

Stormwater BMPs and the Use of Manufactured Treatment Devices

Chris Allen – Stormwater Regulatory Associate

Dana Hinaman – Stormwater Consultant

An aerial, isometric-style rendering of a modern urban environment. On the left is a tall, multi-story building with a distinctive facade of protruding rectangular panels. To its right is a shorter, more traditional multi-story building with many windows. In the foreground, there is a large parking lot with several trees and a road with a few vehicles. The entire scene is rendered in a light, monochromatic style with a green tint at the bottom.

About Contech

Ohio Regulatory Updates for MTDs

Product Overview

- Underground Detention Solutions
- Hydrodynamic Separation
- Filtration & Bioretention

Case Studies/ Project Highlights



CONTECH
ENGINEERED SOLUTIONS

Jellyfish® Filter

The Contech Way

Contech provides innovative, cost-effective site solutions to engineers, contractors and developers on projects across North America. Our portfolio includes bridges, drainage, erosion control, retaining wall, sanitary sewer and stormwater management products.



The experts you need to solve your stormwater challenges



Contech is the leader in stormwater solutions, helping engineers, contractors and owners with infrastructure and land development projects for over a century.

Your Local Stormwater Team



STORMWATER CONSULTANT

Dana Hinaman
DHinaman@conteches.com
(513) 314-4781

*I work with you to
recommend the best
solution to meet permitting
requirements*



STORMWATER DESIGN ENGINEER

Kelsey Stevens
KStevens@conteches.com
(410) 609-6344

*I help develop your final
design deliverables*



REGULATORY ASSOCIATE

Chris Allen
Callen@conteches.com
(443) 457-1519

*I understand the local
stormwater regulations and
what solutions will be
approved*



SALES ENGINEER

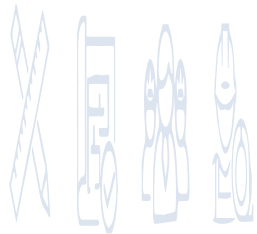
Joe Sommer
JSommer@conteches.com
(614) 447-1171

*I make sure our solutions
meet the needs of the
contractor
during construction*

Innovative, cost-effective site solutions across North America

DESIGN

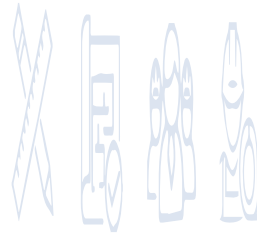
Provides engineers with technically focused recommendations



- Preliminary product recommendations
- Feasibility screening
- Layout assistance
- Cost estimates and options analysis

SPECIFICATION

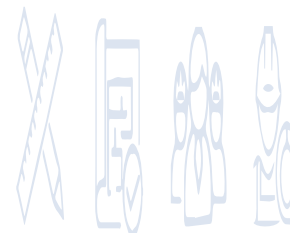
Helps engineers develop an efficient solution



- Engineering calculations
- Specifications
- Site-specific drawings
- Submittal packages

PERMITTING

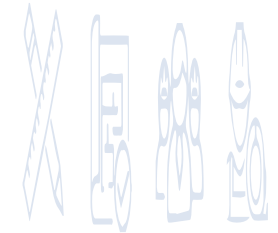
Makes sure all recommendations are approved locally



- Product approvals
- Regulatory stakeholder engagement
- Field and lab evaluation
- Project-specific regulatory support

INSTALLATION

Supports contractors and owners through the entire process



- Pricing and value engineering assistance
- Project coordination
- Installation guidance
- Issue resolution
- Customer service



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Ohio EPA Guidance on MTDs

Underground Storm Water Management System (USWMS)

- Extended detention + pretreatment (50% TSS)
- Infiltration + pretreatment (80% TSS)

Verification of Acceptable Pretreatment

- NJDEP certification of MTDs for **50%** and **80%** TSS removal efficacy
- WADOE certification of MTDs with **General Use Level Designation for Basic Treatment** is acceptable for 80% TSS removal efficacy

