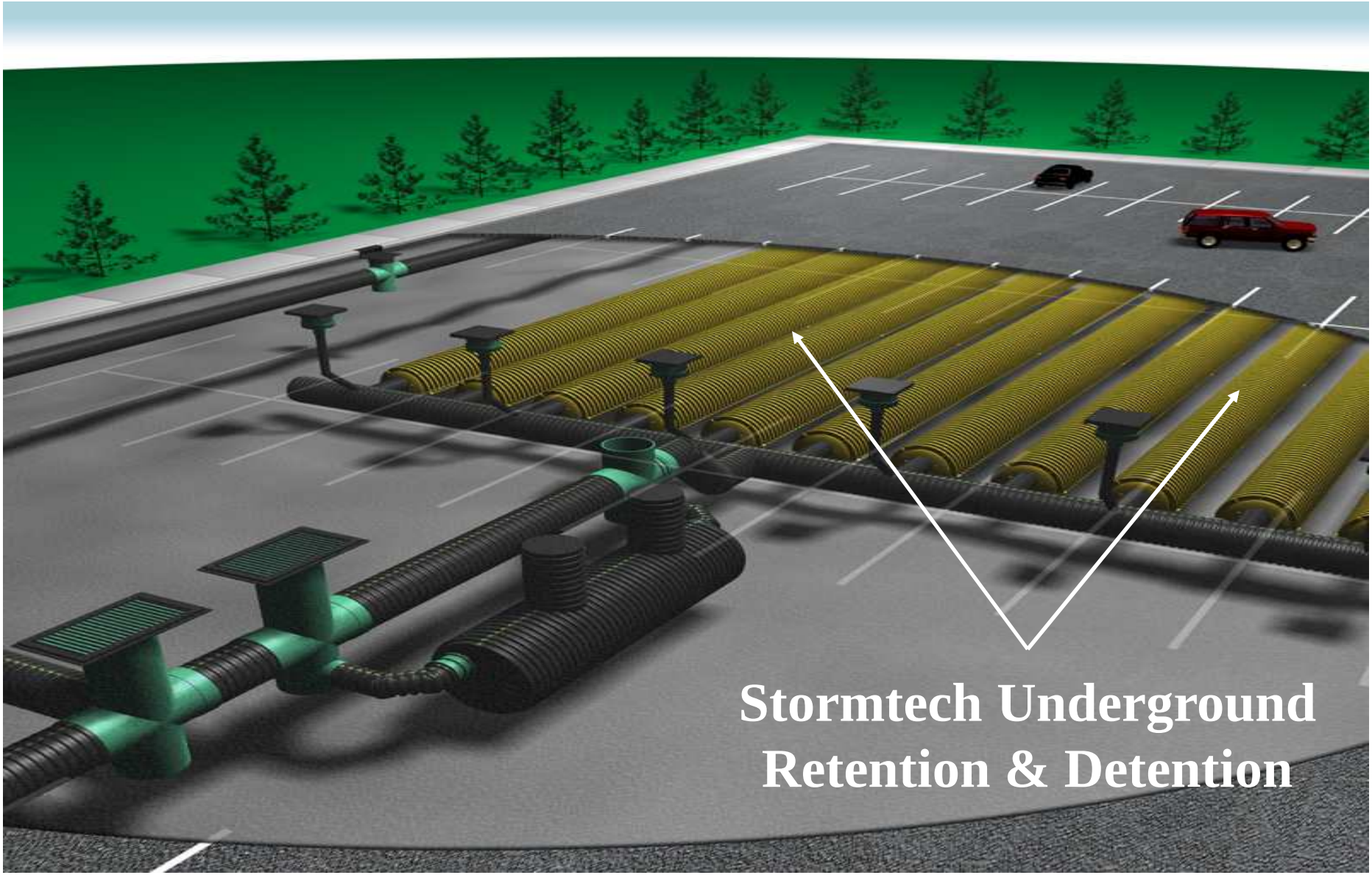
MC-4500 vs 72” Perf pipe	MC-3500 vs 60” Perf Pipe	SC-740 vs 36” Perf. Pipe
MC-4500- 40.4 CF/LF	MC-3500 – 24.7 CF/LF	SC-740-10.5 CF/LF
72” Perf. Pipe – 37.8 CF/LF	60” Perf. Pipe – 27.6 CF/LF	36” Perf.Pipe-10.5 CF/LF



MC-4500 **MC-3500** **DC-780** **SC-740** **SC-310**

MEGA CHAMBER SERIES

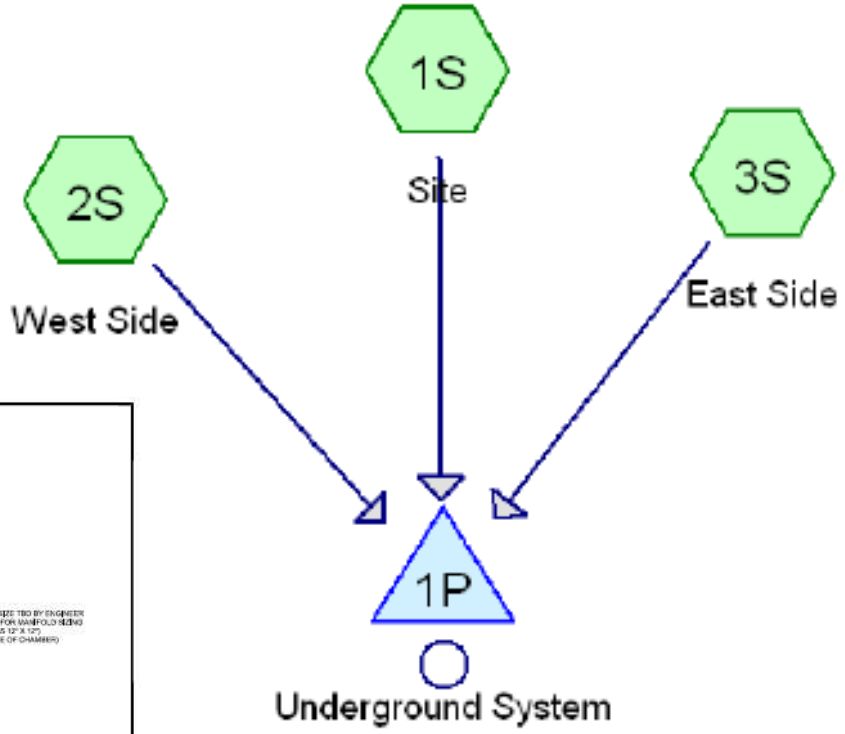
#1 – Efficient Land Use

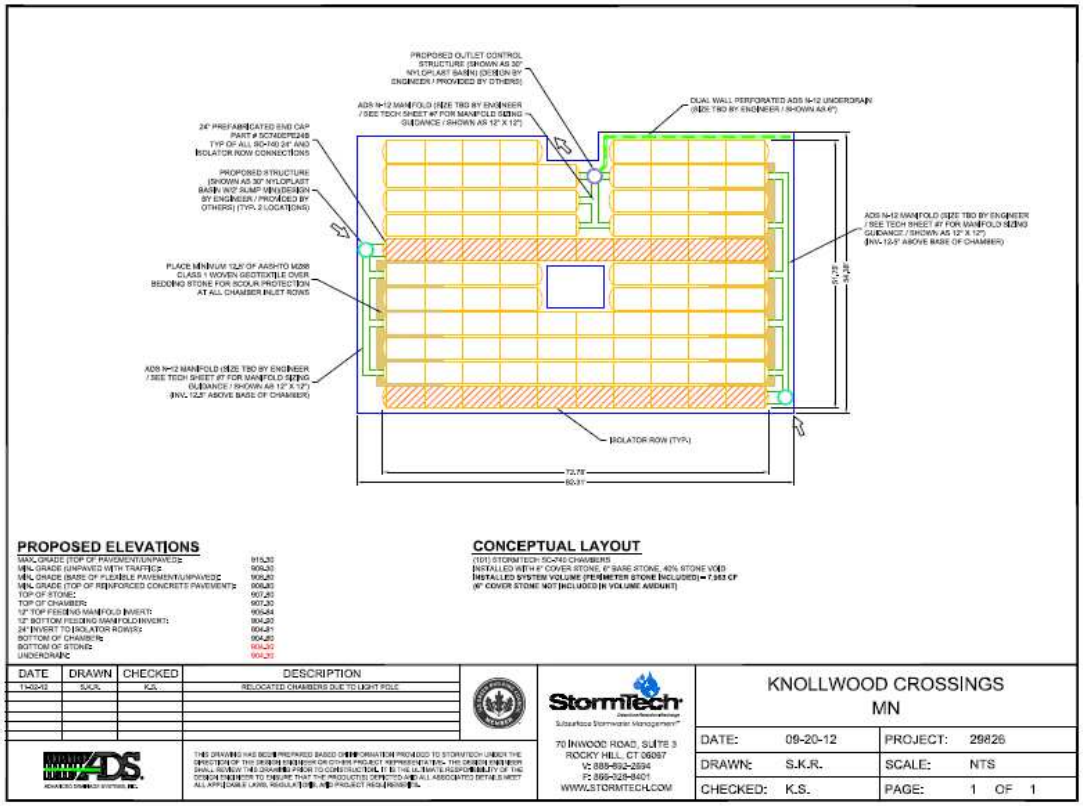


Review of Chambers

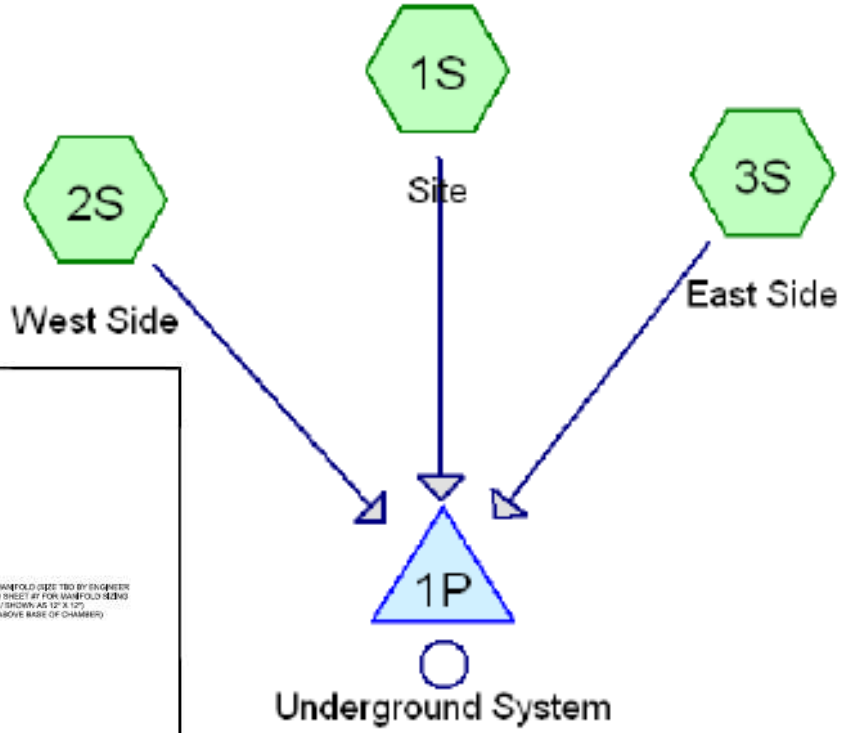
Why so widely used??

