FWWA Conference | 03.06.2018

WATER MANAGEMENT SOLUTIONS

Jason Forgette – Senior Sales Representative

- BA – Business Marketing from Northern Michigan University – Marquette, MI
- 22 years in Water and Sewer supply
- Member: APWA, LAPWA, WRWA, WCHA, WUCA

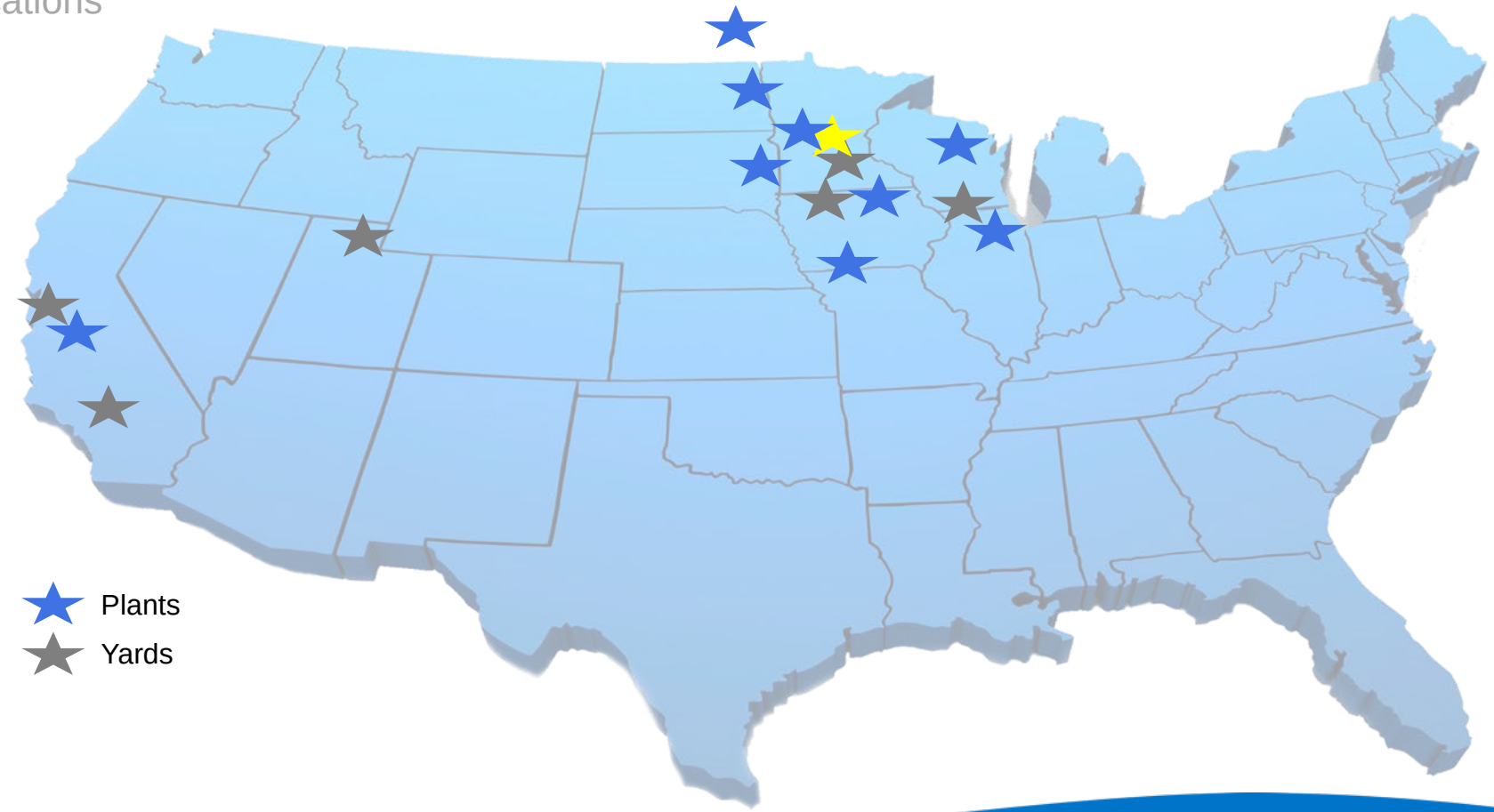
Trevor Sorensen – Application Engineer

- B.S. Degree in Civil Engineering from NDSU
- Product application support for Stormwater Market
- Bartlett & West Intern 2015

Agenda

1. Prinsco's History
2. Stormwater Products
   - Pipe
   - Treatment
   - Storage
3. Case Study: Cerebral Palsy, INC.
   - Submittal
   - Installation
4. Prinsco's Resources

Locations



Parent Company

DUININCK MINNESOTA

DUININCK GOLF

DUININCK TEXAS

DC Duininck Concrete

IN HARVEST
Whole Grains, Rice and Legumes

PRINSCO
ENGINEERED WITH INTEGRITY

Hart Ranch DEVELOPMENT COMPANY

MIDWEST OUTDOOR RESORTS
ADVENTURE AWAITS

GOLDFLO WT®

AASHTO Dual-Wall Pipe

4" – 60"

ASTM F2306
ASTM D3212 10.8 psi
ASTM F477
ASTM F2648

AASHTO M252
AASHTO M294

ECOFLO® 100

Recycled Dual-Wall Pipe

4" – 60"