General Permit OHC000005: Guidance on Manufactured Treatment Devices as Pretreatment for Underground Storm Water Management Systems

TABLE 1: Manufactured Treatment Devices Certified by NJDEP and TAPE for 80 percent TSS Removal for Pretreatment of USWMS Providing Infiltration. (as of 6/2018)

| NJDEP | TAPE (General Use, Basic Treatment) |
|---|---|
| Aqua-Filter Stormwater Filtration System by AquaShield, Inc. | BayFilter w/ BFC Media by BaySaver Technologies, Inc. |
| BayFilter™ Enhanced Media Cartridge by BaySaver Technologies, LLC | BayFilter w/EMC Media |
| Biopod™ Biofilter with StormMix Media by OldCastle Precast Inc. | MWS-Linear Modular Wetland by BioClean Environmental Services, Inc. |
| Filtrerra Bioretention System by Contech Engineered Solutions | StormFilter using PhosphoSorb Media at 1.67 gpm/sq ft by CONTECH Engineered Solutions, LLC. |
| Kraken Stormwater Filtration System by BioClean Environmental Service, Inc. | Stormfilter using ZPG Media by CONTECH Engineered Solutions, LLC. |
| PerkFilter™ Media Filtration System by Oldcastle Precast, Inc. | Filtrerra System by CONTECH Engineered Solutions, LLC. |
| Stormwater Management StormFilter by CONTECH Stormwater Solutions, Inc. | Filtrerra Bioscape by CONTECH Engineered Solutions, LLC. |
| Up-Flo Filter by Hydro International | Media Filtration System by CONTECH Engineered Solutions, LLC. |
| | FloGard Perk Filter by Oldcastle Precast, Inc. |
| | BioPod Biofilter with Curb Inlet by Oldcastle Precast, Inc. |
| | ecoStorm plus by Watertectonics, Inc. |

TABLE 2: Manufactured Treatment Devices Certified by NJDEP for 50 percent TSS Removal for Pretreatment of USWMS Providing Extended Detention. (as of 6/2018)

| NJDEP |
|--|
| Aqua-Swirl By AquaShield, Inc. |
| BaySaver Barracuda by BaySaver Technologies, LLC |
| Continuous Deflective Separator (CDS) Unit by CONTECH Stormwater Solutions, Inc. |
| Downstream Defender by Hydro International, Inc. |
| Dual Vortex Separator by Oldcastle Stormwater Solutions |
| First Defense HC (FDHC) Stormwater Treatment Device by Hydro International, Inc. |
| HydroStorm Hydrodynamic Separator by Hydroworks® LLC. |
| Nutrient Separating Baffle Box® (NSBB) with Hydro-Variant Technology Stormwater Treatment Device by Suntree Technologies, Inc. |
| SiteSaver Stormwater Treatment Device by Fresh Creek Technologies, Inc. |
| StormPro Stormwater Treatment Device by Environment 21, LLC |
| StormTrap SiteSaver®-4 (STSS-4) by FreshCreek Technologies, Inc |
| Terre Kleen™ Hydrodynamic Separator by Terre Hill Stormwater Systems |
| SciClone™ Hydrodynamic Separator by BioClean Environmental Services, Inc. |

An aerial, slightly faded photograph of a modern urban environment. On the left is a tall, multi-story building with a distinctive facade of many small, rectangular protrusions. To its right is a lower, more traditional multi-story building. In the foreground, there is a large parking lot with several trees and a street with a few vehicles. The overall scene is in grayscale, with a blue horizontal band across the middle containing white text.