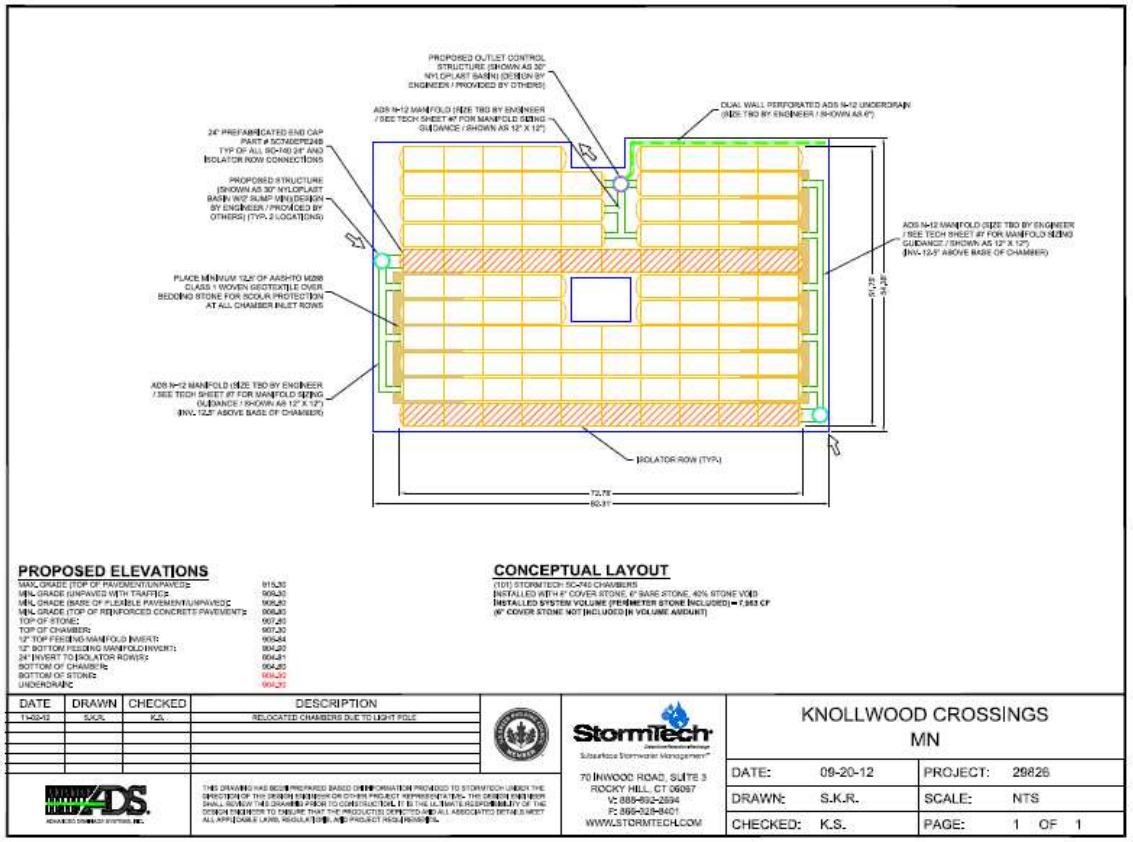
1) Efficient Land use
2) Easy to design





#2 Easy to Design





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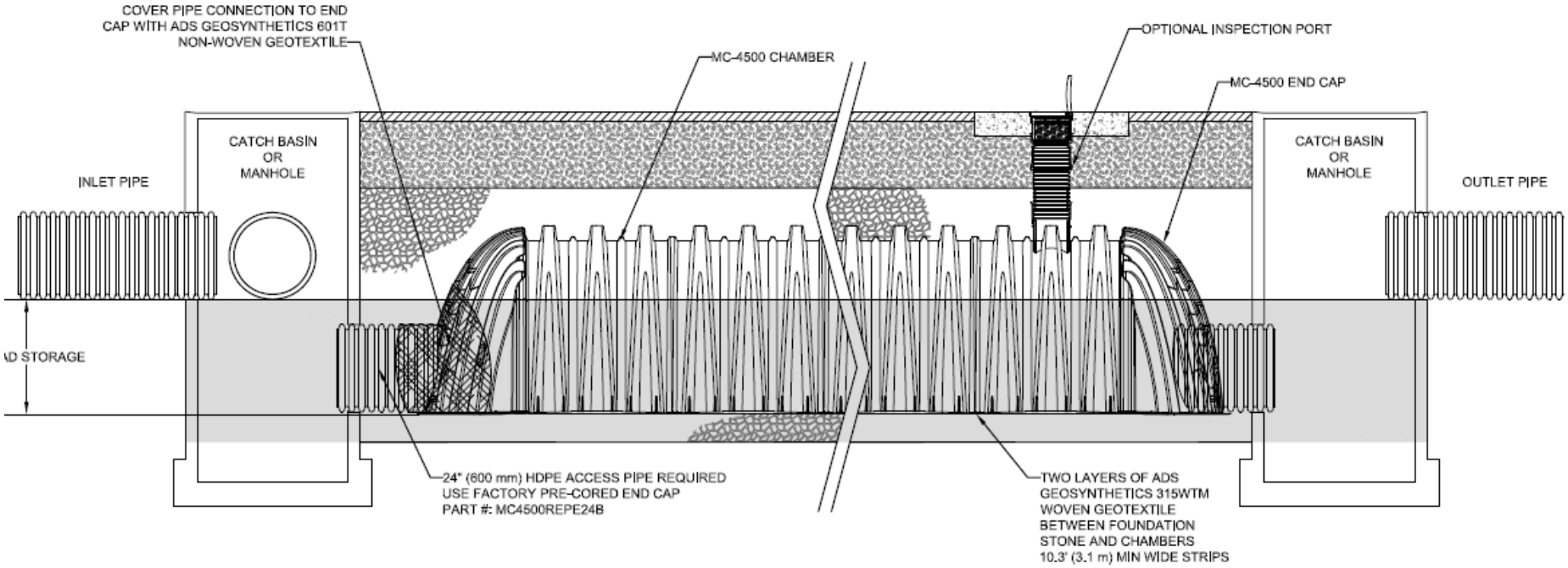
#3 Water Quality/Quantity Efficient



Minnesota Pollution Control Agency

NPDES

#4 Efficient Constructability

8 Basic Steps

Quick Install

1-EXCAVATE

4-STAGE

2-FABRIC

5-CONNECT

3-BASE STONE

6-STACK

Quick Install

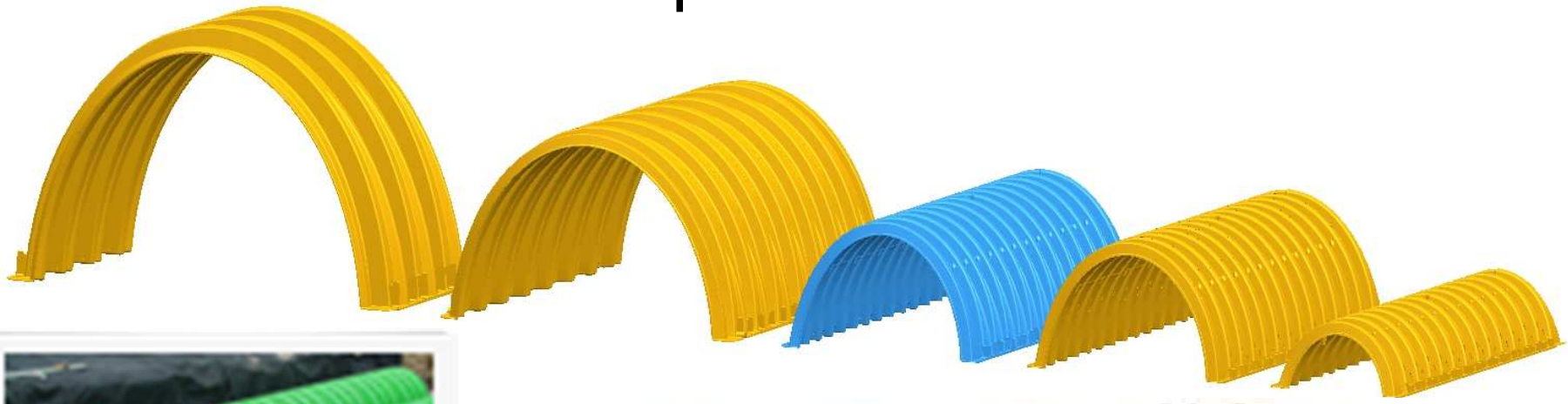
7-ROCK

8-COVER

Review of Chambers

5) Cost Efficiency

Industry Standard Specifications



Industry Standard Specifications

Without adherence to standards, regardless of the type of product, manufacturers' claims can be ambiguous

- The courts have found "the engineer" to be more culpable than the manufacturer
- National standards are developed by experts to be technically correct and reliable

Industry Standard Specifications

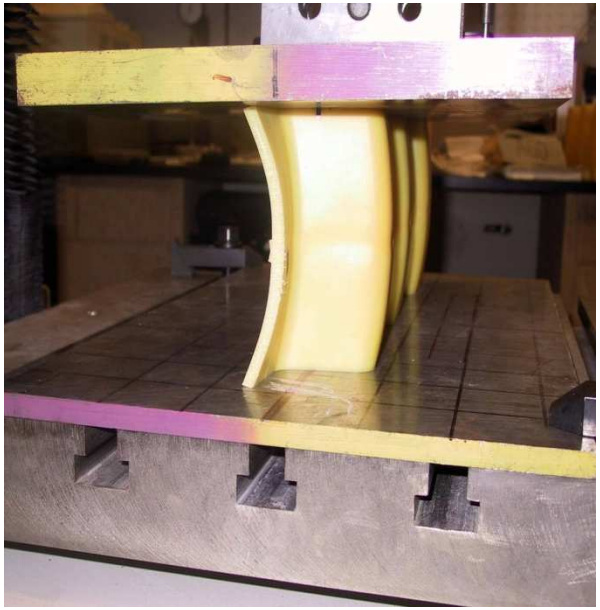
Specifying Industry Standards, not just products, establishes objective, meaningful performance criteria and a defensible basis of design.