ASTM F2306
ASTM D3212 10.8 psi
ASTM F477
ASTM F2648

AASHTO M252
AASHTO M294

GOLDPRO STORM™

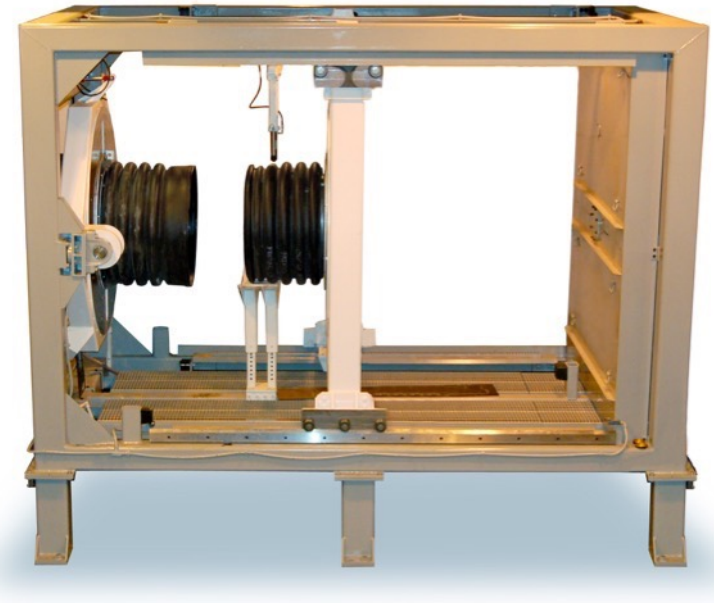
Dual-Wall HP Polypropylene Pipe

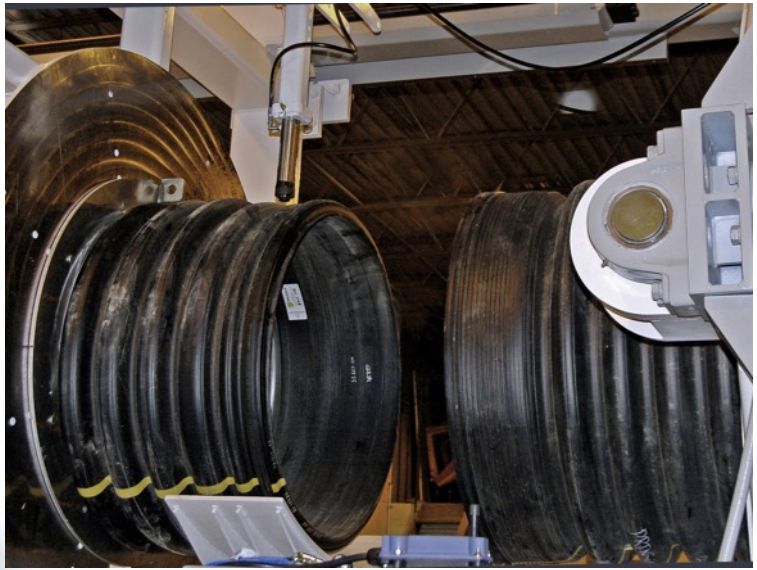
12" – 60"

ASTM F2881
ASTM D3212 10.8 psi
ASTM F477

AASHTO M330

Testing Facilities



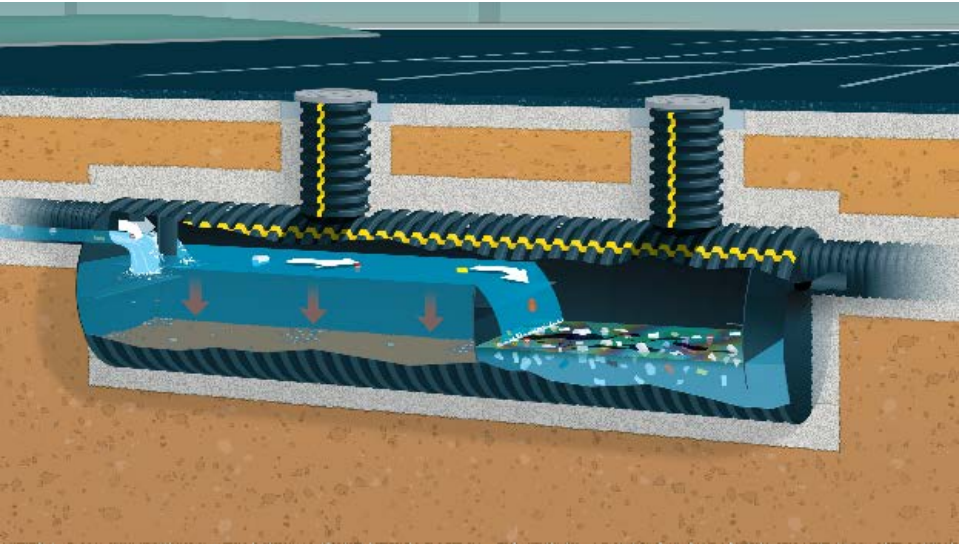


STORMWATER QUALITY

Dual-Wall

36" – 60"

ASTM F2306
ASTM 477
ASTM D3212



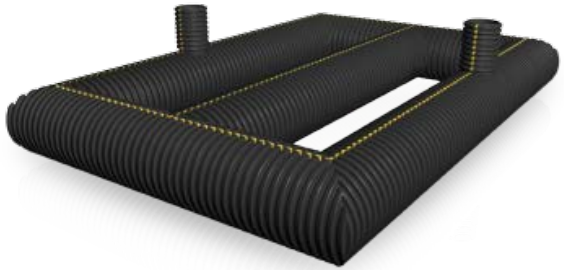
STORMWATER QUALITY

Dual-Wall

- Fabricated dual-wall pipe
- Removes debris in runoff: trash, sediment, oils, & suspended solids
- 80% TSS removal
- 80% oils & grease removal
- 36 – 60” units in 20-40’ lengths
- Flow rates based on desired particle size removal