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Underground Detention Solutions



Corrugated
Metal Pipe



DuroMaxx



ChamberMaxx



CON/SPAN



Terre Arch

Underground Storage Practices

Table 4a Extended Detention Post-Construction Practices with Minimum Drain Times

| Extended Detention Practices | Minimum Drain Time of WQv |
|--|---------------------------|
| Wet Extended Detention Basin ^{1,2} | 24 hours |
| Constructed Extended Detention Wetland ^{1,2} | 24 hours |
| Dry Extended Detention Basin ^{1,3} | 48 hours |
| Permeable Pavement – Extended Detention ¹ | 24 hours |
| Underground Storage – Extended Detention ^{1,4} | 24 hours |
| Sand & Other Media Filtration - Extended Detention ^{1, 5} | 24 hours |

Table 4b Infiltration Post-Construction Practices with Maximum Drain Times

| Infiltration Practices | Maximum Drain Time of WQv |
|---|---------------------------|
| Bioretention Area/Cell ^{1,2} | 24 hours |
| Infiltration Basin ² | 24 hours |
| Infiltration Trench ³ | 48 hours |
| Permeable Pavement – Infiltration ³ | 48 hours |
| Underground Storage – Infiltration ^{3,4} | 48 hours |

- Generally used where space for surface practices is limited
- Can be located under paved areas, athletic fields, or other open spaces
- Can be flexible with site constraints and the configuration/ layout of the USWMS

Solid-wall CMP – Extended Detention

- Most common material for USWMS that are designed for Extended Detention
- Extended Detention practices are closed systems (not designed for infiltration)
- Designed to drawdown the WQv in a minimum of 24-hours



Solid-wall CMP – Extended Detention

- Wide range of gages, corrugations, and shapes, in diameters 12" – 144"
- NCSPA service life guidance of 75+ years for certain materials in recommended environments
- Various pipe coatings and materials are available to accommodate site-specific needs: Aluminized Steel Type 2, Galvanized, CORLIX[®] Aluminum, and Polymeric



Perforated CMP – Infiltration

- Most common material for USWMS that are designed for Infiltration
- Infiltration systems can be used to provide runoff reduction and/or groundwater recharge
- Designed to infiltrate the WQv within 48-hours

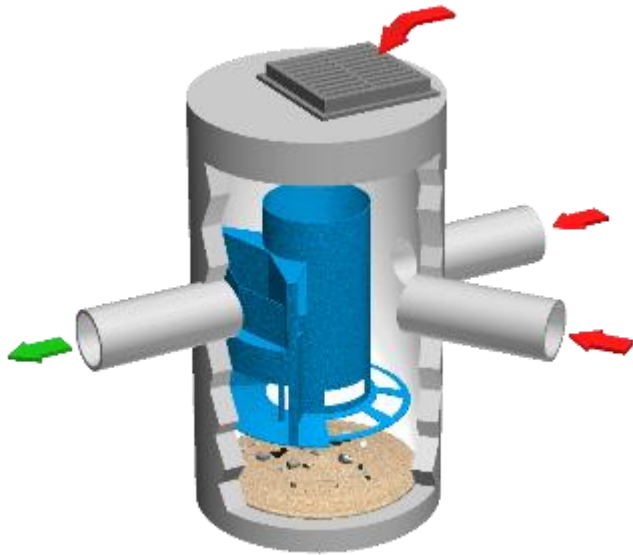


Subsurface infiltration with perforated CMP

- Perforated CMP backfilled with washed stone (typically 40% stone voids) provides more storage/LF and a smaller system footprint
- Perforated CMP systems not designed for infiltration can be considered for Extended Detention