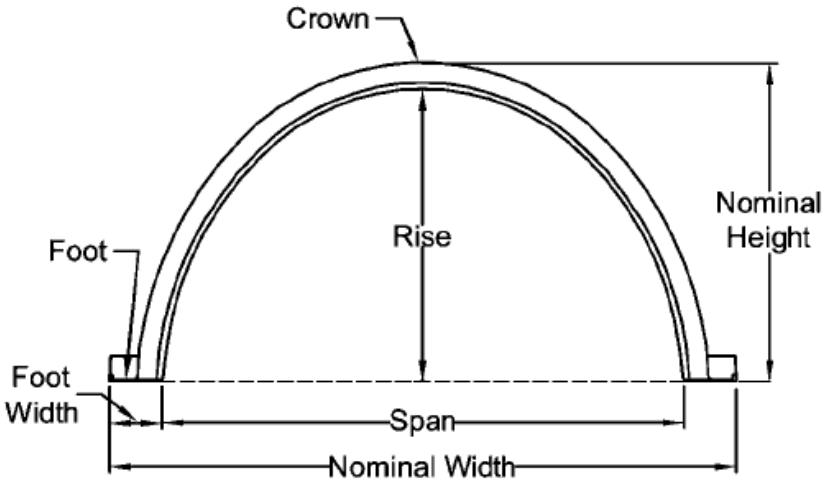
1 AASHTO is the American Association of State Highway and Transportation Officials
2 ASTM / ASTM International is the American Society of Testing Materials

Industry Standard Specifications

ASTM has developed the following product standards for stormwater chambers:

-**ASTM F2418** Polypropylene Corrugated Storm Chambers
-**ASTM F2922** Polyethylene Corrugated Storm Chambers





Industry Standard Specifications

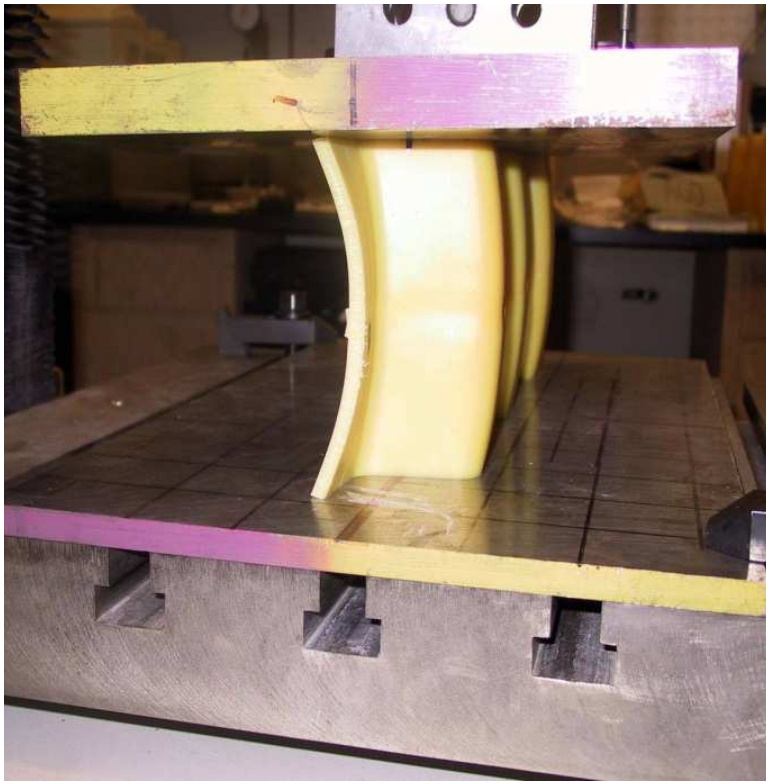
Material and Manufacture

PP0330B99945

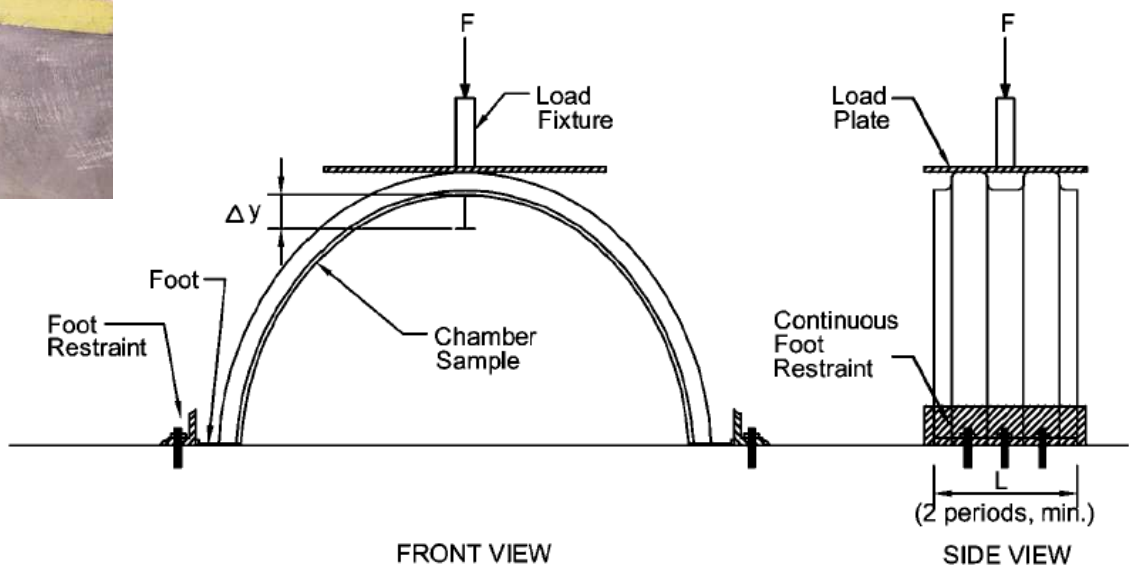
516500C or E

- Density
- Tensile Strength
- Elongation Modulus
- Melt flow rate
- UV Resistance
- Short & Long term Material Properties

Industry Standard Specifications



- Wall Thickness
- Dimensions/Shape
- Arch Stiffness Constant
- Impact Resistance
- Mechanical & Physical Properties



Industry Standard Specifications

Soil-Structure interaction :
AASHTO LRFD Bridge Design Specification
-Section 3 – Loading Calculations
-Section 12.12 Structural Design of TP Structures

Industry Standard Specifications

ASTM F2787 – Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers

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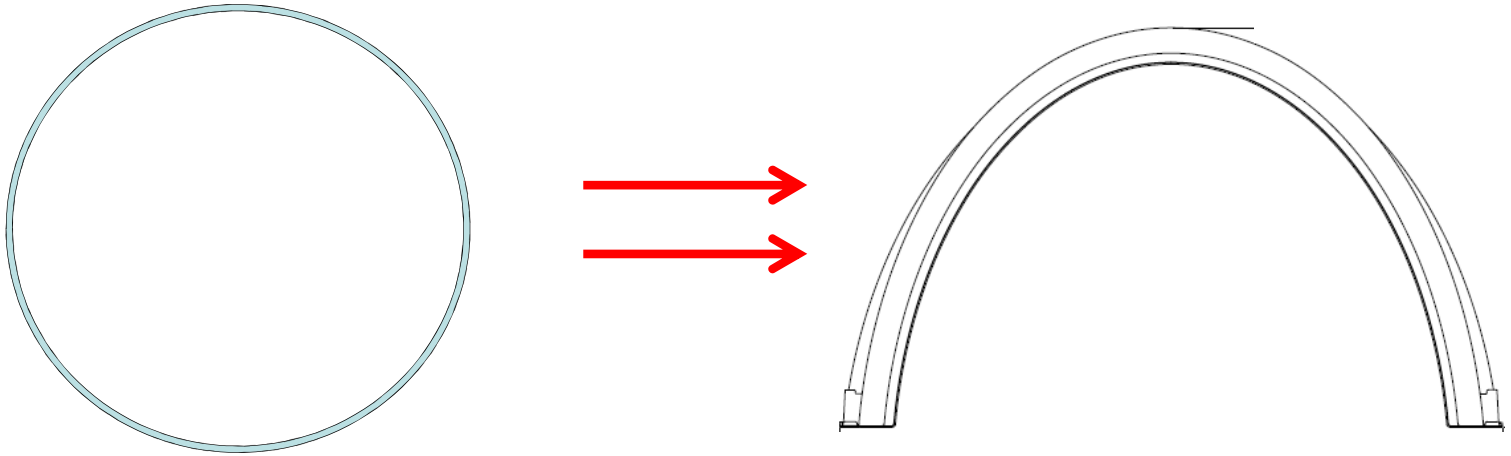


Pipe

Chamber

Industry Standard Specifications

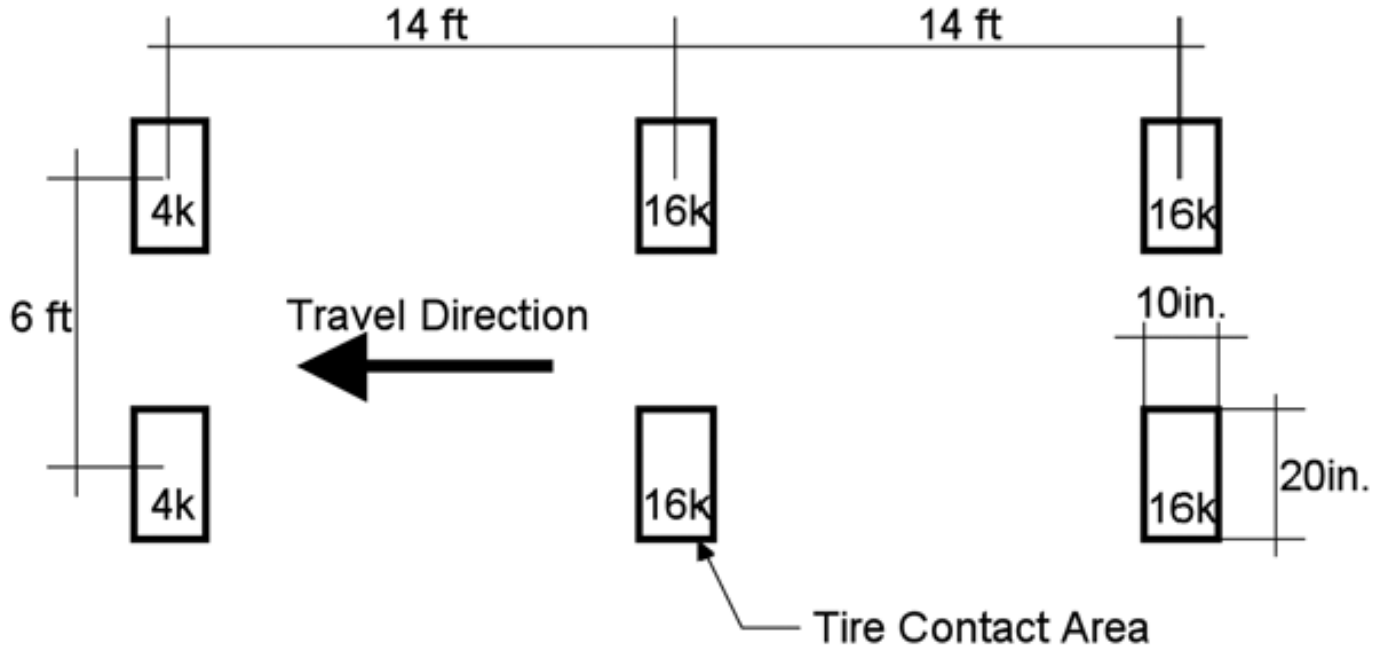


FIG. A1.1 Characteristics of Design Truck and Design Tire Contact Area

Utilizes the HL93 AASHTO Design Truck (former HS-20)

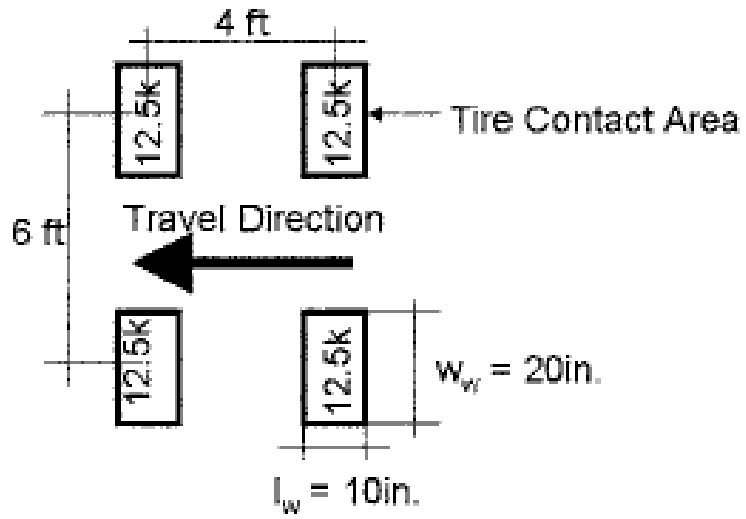


FIG. A1.2 Characteristics of Design Tandem

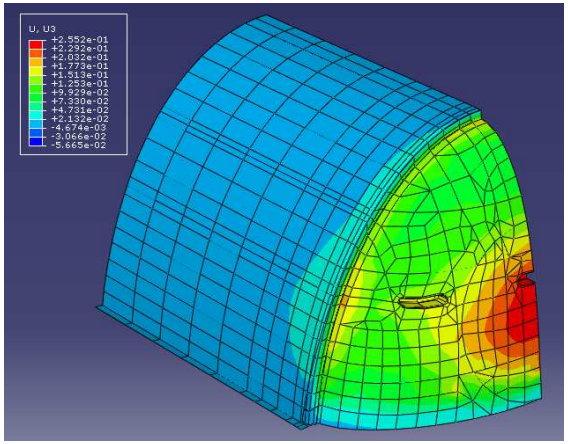
Or the AASHTO Design Tandem (former HS-20)