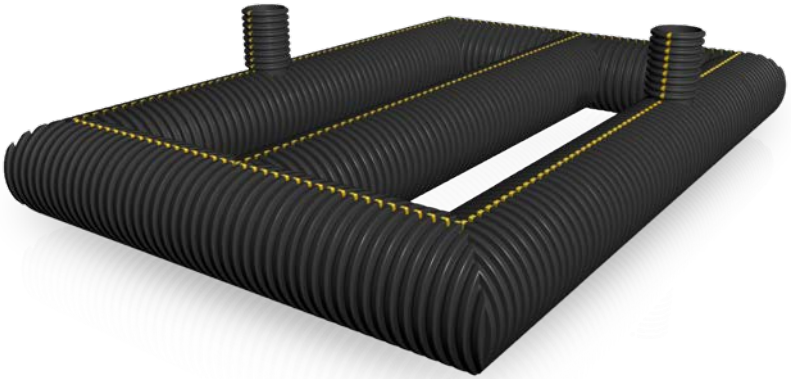
HYDROSTOR™

Arched Stormwater Chambers



UNDERGROUND DETENTION

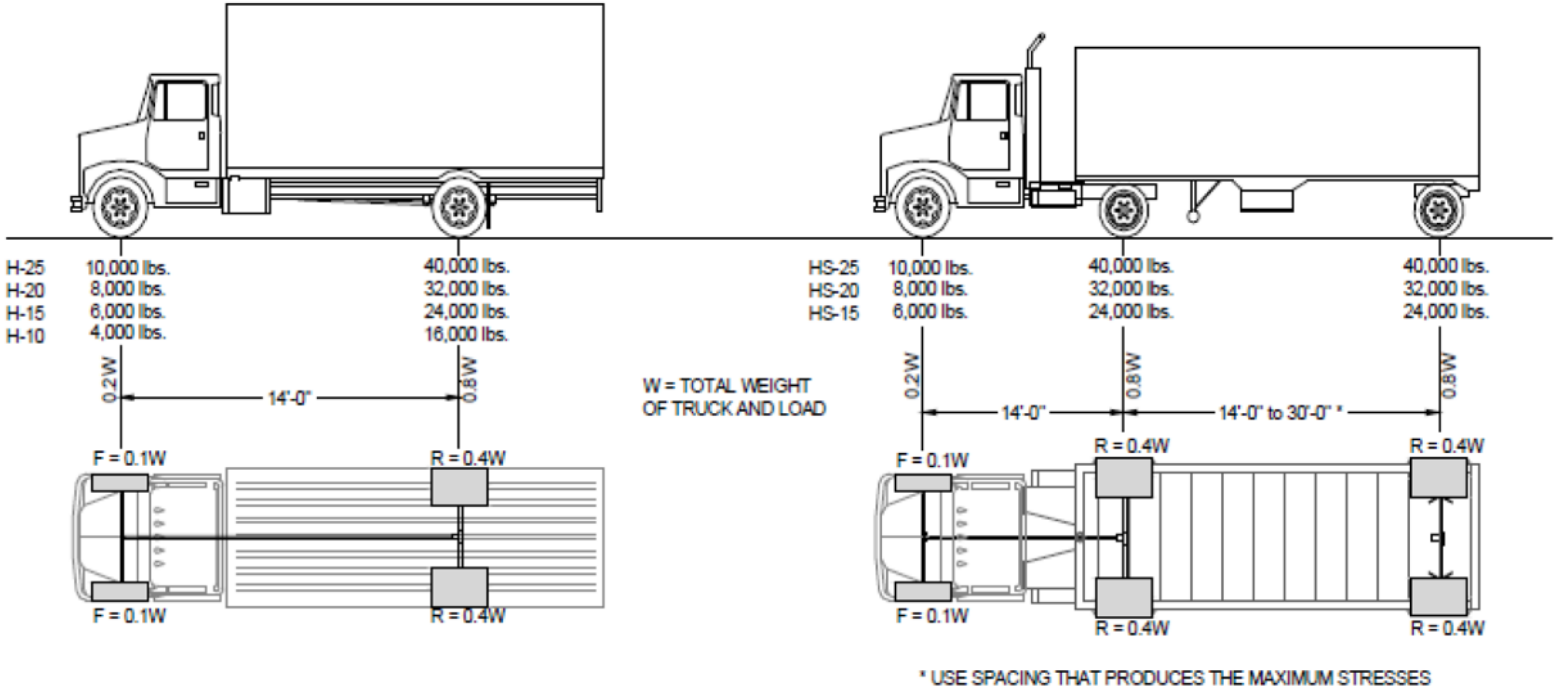
Customized Dual-wall Pipe Systems



UNDERGROUND DETENTION

Customized Dual-wall Pipe Systems

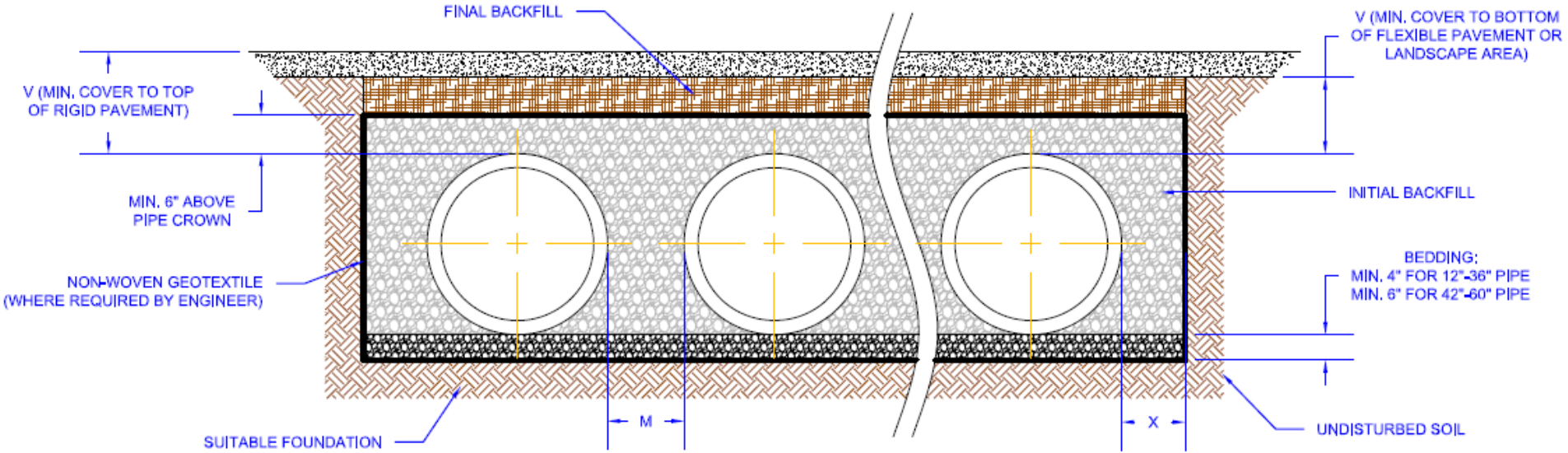
- Retention allows for groundwater recharge
- Detention detains and then releases to system
- Customizable to project needs
- Up to 60” GOLDFLO or GOLDFLO WT
- Perforated to accommodate stone void volume
- Optional risers for man-entry & cleanouts
- Proven performance under H-20 & H-25 loading



AASHTO
THE VOICE OF TRANSPORTATION

Source: AASHTO Standard Specifications for Highway Bridges

Pipe Installation



Soil Classification		Min.	Max.*	Description
ASTM D2321	ASTM D2487	Compaction Standard Density (%)	Layer Height	
Class I	–	Dumped**	18"	Graded or crushed stone Crushed gravel
Class II	GW GP SW SP	85%	12"	Well-graded sand, gravel & gravel/sand mixtures Poorly graded sand, gravel & gravel/sand mixtures Little or no fines
Class III	GM GC SM SC	90%	9"	Silty or clay-like gravel Gravel/sand/silt or gravel/clay mixtures Silty or clay-like sands Sand/clay or sand/silt mixtures

WATER MANAGEMENT SOLUTIONS

HydroStor™

Stormwater Chambers

HydroStor™ HS180		HydroStor™ HS75
180 ft³/chamber	Installed Storage Capacity*	75 ft³/chamber
45.5"	Height	30"
77.8"	Width	51"
88.7"	Unit Length	87.1"
85.3"	Installed Length	84.9"
127 lbs	Weight	70 lbs
17	Chambers/Pallet	32
Polypropylene	Material	Polypropylene
Injection Molding	Mfg. Process	Injection Molding
Integrated Handle	Special Features	Integrated Handles
Meets or Exceeds	ASTM Standards	Meets or Exceeds

* Assuming 40% void volume of backfill with 9" bedding & 12" cover for HS180 and 6" bedding & 6" cover for HS75

HydroStor™

Designed to meet or exceed:

ASTM F2418: Product Standard

- Standard Specification for Polypropylene (PP) Corrugated Wall Stormwater Collection Chambers

ASTM F2787: Design Standard

- Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers

WATER MANAGEMENT SOLUTIONS

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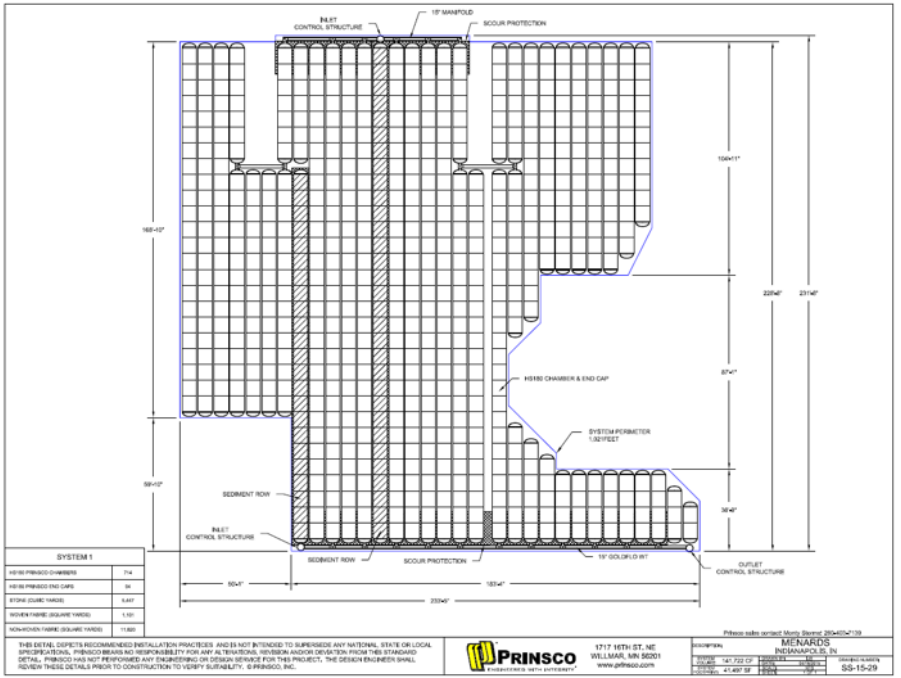
Storage