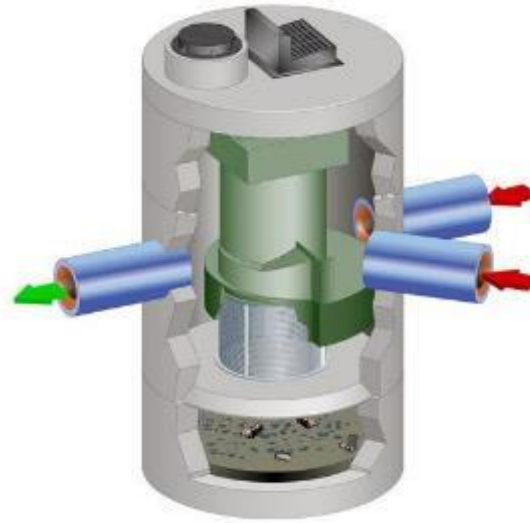


Hydrodynamic Separation



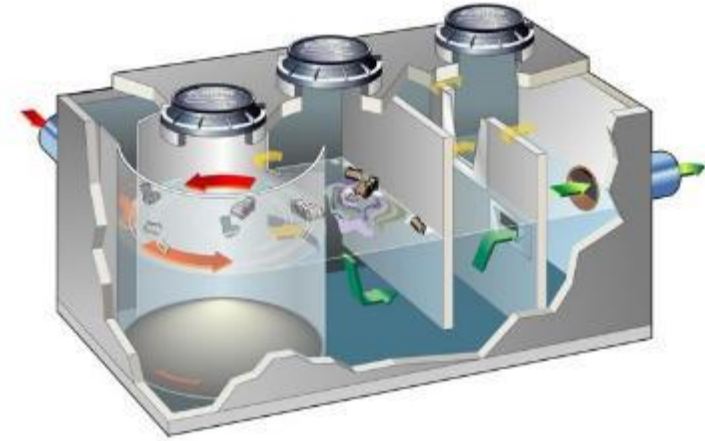
Cascade Separator™

NEW
Undergoing NJDEP



CDS®

NJDEP ✓
ODOT ✓



Vortechs®

ODOT ✓

Hydrodynamic Separator Fundamentals

Swirl Concentration



Gravity Separation



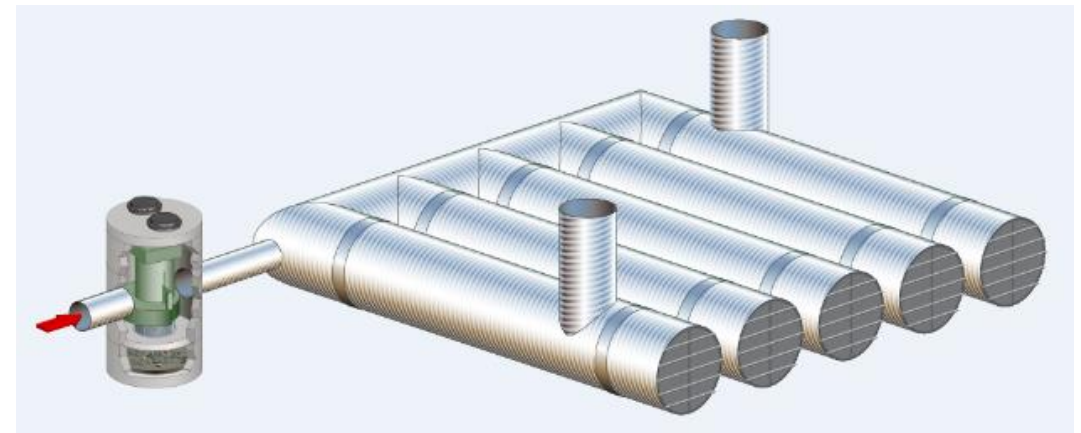
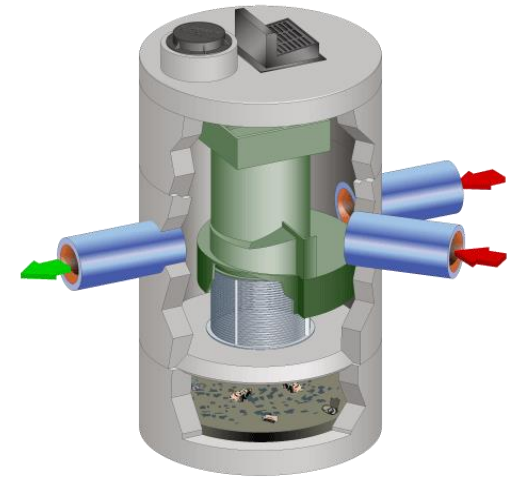
Flow Controls