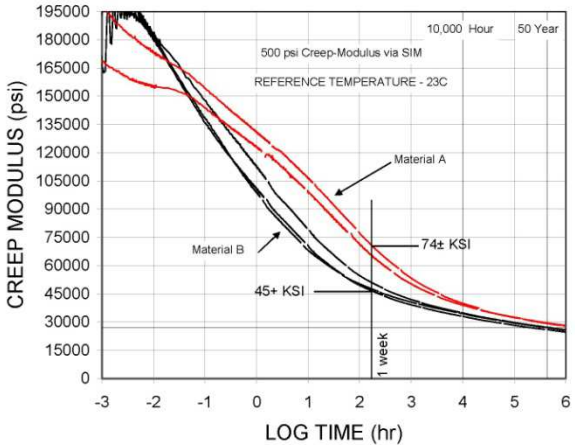
Needs to meet LRFD load & Resistance design factors

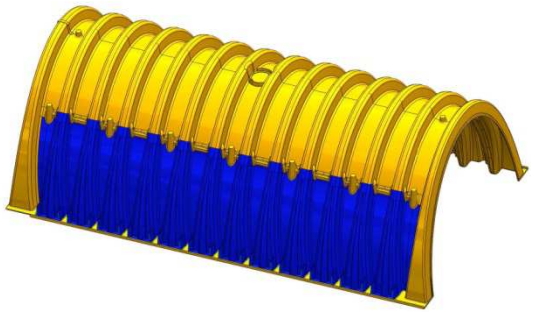
For HL93:

- Live Loads
- Impact
- Multiple Presence Factors

Industry Standard Specifications







Computer Modeling (FEA – CANDE) is used to:

- Analyze Resin Properties
- Chamber Shape, Corrugation Profile, Wall Thickness
- Bedding/backfill Min/Max Covers per Details

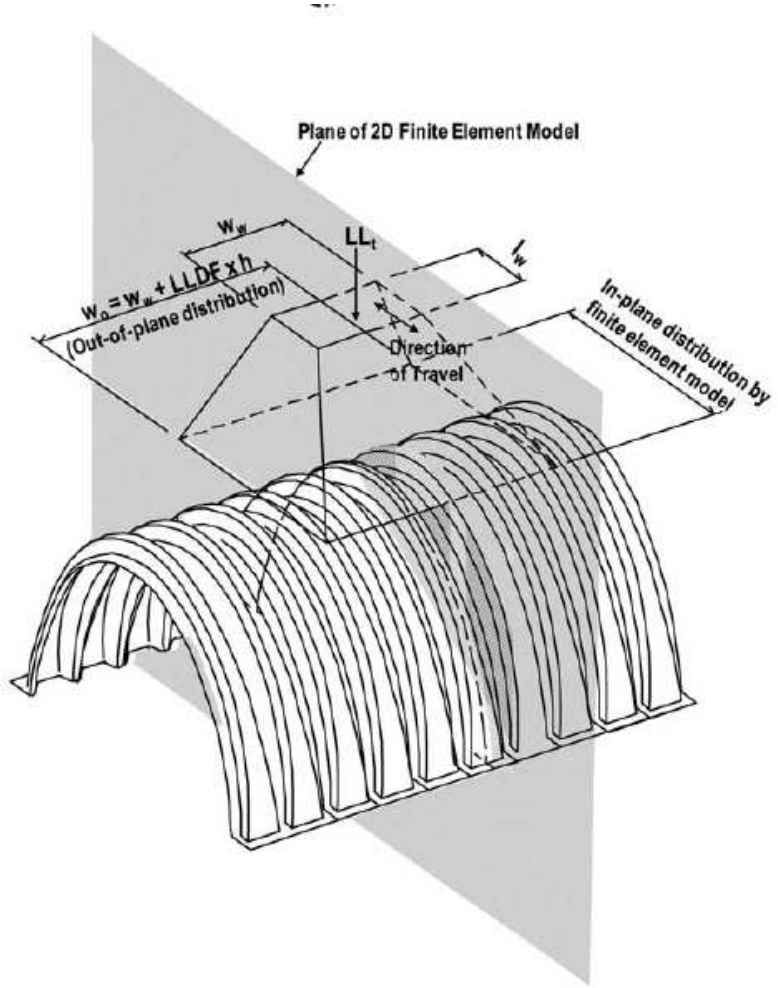
Industry Standard Specifications

Full Scale testing used to determine if chamber design

Acceptable – when FS exceed:

1.75 for Live loads

1.95 for Dead loads



Industry Standard Specifications

Shallow Cover Testing:

- 27kips – 35kips/axle
- 12”-18”/11”-4” rutted cover
- Low speed passes on Crown/Shoulder
- 10 min Static holds
- 100 Low speed passes
- Exceeds resist full factored AASHTO loads @ 18”- 78” cover

Industry Standard Specifications

Deep Cover Testing:

- 12.6FT – 17.3Ft Cover
- Zero spacing between Chambers
- 8.5 months
- Exceeds resist full factored AASHTO loads @ 18”- 78” cover

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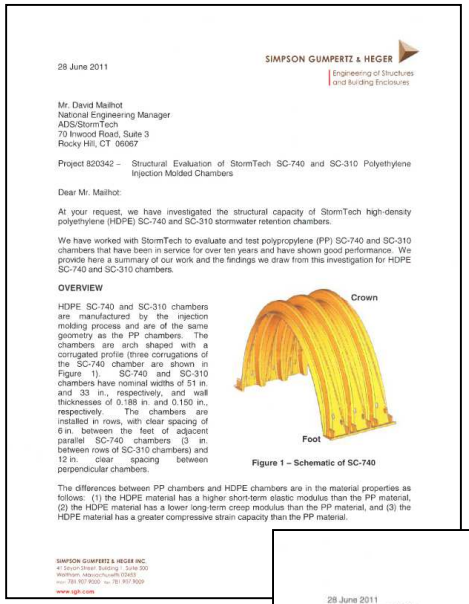
Industry Standard Specifications



SIMPSON GUMPERTZ & HEGER
Engineering of Structures and Building Enclosures

28 June 2011

Mr. David Mailhot
National Engineering Manager
ADS/StormTech
70 Inwood Road, Suite 3
Rocky Hill, CT 06067

Project 820342 – Structural Evaluation of StormTech SC-740 and SC-310 Polyethylene Injection Molded Chambers

Dear Mr. Mailhot:

At your request, we have investigated the structural capacity of StormTech high-density polyethylene (HDPE) SC-740 and SC-310 stormwater retention chambers.

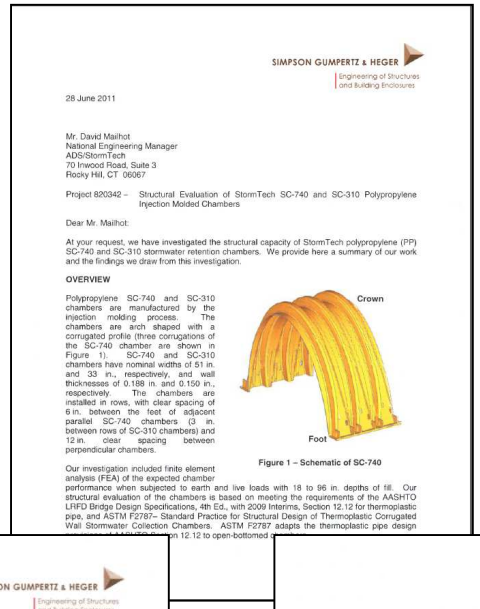
We have worked with StormTech to evaluate and test polypropylene (PP) SC-740 and SC-310 chambers that have been in service for over ten years and have shown good performance. We provide here a summary of our work and the findings we draw from this investigation for HDPE SC-740 and SC-310 chambers.

OVERVIEW

HDPE SC-740 and SC-310 chambers are manufactured by the injection molding process and are of the same geometry as the PP chambers. The chambers are arch shaped with a corrugated profile (three corrugations of the SC-740 chamber are shown in Figure 1). SC-740 and SC-310 chambers have nominal widths of 51 in. and 33 in., respectively, and wall thicknesses of 0.188 in. and 0.150 in., respectively. The chambers are installed in rows, with clear spacing of 6 in. between the feet of adjacent parallel SC-740 chambers (3 in. between rows of SC-310 chambers) and 12 in. clear spacing between perpendicular chambers.

Figure 1 – Schematic of SC-740

The differences between PP chambers and HDPE chambers are in the material properties as follows: (1) the HDPE material has a higher short-term elastic modulus than the PP material, (2) the HDPE material has a lower long-term creep modulus than the PP material, and (3) the HDPE material has a greater compressive strain capacity than the PP material.



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Engineering of Structures and Building Enclosures

28 June 2011

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Project 820342 – Structural Evaluation of StormTech SC-740 and SC-310 Polypropylene Injection Molded Chambers

Dear Mr. Mailhot:

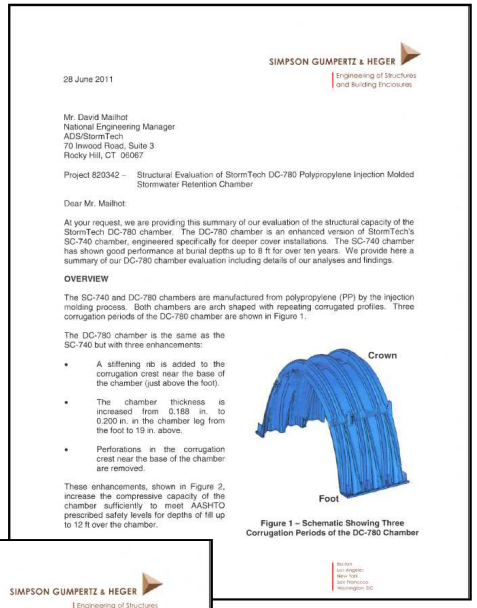
At your request, we have investigated the structural capacity of StormTech polypropylene (PP) SC-740 and SC-310 stormwater retention chambers. We provide here a summary of our work and the findings we draw from this investigation.

OVERVIEW

Polypropylene SC-740 and SC-310 chambers are manufactured by the injection molding process. The chambers are arch shaped with a corrugated profile (three corrugations of the SC-740 chamber are shown in Figure 1). SC-740 and SC-310 chambers have nominal widths of 51 in. and 33 in., respectively, and wall thicknesses of 0.188 in. and 0.150 in., respectively. The chambers are installed in rows, with clear spacing of 6 in. between the feet of adjacent parallel SC-740 chambers (3 in. between rows of SC-310 chambers) and 12 in. clear spacing between perpendicular chambers.