RETENTION/DETENTION COST COMPARISONS

		100 Year Service Life					
		SC310 Small Chamber 15"Hx34" W	ChamberMaxx Medium Chamber 30.3"Hx51.4"W	SC740 Medium Chamber 30"Hx51"W	**HS75** Medium Chamber 30"Hx51"W	MC3500 Large Chamber 45"Hx77" W	**HS180** Large Chamber 45.5"Hx77.8"W
Pipe Dia or Chamber Width (in) =	-	34	51.4	51	51	77	77.8
Chamber Height (in) =	-	16	30.3	30	30	45	45.5
Aggregate Below (in) =	-	6	6	6	6	9	9
Aggregate Above (in) =	-	6	6	6	6	12	12
Aggregate Side (in) =	-	3	6	6	6	9	8
Inside Volume (CF/LF) =	-	**2.07**	**6.93**	**6.45**	**6.56**	**15.33**	**15.98**
Excavation (CF/LF) =	-	7.19	16.86	16.63	16.63	39.42	39.62
Aggregate (CF/LF) =	-	5.12	9.93	10.18	10.07	24.09	23.64
Stone Porosity Volume (CF/LF) =	-	**2.29**	**3.85**	**4.07**	**3.98**	**9.63**	**9.34**
TOTAL VOLUME (CF/LF) =	-	**4.36**	**10.78**	**10.52**	**10.54**	**24.96**	**25.32**
Excavation Costs ($/CY) =	**$15.00**						
Excavation Costs ($/CF) =	$0.56	$4.00	$9.37	$9.24	$9.24	$21.90	$22.01
Excavation Costs ($/ton) =	$10.10						
Aggregate Costs ($/CY) =	**$30.00**						
Aggregate Costs ($/CF) =	$1.11	$5.69	$11.03	$11.31	$11.18	$26.76	$26.27
Aggregate Costs ($/ton) =	$18.52						
Pipe Material Cost ($/LF) =	-	-	-	-	-	-	-
Chamber Material Cost ($/Chamber) =	-	**$125.00**	**$225.00**	**$200.00**	**$200.00**	**$400.00**	**$400.00**
Chamber Material Cost ($/LF) =	-	**$17.61**	**$31.69**	**$28.17**	**$28.17**	**$56.34**	**$56.34**
Pipe Installation ($/LF) =	-	-	-	-	-	-	-
Chamber Installation ($/LF) =	-	$8.80	$15.85	$14.08	$14.08	$28.17	$28.17
(not including headers) TOTAL COSTS ($/LF) =	-	$36.10	$67.94	$62.80	$62.67	$133.17	$132.79
DESIGN VOLUME REQUIRED (CF) =	**10,000**						
Pipe + Headers Required (LF) =	-	-	-	-	-	-	-
Chambers Required (LF) =	-	2,294	928	951	949	401	395
Chambers Required (# of Chambers) =	-	323	131	134	134	56	56
Estimated Header Components Required (LF) =		-	-	-	-	-	-
Pipe Laterals Required (LF) =		-	-	-	-	-	-
Pipe Laterals ($) =		-	-	-	-	-	-
Chambers ($) =		$40,380	$29,397	$26,777	$26,726	$22,571	$22,250
Header/End Cap Components ($) =		$2,019	$2,352	$1,607	$1,604	$2,257	$2,225
MATERIAL COSTS FOR VOLUME REQUIRED ($) =	-	**$42,399**	**$31,749**	**$28,383**	**$28,329**	**$24,828**	**$24,475**
MATERIAL COSTS FOR VOLUME REQUIRED ($/CF) =	-	**$4.24**	**$3.17**	**$2.84**	**$2.83**	**$2.48**	**$2.45**
Footprint Required (SF) =	-	7,072	4,437	4,515	4,507	2,871	2,824
Depth Required (FT) =		2.33	3.53	3.50	3.50	5.50	5.54
Excavation Required (CF) =	-	16,501	15,641	15,803	15,773	15,792	15,649
Excavation Required (CY) =		611	579	585	584	585	580
Aggregate Required (CF) =	-	11,753	9,213	9,672	9,549	9,650	9,338
Aggregate Required (CY) =	-	435	341	358	354	357	346
INSTALLED COSTS FOR VOLUME REQUIRED ($) =	-	**$82,796**	**$63,022**	**$59,691**	**$59,462**	**$53,353**	**$52,445**
INSTALLED COST FOR VOLUME REQUIRED ($/CF) =	-	**$8.28**	**$6.30**	**$5.97**	**$5.95**	**$5.34**	**$5.24**



Cerebral Palsy, Inc. / Aquatic Center Parking Lot

- Featured in Stormwater Magazine
- Green Bay, Wisconsin
- HydroStor 75 Retention System
- Engineer: Robert E. Lee
- Contractor: Keller Inc.

the installation of the underground stormwater detention system for Keller Inc.

The approximately 21,404-square-foot addition was designed by Somerville Inc. in Green Bay and built by Keller in Kaukauna, WI. Keller also built or reconstructed the driveways, parking lots, sidewalks, and utilities that serve the facility.

The project impacts approximately 2.2 acres of the site, according to the stormwater management and erosion control plan provided by Patrick Kuehl, who designed the detention system. Kuehl is a civil engineer with Robert E. Lee & Associates Inc. in Green Bay.

Among the factors that Kuehl considers when he's designing a stormwater detention system are the soil type, the slope, the volume of water the site is expected to receive during a 2-year and 100-year storm, the cost, and how the system fits geometrically into the space.

"Finding a system that would fit into the space available at this site was a challenge," he says. "There is virtually no green space."

HydroStor HS75 chambers and GoldFlo WT pipes from Prinsco Inc. in Willmar, MN, were chosen. According to Prinsco, the HDPE chambers hold 7.5 cubic feet of stormwater each and are designed for maximum land utilization and minimum environmental impact. The dual-wall HDPE pipes form the inlet and outlet manifolds. They have watertight integral gasket bell and spigot coupling systems for optimum flow.

The detention chambers are located under the existing parking lot. Their area is 2,673 square feet and the chambers provide a volume of 5,332 cubic feet of storage. They will be largely empty most of the time.

Stormwater from the roof of the building and from the roadway around the building enters catch basins and storm manholes with sumps that collect sediment and phosphorus.

"There was no need for a sediment retention chamber," says Wildenberg. "It's basically a clear water system. All of the surface areas that will ultimately shed water to this system are not subject to accumulating sediment. All water that will be collected will have hard surfaces to run on—that is, the private paved roadway around the building, and the roof of the building."