Organize inflow energy & turbulence into a stable flow pattern

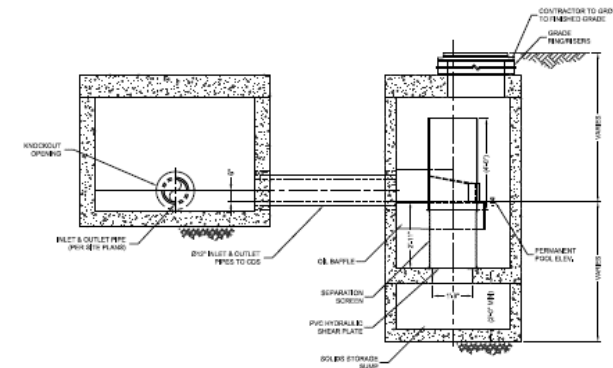
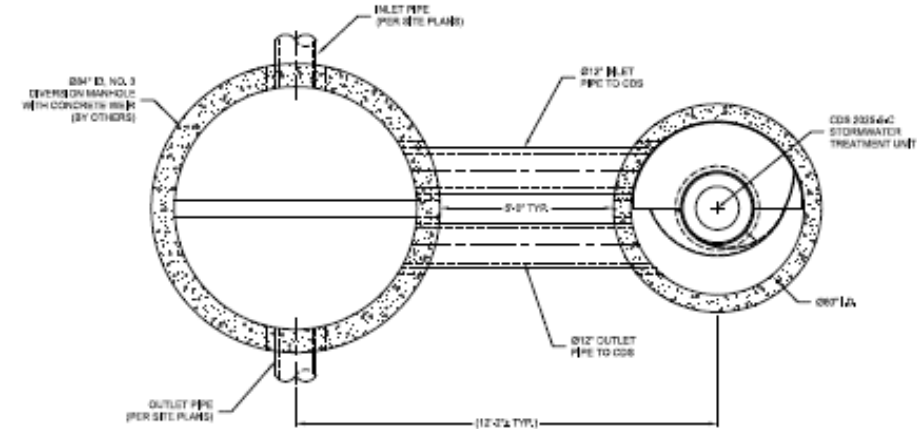
Pretreatment at 50% TSS Removal

- Required per Ohio EPA Phase II Permit when using underground extended detention
- Targets coarser particle sizes of TSS
- Protects outlet control structures
- Removes sediment prior to entering underground detention system
- Consolidates sediment capture in an easily maintainable location
- Maintains stone voids in perforated systems
- Increases the service life of an underground detention system
- Additional capture of trash, neutrally buoyant materials, and hydrocarbons



Key considerations for HDS

- Minimization of structures
 - Junction structure
 - Catch basin
- Online vs. Offline configuration
- Easement requirements
- Inspection and Maintenance access

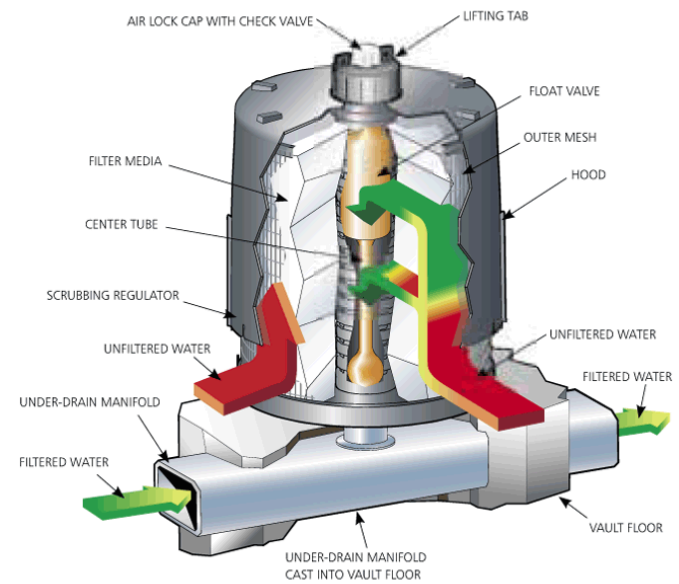


CDS[®] Features

- Captures and retains 100% of floatables and neutrally buoyant debris 2.4mm or large
 - Superior pollutant removal
- Non-blocking , self-cleaning screen
 - Ease of maintenance
- Isolated storage sump eliminates scour potential
 - Excellent pollutant retention