Figure 1 – Schematic of SC-740

Our investigation included finite element analysis (FEA) of the expected chamber performance when subjected to earth and live loads with 18 to 96 in. depths of fill. Our structural evaluation of the chambers is based on meeting the requirements of the AASHTO LRFD Bridge Design Specifications, 4th Ed., with 2009 Interims, Section 12.12 for thermoplastic pipe, and ASTM F2787– Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers. ASTM F2787 adapts the thermoplastic pipe design



SIMPSON GUMPERTZ & HEGER
Engineering of Structures and Building Enclosures

28 June 2011

Mr. David Mailhot
National Engineering Manager
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Rocky Hill, CT 06067

Project 820342 – Structural Evaluation of StormTech DC-780 Polypropylene Injection Molded Stormwater Retention Chamber

Dear Mr. Mailhot:

At your request, we are providing this summary of our evaluation of the structural capacity of the StormTech DC-780 chamber. The DC-780 chamber is an enhanced version of StormTech's SC-740 chamber, engineered specifically for deeper cover installations. The SC-740 chamber has shown good performance at burial depths up to 8 ft for over ten years. We provide here a summary of our DC-780 chamber evaluation including details of our analyses and findings.

OVERVIEW

The SC-740 and DC-780 chambers are manufactured from polypropylene (PP) by the injection molding process. Both chambers are arch shaped with repeating corrugated profiles. Three corrugation periods of the DC-780 chamber are shown in Figure 1.

The DC-780 chamber is the same as the SC-740 but with three enhancements:

- A stiffening rib is added to the corrugation crest near the base of the chamber (just above the foot).
- The chamber thickness is increased from 0.188 in. to 0.200 in. in the chamber leg from the foot to 19 in. above.
- Perforations in the corrugation crest near the base of the chamber are removed.

Figure 1 – Schematic Showing Three Corrugation Periods of the DC-780 Chamber

These enhancements, shown in Figure 2, increase the compressive capacity of the chamber sufficiently to meet AASHTO prescribed safety levels for depths of fill up to 12 ft over the chamber.

SIMPSON GUMPERTZ & HEGER
Engineering of Structures and Building Enclosures

28 June 2011
(Revised 22 June 2012)

Mr. David Mailhot
National Engineering Manager
ADS/StormTech
70 Inwood Road, Suite 3
Rocky Hill, CT 06067

Project 060038.01 – Structural Evaluation of StormTech MC-4500 Polypropylene Injection Molded Chambers

Dear Mr. Mailhot:

At your request, we have investigated the structural capacity of the MC-4500 Stormwater Chamber and provide here a summary of our investigation and the findings we drew from this investigation.

OVERVIEW

Polypropylene (PP) MC-4500 chambers are manufactured by the injection molding process. The chamber is arch shaped with a corrugated profile (Figure 1). The chamber has a nominal height of 60 in., a nominal width of 101 in., and a longitudinal length of 52 in. Chamber walls have a nominal thickness of 0.255 in. Installation of the MC-4500 is similar to the MC-3500 and SC-740 chambers, with chambers installed in rows, below grade, usually under roadways or parking lots. The chambers will be installed with clear spacing of 9 in. between the feet of adjacent parallel chambers but with a minimum of 24 in. clear spacing between perpendicular chamber rows.

Figure 1 – MC-4500 Chamber

Our investigation included extensive finite element analysis (FEA) of the expected chamber performance when subjected to earth and live loads with 24 to 84 in. depths of fill. Our structural evaluation of the chambers is based on meeting the requirements of the AASHTO LRFD Bridge Design Specifications, 4th Ed., with 2009 Interims, Section 12.12 for thermoplastic pipe, and ASTM F2787 – Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers. ASTM F2787 adapts the thermoplastic pipe design provisions of AASHTO Section 12.12 to open-bottomed chambers.

SIMPSON GUMPERTZ & HEGER
Engineering of Structures and Building Enclosures

28 June 2011

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Project 060038.05 – Structural Evaluation of StormTech MC-3500 Chamber and MC-3500 End Cap

Dear Mr. Mailhot:

At your request, we have investigated the structural capacity of the MC-3500 stormwater retention chamber and the associated end cap. We provide here a summary of our investigation and the findings we drew from this investigation.

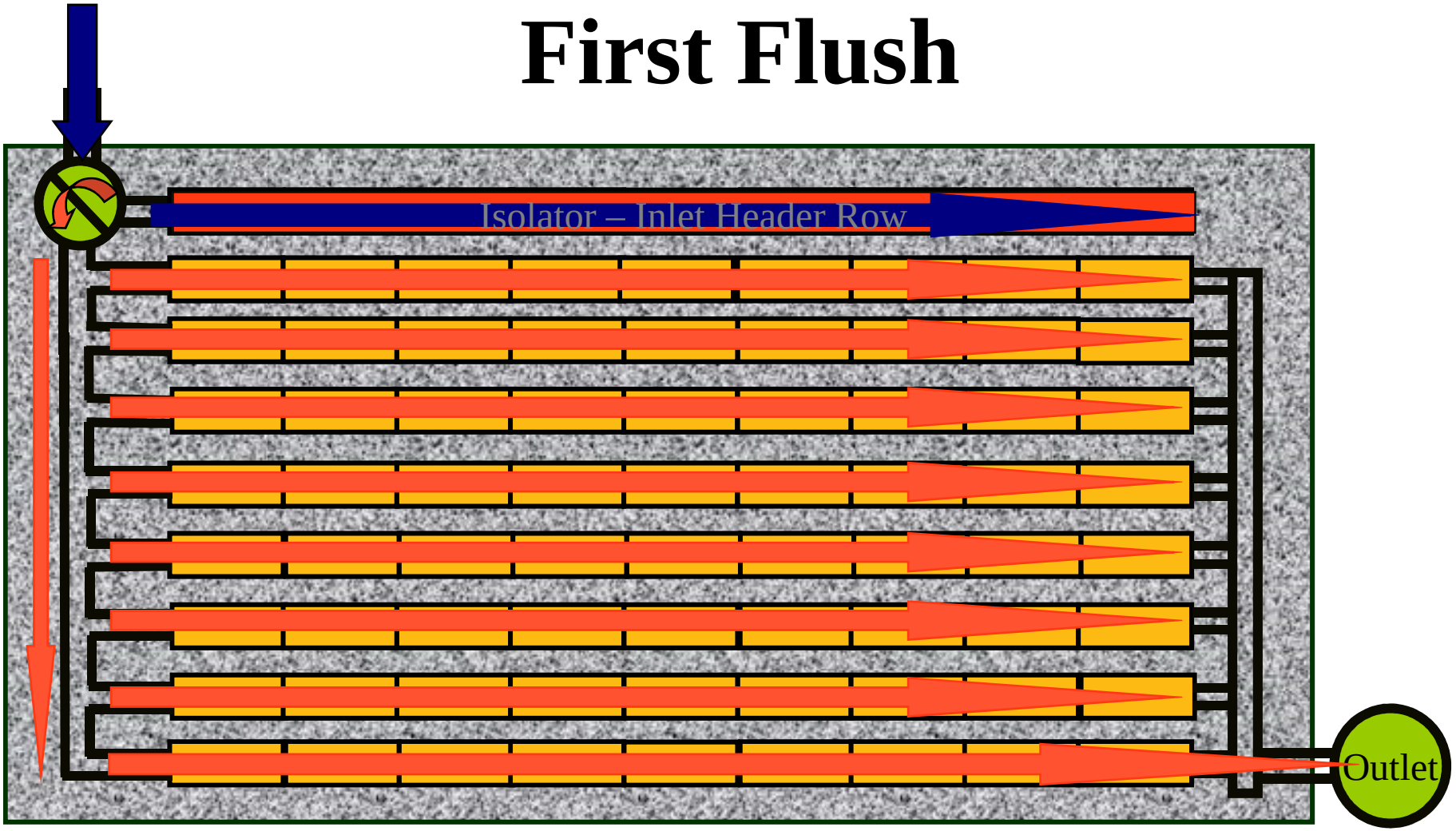
OVERVIEW

The MC-3500 chamber is manufactured from polypropylene (PP) by the injection molding process. The chamber is arch shaped with a corrugated profile (Figure 1). The chamber has a nominal height of 45 in., a nominal width of 76 in., and an overall length of 90 in. Chamber walls have a nominal thickness of 0.23 in. Installation of the MC-3500 is generally similar to the SC-740 chambers. The chambers will be installed in rows, with clear spacing of 6 in. between the feet of adjacent parallel chambers but with a minimum of 24 in. clear spacing between perpendicular chambers.

Figure 1 – MC-3500 Chamber

The MC-3500 end cap (Figure 2) is manufactured from polyethylene (PE) sheet by thermoforming. It has a smooth inside surface without intermediate stiffening ribs. The end cap latches over the end corrugation of the chamber as shown in the latch detail in Figure 2.

First Flush



Water Quality Expectations

Non-woven fabric on top

Woven fabric on bottom

Water Quality Expectations

- February 23, 2005 - Tennessee Tech University summarized laboratory testing on the Isolator Row in accordance with Maine DEP testing protocol. Tests demonstrated the following:
  - 95% TSS overall removal at 8.1 gpm/sqft for US Silica OK-110 (110 micron).
  - 80% captured on fabric.

- October 20, 2006 - Tennessee Tech University summarized laboratory testing on the Isolator Row in accordance with New Jersey Center for Advanced Technologies (NJCAT) testing protocol. Tests demonstrated the following:
  - 60% TSS Removal at 3.2 gpm/sqft for Sil-Co-Sil 106 with accumulated fines (D_{50} = 10 microns)
  - 66% TSS Removal at 3.2 gpm/sqft for Sil-Co-Sil 106 (D_{50} = 22 microns)
  - 71% TSS Removal at 3.2 gpm/sqft for Sil-Co-Sil 250 (D_{50} = 45 microns)
  - 88% TSS Removal at 1.7 gpm/sqft for Sil-Co-Sil 250 (D_{50} = 45 microns)

- August, 2007 – NJCAT summarized its third party evaluation of the Tennessee Tech test results and produced the "NJCAT Technology Verification Report StormTech Isolator Row". Their verification is summarized as follows:

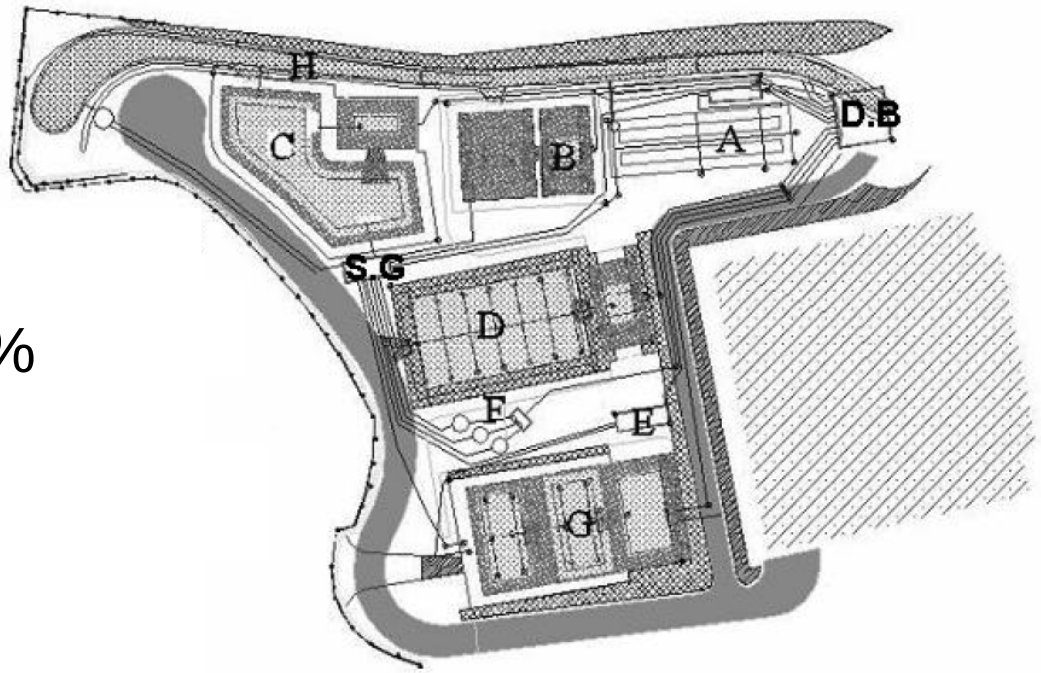
    - **Claim 1:** A StormTech® SC-740 Isolator™ Row, sized at a treatment rate of no more than 2.5 gpm/ft^2 of bottom area, using two layers of woven geotextile fabric under the base of the system and one layer of non-woven fabric wrapped over the top of the system and a mean event influent concentration of 270 mg/L (range of 139 – 361 mg/L) has been shown to have a TSS removal efficiency (measured as SSC) of at least 60% for SIL-CO-SIL 106, a manufactured silica product with an average particle size of 22 microns, in laboratory studies using simulated stormwater.