After this sump treatment, water enters a flow control manhole that directs runoff from up to the 2-year design storm to a 12-inch pipe that discharges to the underground storage chambers. This stormwater is released slowly to a Village of Allouez storm sewer system that carries the water to village-owned Heritage Hill Stormwater Pond for further treatment.

Once the 12-inch pipe reaches maximum capacity, any additional flow is diverted to a 15-inch pipe which discharges to a roadside ditch that carries all of the runoff exceeding the capacity of the underground chambers to the East River.

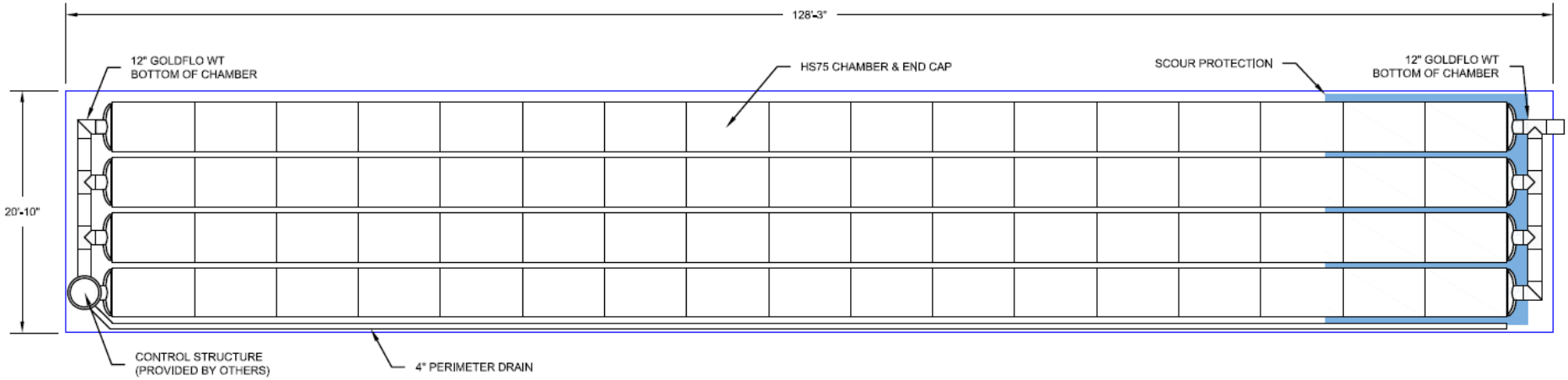
"We really had to coordinate with the village regarding pretreating and reducing the flow of the stormwater," says Kuehl. "It was challenging, but working with the village, we came to a solution. The village benefits, too. They were able to redirect stormwater from an adjacent parcel to the pond, increasing the area of development treated by the Heritage Hill Stormwater Pond."

The site posed its own challenges. Space was limited and the center had to remain open during the installation, he says.

In addition, notes Wildenberg, there was little difference between the elevation of the site and of the stormwater treatment pond, so the

HydroStor chambers installed beneath a parking lot

Case Study: Cerebral Palsy, INC. – Site Plans



68 chambers + 8 end caps = Storage volume of 5,679 cubic feet

Cerebral Palsy, INC.
Submittal Packet

PRINSCO
ENGINEERED WITH INTEGRITY™

CEREBRAL PALSY, INC.

GREEN BAY, WI

HYDROSTOR HS75 STORMWATER CHAMBER SYSTEM

STORMWATER CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE HYDROSTOR HS75 OR APPROVED EQUIVALENT.
2. CHAMBERS SHALL BE MADE FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORT PANELS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
4. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
5. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS."
6. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. THE CHAMBER MANUFACTURER SHALL SUBMIT THE FOLLOWING UPON REQUEST TO THE SITE DESIGN ENGINEER FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE:
   A. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY AASHTO FOR THERMOPLASTIC PIPE.
   B. A STRUCTURAL EVALUATION SEAL BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET, THE 50 YEAR CREEP MODULUS DATA SPECIFIED IN ASTM F2418 MUST BE USED AS PART OF THE AASHTO STRUCTURAL EVALUATION TO CERTIFY LONG-TERM PERFORMANCE.
   C. STRUCTURAL CROSS SECTION DETAIL ON WHICH THE STRUCTURAL EVALUATION IS BASED.
7. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

NOTES:

1. PRIOR TO BEGINNING INSTALLATION OF HYDROSTOR STORMWATER CHAMBERS, A PRECONSTRUCTION MEETING SHALL BE HELD WITH A PRINSCO REPRESENTATIVE AND THE INSTALLERS.
2. HYDROSTOR STORMWATER CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE PRINSCO "HYDROSTOR CONSTRUCTION GUIDE."
3. HYDROSTOR STORMWATER CHAMBERS SHALL NOT BE INSTALLED ON WET OR UNSTABLE FOUNDATION OR SUBGRADE. FOUNDATION STONE MUST BE LEVEL AND COMPACTED.
4. PRINSCO RECOMMENDS PRETREATMENT OF STORMWATER RUNOFF USING A PRINSCO STORMWATER QUALITY UNIT AND/OR A SEDIMENT ROW.
5. MAINTAIN MINIMUM SPACING BETWEEN CHAMBERS: 6" FOR HS75 AND 8" FOR HS180.
6. CONSTRUCTION EQUIPMENT SHALL NOT BE SITUATED ATOP THE CHAMBERS UNTIL SUFFICIENT COVER HAS BEEN ACHIEVED. DUMP TRUCKS, RUBBER TIRE LOADERS, EXCAVATORS, WHEEL OR ROLLER LOADS ARE NOT ALLOWED UNTIL PROPER FILL HEIGHTS HAVE BEEN ACHIEVED, REFER TO PRINSCO "HYDROSTOR CONSTRUCTION GUIDE" FOR SPECIFIC LOADING CRITERIA.
7. EMBEDMENT BACKFILL MUST BE PLACED USING THE FOLLOWING METHODS ONLY:
   - BACKFILL WITH AN EXCAVATOR LOCATED OUTSIDE THE EXCAVATION
   - BACKFILL WITH A STONE SHOOTER LOCATED OUTSIDE THE EXCAVATION
   - BACKFILL AS ROWS ARE BUILT WITH AN EXCAVATOR ON THE SUBGRADE OR FOUNDATION STONE
8. EMBEDMENT BACKFILL SHALL NOT BE PLACED USING THE "DUMP AND PUSH" METHOD. THIS MAY CAUSE DAMAGE TO THE CHAMBERS, WILL RESULT IN IMPROPER INSTALLATION AND WILL VOID THE PRINSCO STANDARD WARRANTY.
9. ONCE SUFFICIENT COVER IS ACHIEVED (12" FOR HS180; 6" FOR HS75), GRADING MAY COMMENCE WITH A SMALL DOZER OR SKID LOADER (LESS THAN 4.5 PSI GROUND PRESSURE). EQUIPMENT SHALL ALWAYS TRAVEL PARALLEL TO CHAMBER ROWS. SEE PRINSCO "HYDROSTOR CONSTRUCTION GUIDE" FOR SPECIFIC LOADING CRITERIA.