Filtration & Bioretention



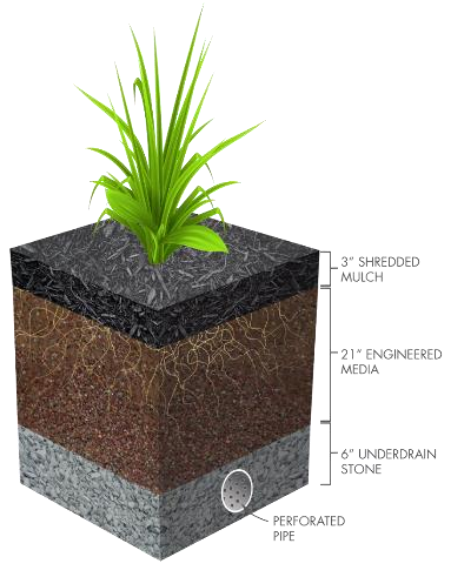
Stormwater Management StormFilter®

NJDEP ✓
GULD Basic ✓



Jellyfish®

CULD Basic



Filterra®

NJDEP ✓
GULD Basic ✓

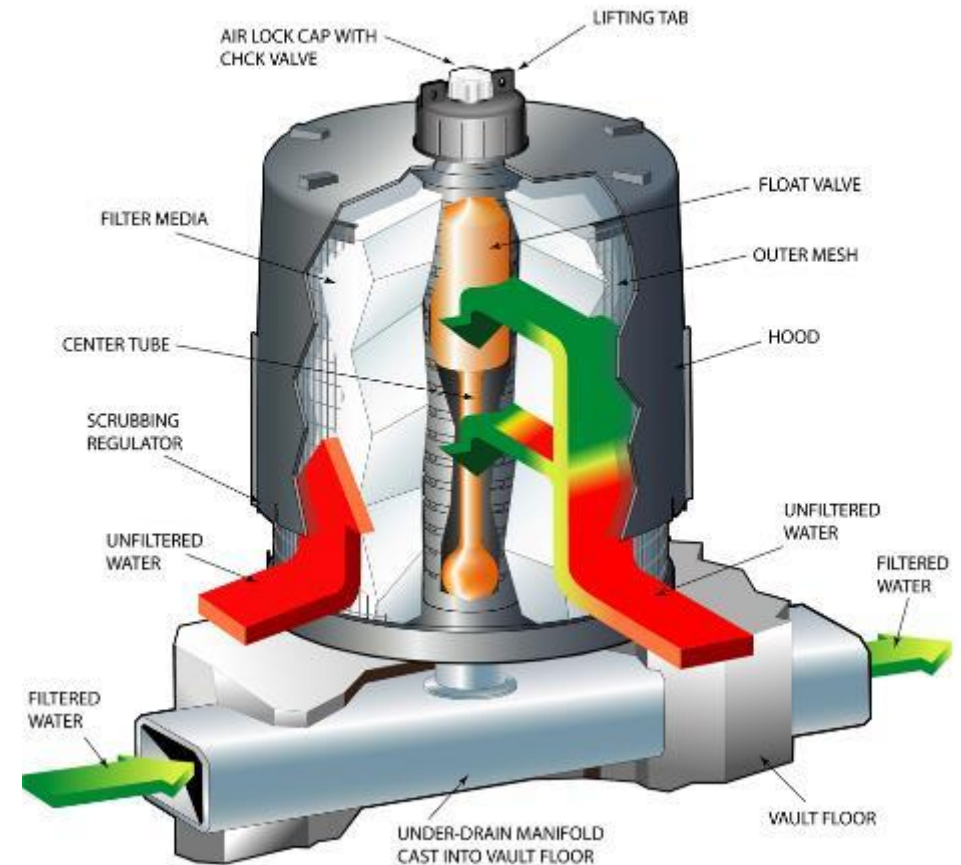
Pretreatment at 80% TSS Removal

- Required per Ohio EPA Phase II Permit when using underground infiltration
- Targets finer particle sizes of TSS
- Removes sediment prior to entering underground infiltration system
- Maintains stone voids in perforated systems
- Increases the service life of an underground infiltration system
- Additional capture of nutrients (phosphorous, nitrogen) and metals



Features & Benefits of StormFilter

- Siphon actuated, high surface area media cartridges
 - Stormwater is drawn evenly through the filter media providing efficient, effective stormwater treatment