    - **Claim 2:** A StormTech® SC-740 Isolator™ Row, sized at a treatment rate of no more than 2.5 gpm/ft^2 of bottom area, using two layers of woven geotextile fabric under the base of the system and one layer of non-woven fabric wrapped over the top of the system and a mean event influent concentration of 318 mg/L (range of 129 – 441 mg/L) has been shown to have a TSS removal efficiency (measured as SSC) of 84% for SIL-CO-SIL 250, a manufactured silica product with an average particle size of 45 microns, in laboratory studies using simulated stormwater.

Water Quality Expectations

- **Claim 3:** A StormTech® SC-740 Isolator™ Row, sized at a treatment rate of no more than 6.5 gpm/ft^2 of bottom area, using a single layer of woven geotextile fabric under the base of the system and one layer of non-woven fabric wrapped over the top of the system and a mean event influent concentration of 371 mg/L (range of 116 – 614 mg/L) has been shown to have a TSS removal efficiency (measured as SSC) of greater than 95% for OK-110, a manufactured silica product with an average particle size of 110 microns, in laboratory studies using simulated stormwater.

Water Quality Expectations



- TSS – 80%
- Hydrocarbons – 90%
- Zinc– 53%
- Phosphorus– 49%

June 2008 – The University of New Hampshire Stormwater Center
Field Test

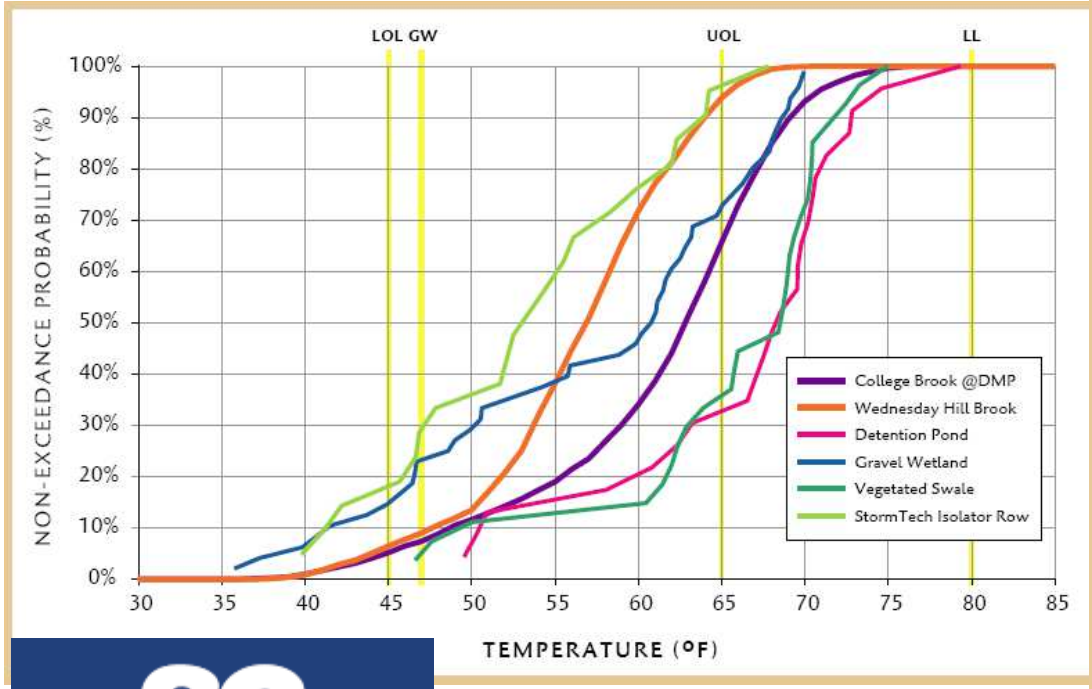
Water Quality Expectations

Filtration and infiltration systems **showed the strongest ability to reduce temperature variations.** The gravel wetland, the ADS (Advanced Drainage Systems™) Infiltration System, and the StormTech Isolator Row have a strong capacity to reduce temperatures of runoff.

The two subsurface infiltration systems, ADS and STIR, are the only systems with mean July temperatures within the optimum zone of 45°F to 65°F for coldwater aquatic species. All other systems result in runoff within the stress zone for aquatic species, between 65°F and 80°F.

The Gravel Wetland, the ADS infiltration system, and the Isolator Row systems have the lowest exceedance values of the UOL at 13.0%, 5.0%, 1.5% respectively.

Water Quality Expectations



Comparison of summer temperatures for two streams: Wednesday Hill Brook (unimpacted) and College Brook (impacted); a wet and dry pond, a gravel wetland, and subsurface infiltration (Stormtech Isolator Row) with environmental indicators for cold water fisheries:

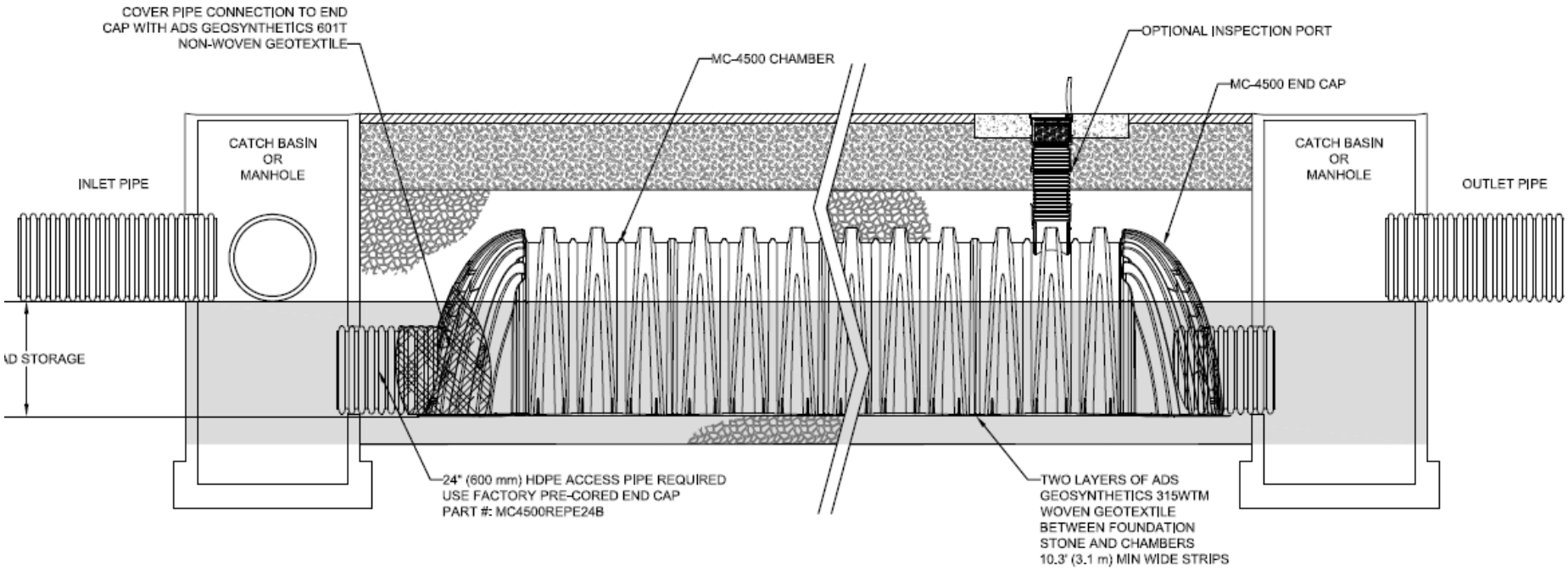
Average Annual Groundwater Temperature (GW) = 47°F