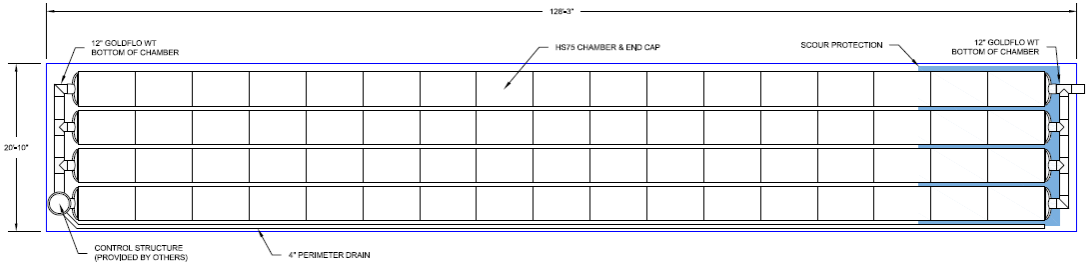
PROJECT INFORMATION:

- PROJECT NUMBER: 17-056
- PRINSCO SALES CONTACT: Jason Forgette: 320-444-4603
- ENGINEER:
- CONTRACTOR:

THE UNDERSIGNED HEREBY APPROVES THE ATTACHED (6) PAGES

CUSTOMER _____ DATE _____

Cerebral Palsy, INC.
Submittal Packet



TYPICAL ELEVATIONS - HS75 BEDS (ft)

MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	657.47
MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	651.47
MINIMUM ALLOWABLE GRADE (UNPAVED WITH NO TRAFFIC):	650.97
MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	650.97
MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	650.97
TOP OF STONE (MIN):	649.97
TOP OF CHAMBER:	649.47
12" BOTTOM OF CHAMBER (INVERT):	647.10
BOTTOM OF CHAMBER (MIN):	646.97
4" PERIMETER DRAIN (INVERT):	646.47
BOTTOM OF FOUNDATION STONE:	646.47

PROPOSED SYSTEM LAYOUT HS75

INSTALLED SYSTEM VOLUME (ft^3)	5,679
INSTALLED SYSTEM FOOTPRINT (ft^2):	2,673
SYSTEM PERIMETER (ft):	298
NUMBER OF CHAMBERS:	68
NUMBER OF END CAPS:	8
STONE REQUIRED (yd^3):	226
NON-WOVEN GEOTEXTILE (yd^2):	852
WOVEN GEOTEXTILE (yd^2):	39

Prinsco sales contact: Jason Forgatte: 320-444-4803

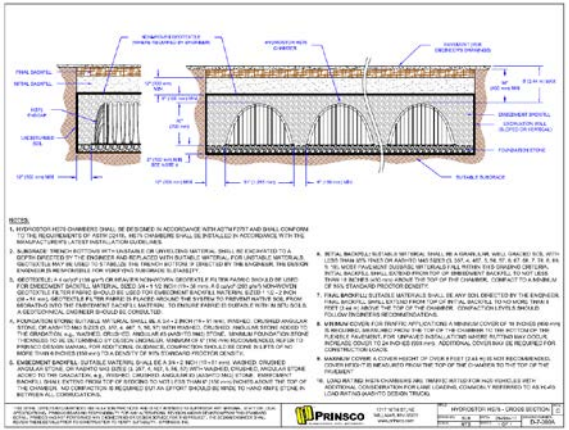
THIS DETAIL DEPICTS RECOMMENDED INSTALLATION PRACTICES AND IS NOT INTENDED TO SUPERSEDE ANY NATIONAL, STATE OR LOCAL SPECIFICATIONS. PRINSCO BEARS NO RESPONSIBILITY FOR ANY ALTERATIONS, REVISION AND/OR DEVIATION FROM THIS STANDARD DETAIL. PRINSCO HAS NOT PERFORMED ANY ENGINEERING OR DESIGN SERVICE FOR THIS PROJECT. THE DESIGN ENGINEER SHALL REVIEW THESE DETAILS PRIOR TO CONSTRUCTION TO VERIFY SUITABILITY. © PRINSCO, INC.

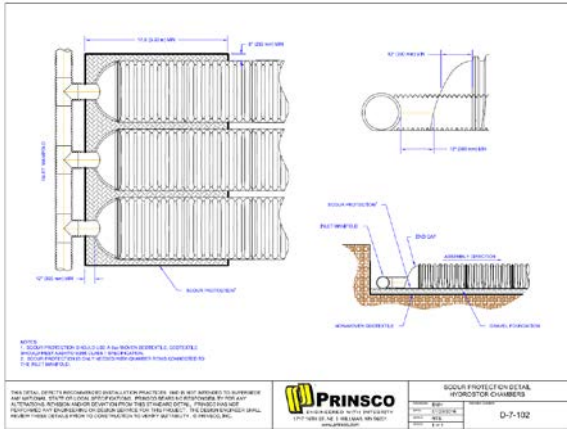
PRINSCO
ENGINEERED WITH INTEGRITY

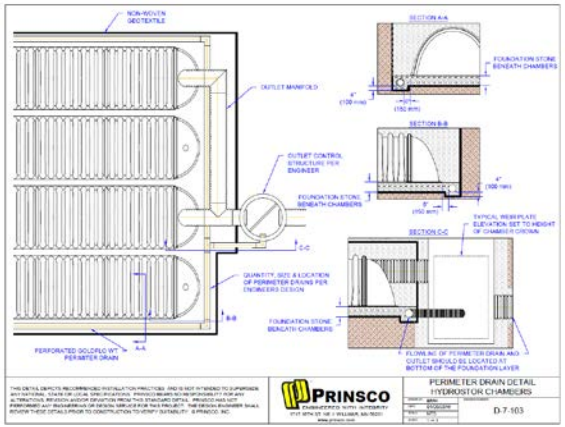
1717 16TH ST. NE
WILLMAR, MN 56201
www.prinsco.com

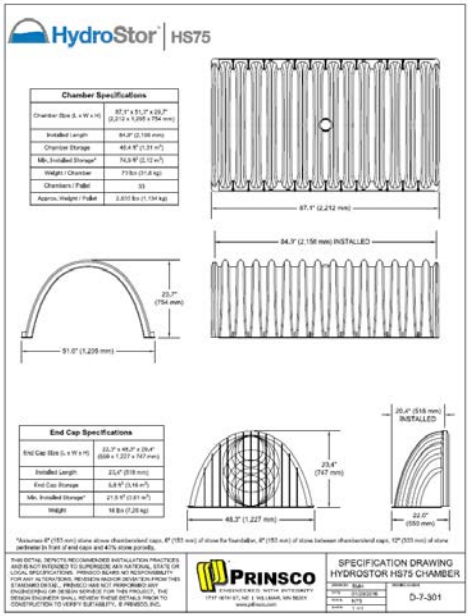
TITLE:	CEREBRAL PALSY, INC, GREEN BAY, WI		REV: A
DRAWN BY:	DJB	DATE:	10-Mar-17
SCALE:	NTS	SHEET:	2 OF 6
		DRAWING NUMBER	17-056