Lower Optimum Limit (LOL) = 45°F

Upper Optimum Limit (UOL) = 65°F

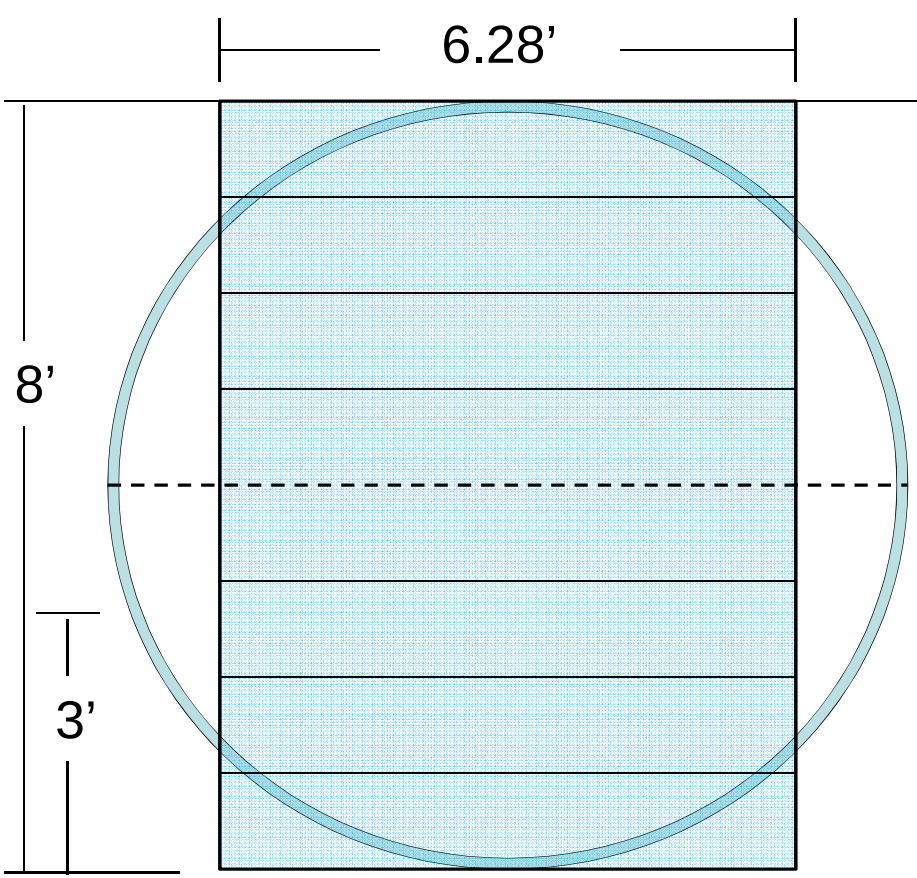
Lethal Limit (LL) = 80°F

Water Quality Expectations



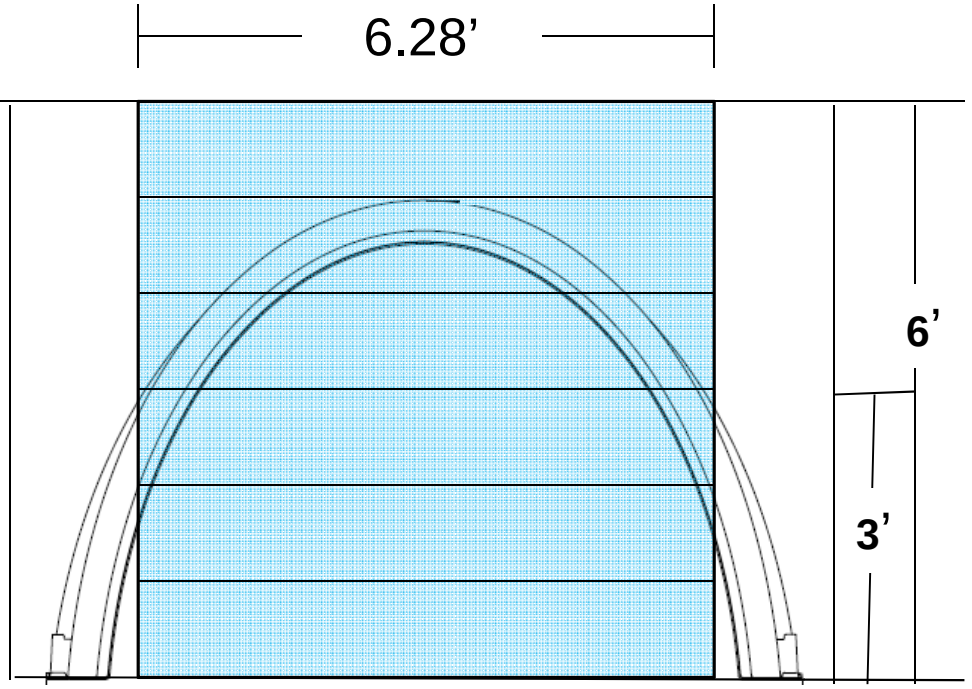
Modeling in WinSLAMM

Water Quality Expectations



96” CMP

50.26 CF/LF ÷8’ = 6.283’

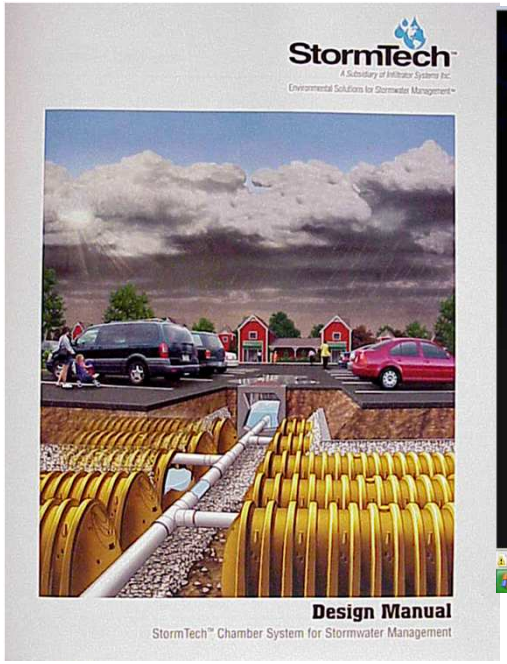


MC4500

37.68 CF/LF ÷6’ = 6.28

Support Materials

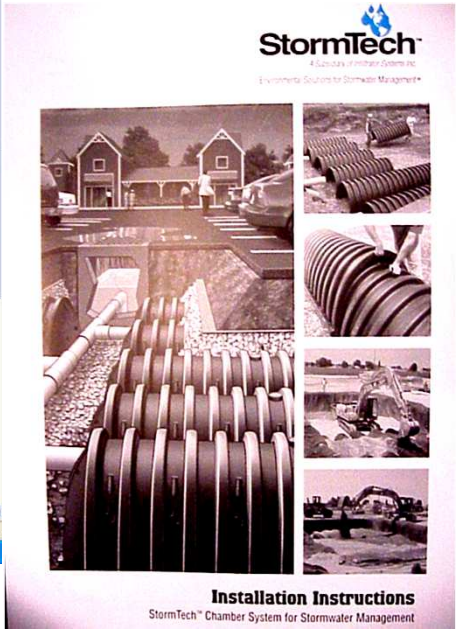
Design Manual



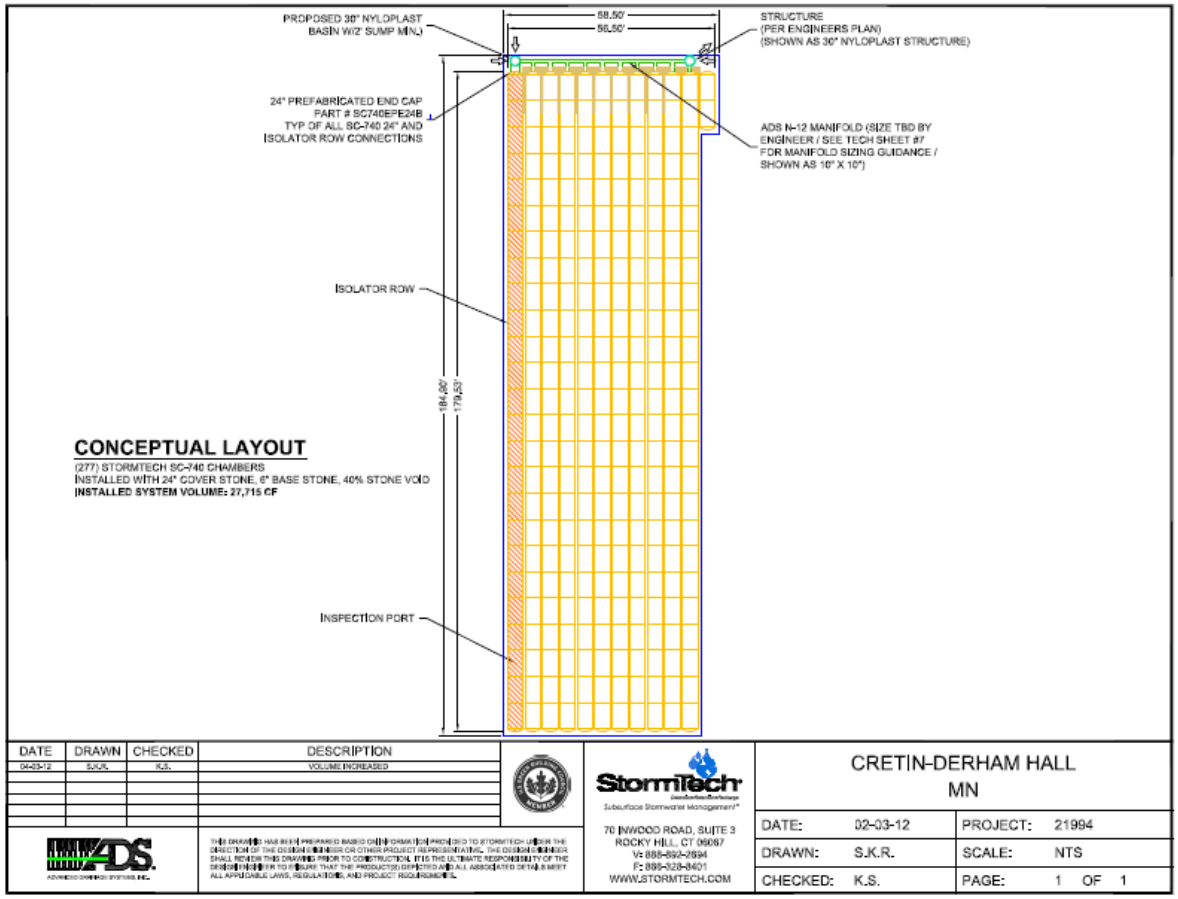
Web Site

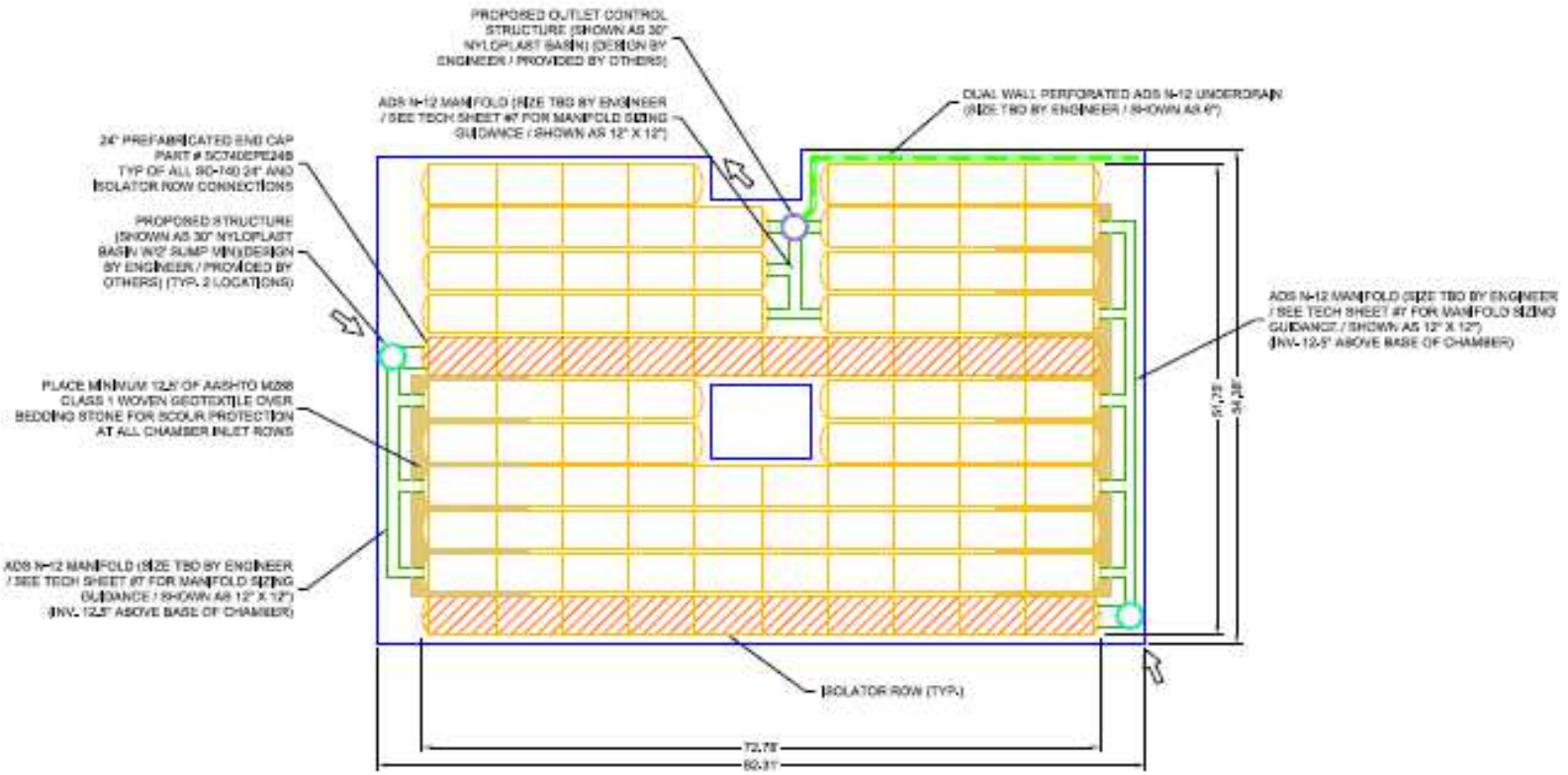
NEW 11/10/08

Installation Instructions



Cretin Durham Hall – St. Paul





PROPOSED ELEVATIONS

MAX. GRADE (TOP OF PAVEMENT/UNPAVED):	915.30
MIN. GRADE (UNPAVED WITH TRAFFIC):	908.50
MIN. GRADE (BASE OF FLEXIBLE PAVEMENT/UNPAVED):	908.50
MIN. GRADE (TOP OF REINFORCED CONCRETE PAVEMENT):	908.50
TOP OF STONE:	907.50
TOP OF CHAMBER:	907.30
12" TOP FEEDING MANIFOLD INVERT:	906.64
12" BOTTOM FEEDING MANIFOLD INVERT:	894.20
24" INVERT TO ISOLATOR ROW(S):	894.81
BOTTOM OF CHAMBER:	894.80
BOTTOM OF STONE:	894.30
UNDERDRAIN:	894.31