Cerebral Palsy, INC.
Submittal Packet





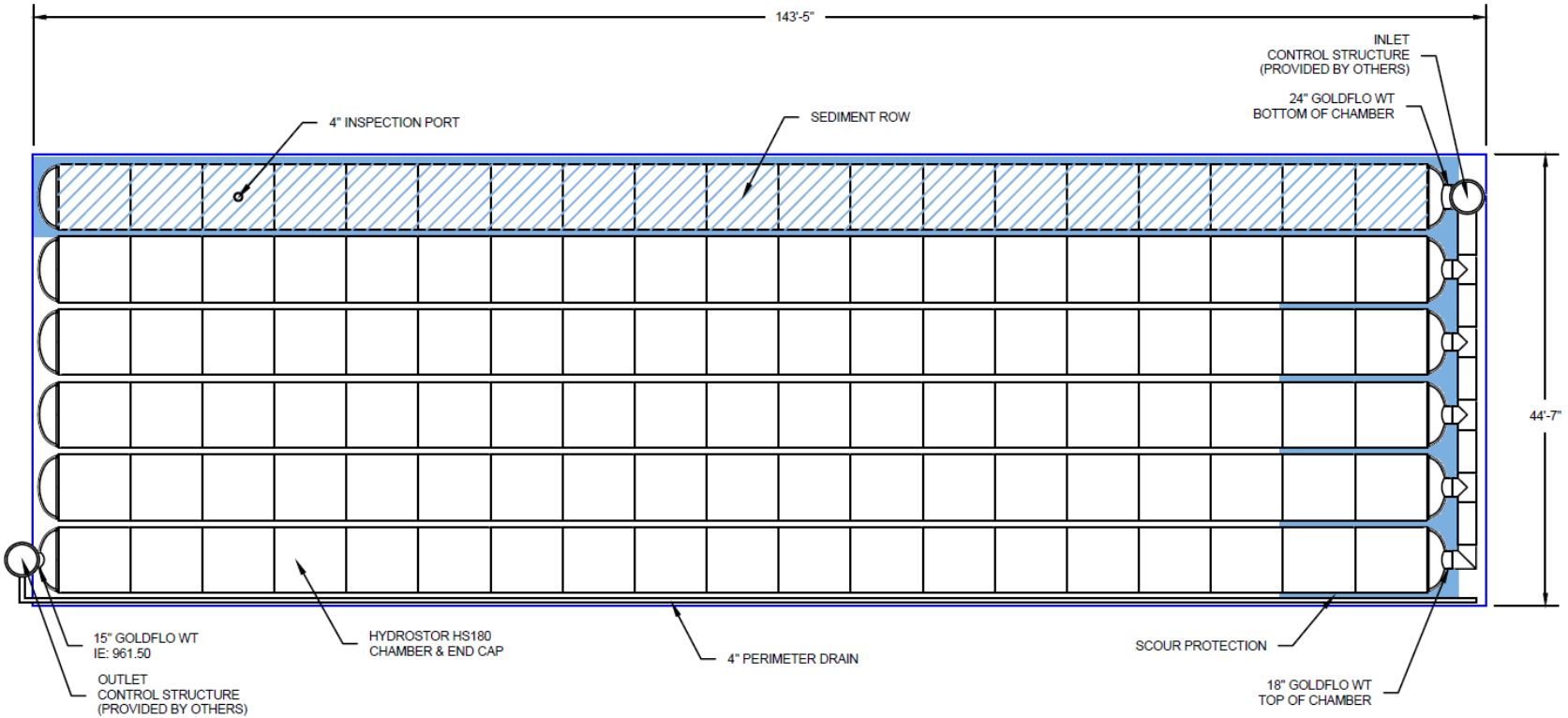




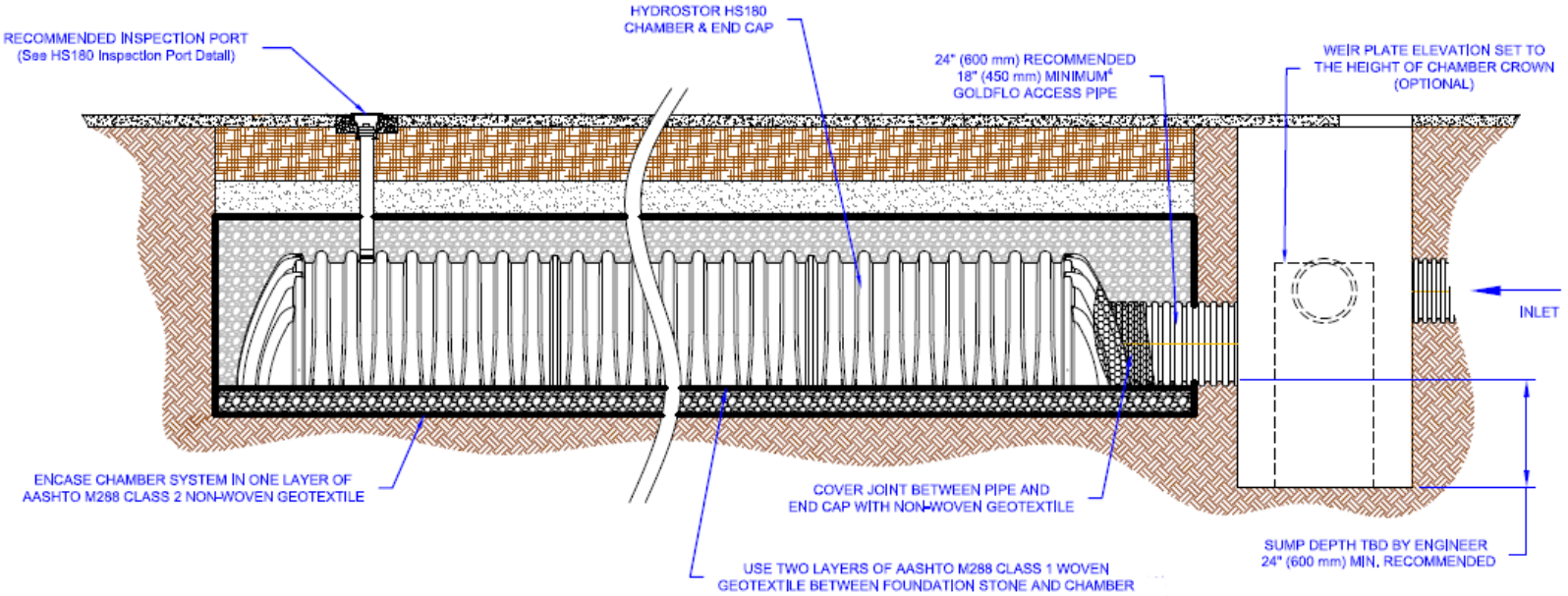
Cerebral Palsy, INC. – Geotextile and Bedding Placement

Prinsburg Yard Expansion – Woven Geotextile Placement (Scour Protection and Sediment Row)