CONCEPTUAL LAYOUT

(101) STORMTECH SC-740 CHAMBERS
INSTALLED WITH 6" COVER STONE, 6" BASE STONE, 40% STONE VOID
INSTALLED SYSTEM VOLUME (PERIMETER STONE INCLUDED) = 7,983 CF
(6" COVER STONE NOT INCLUDED IN VOLUME AMOUNT)

DATE	DRAWN	CHECKED	DESCRIPTION
11-02-12	S.K.R.	K.S.	RELOCATED CHAMBERS DUE TO LIGHT POLE

ADS

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO STORMTECH UNDER THE DIRECTION OF THE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

StormTech
Subsurface Stormwater Management
70 INWOOD ROAD, SUITE 3
ROCKY HILL, CT 06067
V: 888-892-2694
F: 866-328-8401
WWW.STORMTECH.COM

KNOLLWOOD CROSSINGS
MN

DATE:	09-20-12	PROJECT:	29826
DRAWN:	S.K.R.	SCALE:	NTS
CHECKED:	K.S.	PAGE:	1 OF 1

Knollwood Crossing, St. Louis Park

Dock Street Apartments, Minneapolis

Dock St. Apartments, Minneapolis

NOTES FOR INSTALLATION OF MC-3500 CHAMBER SYSTEM:

1. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
2. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
3. MAINTAIN MINIMUM - 9" SPACING BETWEEN THE CHAMBER ROWS.
4. END CAPS SHALL BE FASTENED TO CHAMBERS WITH (3) 2-1/2" COURSE THREAD SCREWS.
5. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM 12" INTO CHAMBER END CAPS.
6. EMBEDMENT STONE SURROUDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4"-2" MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4

CONTACT STORMTECH:

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

NOTES FOR CONSTRUCTION EQUIPMENT:

1. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE MC-3500/MC-4500 STORMTECH CONSTRUCTION GUIDE.
2. THE USE OF EQUIPMENT OVER MC-3500 CHAMBERS IS LIMITED:
   A. NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS
   B. NO RUBBER TIRED LOADER, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE MC-3500/MC-4500 STORMTECH CONSTRUCTION GUIDE.
   C. WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE MC-3500/MC-4500 STORMTECH CONSTRUCTION GUIDE.
3. STONE MUST BE PLACED EVENLY ON BOTH SIDES OF CHAMBERS TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING AND ALIGNMENT.
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5. DUMP TRUCKS OR LOADERS SHALL NOT DUMP STONE DIRECTLY ON THE BED.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

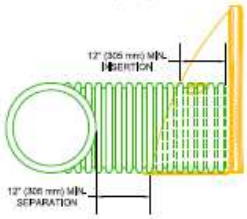
PROPOSED ELEVATIONS

MAX. GRADE (TOP OF PAVEMENT/UNPAVED):	830.80
MIN. GRADE (UNPAVED WITH TRAFFIC):	828.80
MIN. GRADE (BASE OF FLEXIBLE PAVEMENT/UNPAVED):	828.30
MIN. GRADE (TOP OF REINFORCED CONCRETE PAVEMENT):	828.30
TOP OF STONE:	825.30
TOP OF CHAMBER:	824.30
12" TOP FEEDING MANIFOLD INVERT:	822.75
15" TOP MANIFOLD INVERT:	822.50
24" INVERT TO ISOLATOR ROW(S):	820.72
12" BOTTOM FEEDING MANIFOLD INVERT:	820.66
BOTTOM OF CHAMBER:	820.55
BOTTOM OF STONE:	819.80

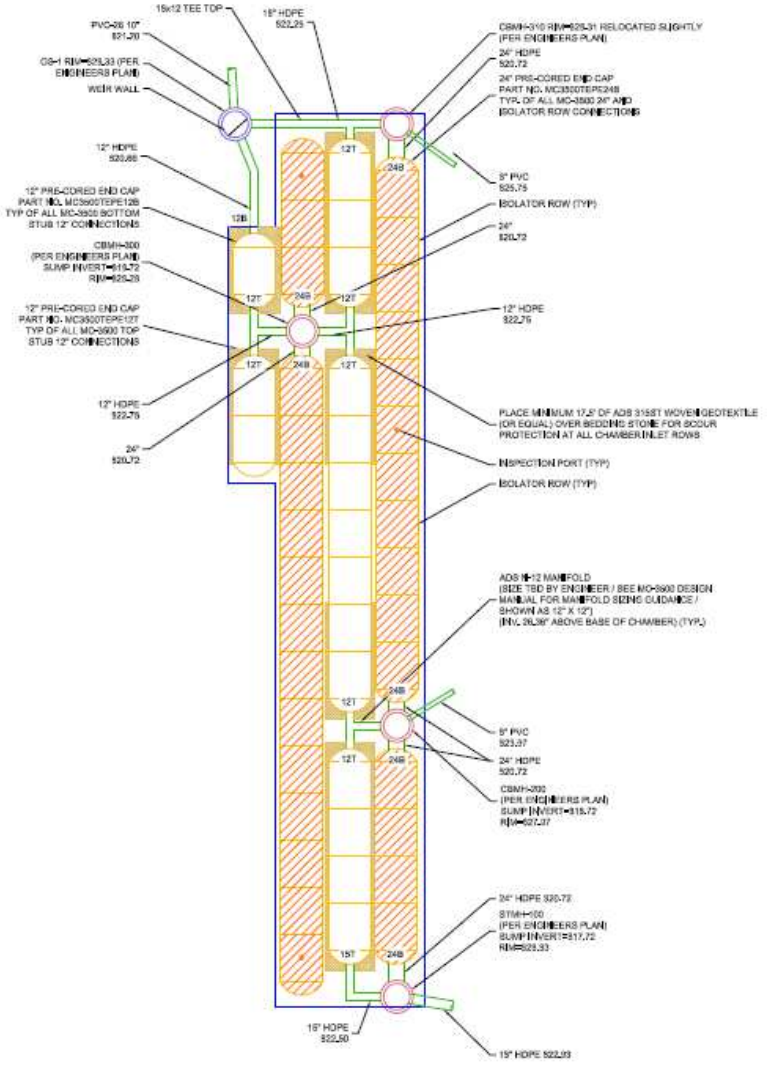
PROPOSED LAYOUT

(48) STORMTECH MC-3500 CHAMBERS
(18) STORMTECH MC-3500 END CAPS
INSTALLED WITH 12" COVER STONE, 9" BASE STONE, 40% STONE VOID
INSTALLED SYSTEM VOLUME (PERIMETER STONE INCLUDED): 10,718 CF

MC-3500 MANIFOLD INSERTION & SEPARATION DETAIL (NTS)



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN THE END CAP OPENING.



THE DOCK ST APTS.
MINNEAPOLIS, MN

DATE: 11-4-12 | PROJECT #: 21365
DRAWN BY: JTL | SCALE: NTS
CHECKED BY: | PAGE: 1 OF 5

DESCRIPTION | DATE | DRN | CHK

StormTech
Subsurface Stormwater Management
70 Mitchell Road, Suite B | Oxford, CT 06478
800-555-6720 | 888-892-2694 | www.stormtech.com

ADS

Schmidt Brewery Lofts, St. Paul

Schmidt Brewery Lofts, St. Paul

Chick-fil-A, Bloomington

Scenic Heights Elementary, Deephaven

Calhoun Greenway
Minneapolis

Walmart, Roseville

Walmart, Roseville

Walmart, Roseville

Byerly's, Edina

Hansen Center, Duluth

Pequot Lakes High School

Knollwood Crossing

Dock St. Apartments, Minneapolis

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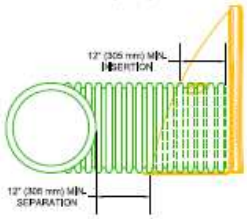

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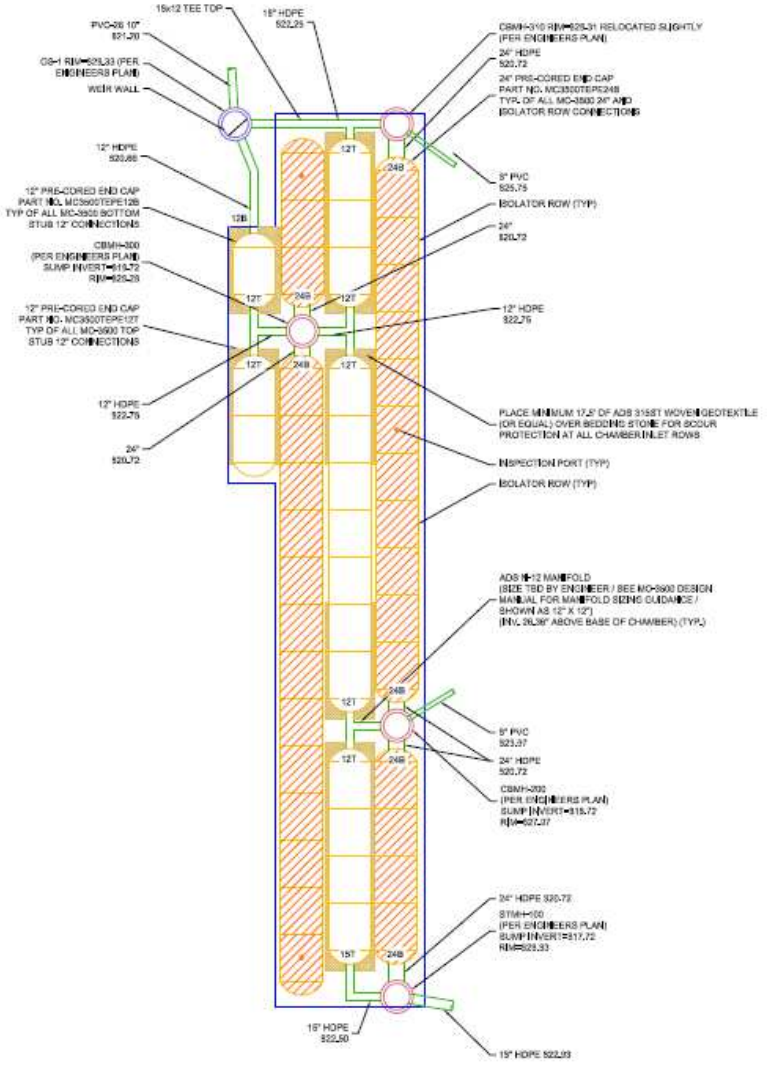

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ADS

StormTech®
Detention • Retention • Water Quality
Division of ADS

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