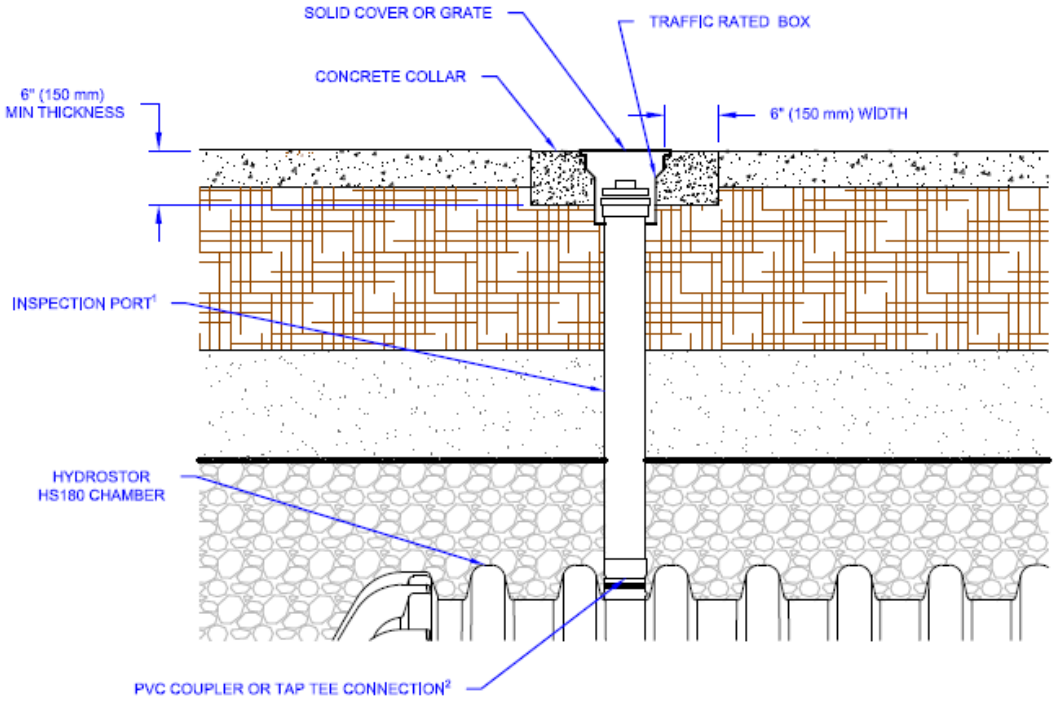
Elements of a System: Sediment Row



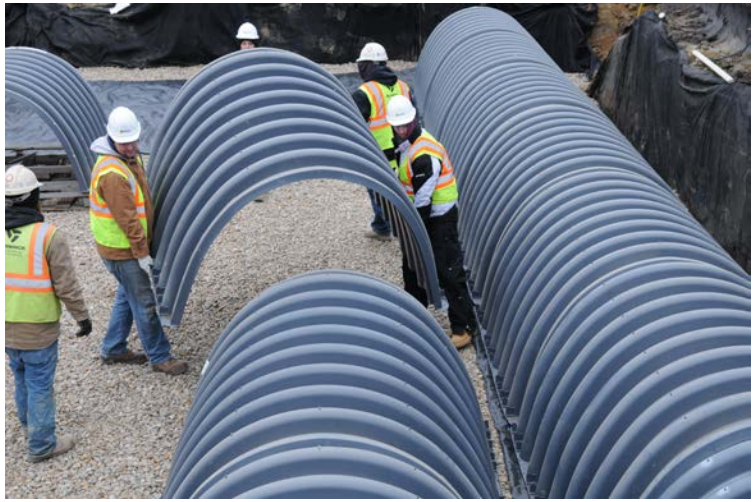
Elements of a System: Sediment Row



Elements of a System: Inspection Ports



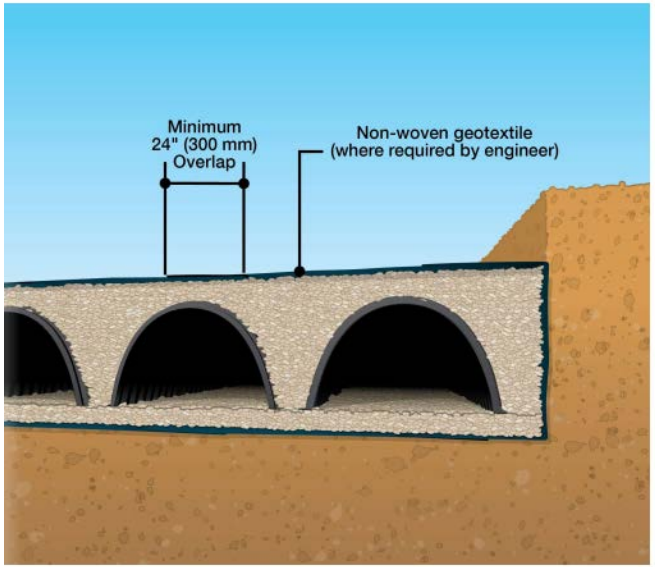
Case Study – Placement



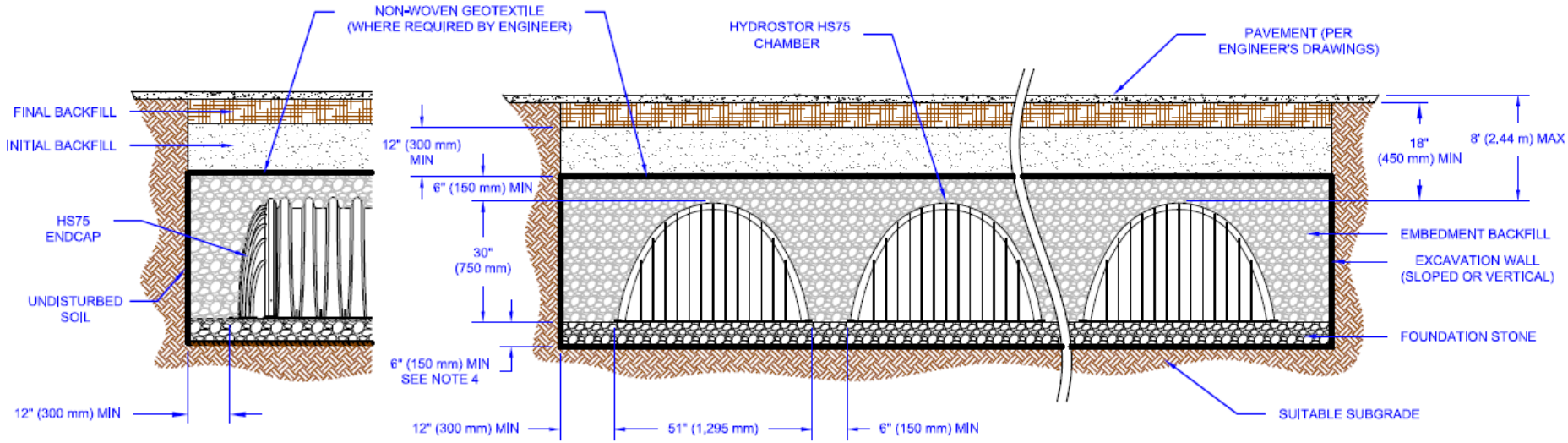
Case Study– Endcap and Manifold Installation

Case Study – Control Structure Connection

Cerebral Palsy, INC. – Backfilling & Geotextiles



Chamber Installation



Resources

- Design Aids
- Calculators
- Product Brochures
- Installation Guides & Videos
- Specification Sheets
- CAD Details
- Fitting Drawings
- Engineering Guides

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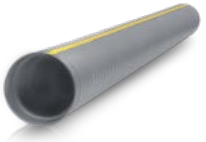

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