- Maintenance intervals of 1-5 years
 - Fewer maintenance events and reduced long term ownership costs
- Performance verified by both the WA DOE and NJ DEP
 - Superior pollutant capture with confidence



Features & Benefits of StormFilter

- Internal peak bypass & multiple configurations
 - Design flexibility to meet your unique site requirements
- Multiple cartridge heights
 - Flexibility to meet site-specific hydraulic needs and reduce system size and costs
- Customizable media cartridges
 - Ability to target specific pollutants of concern



StormFilter Cartridge Capacities

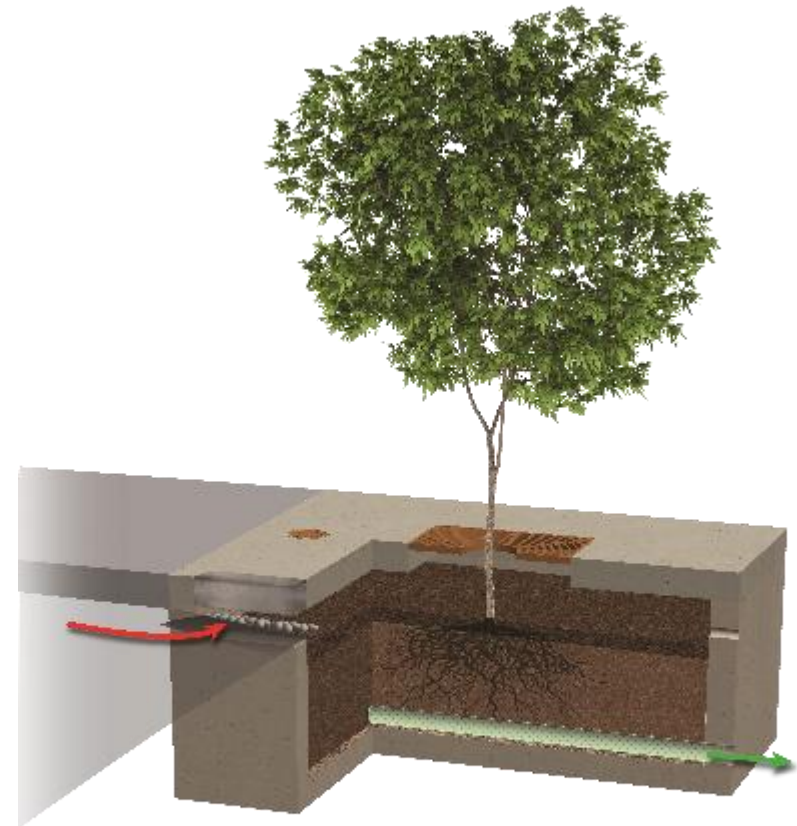
| Cartridge Height | Cartridge Flow Rates (gpm) | | |
|------------------|----------------------------|--------------------------|-----------------------|
| | 2 gpm/ft ² | 1.67 gpm/ft ² | 1 gpm/ft ² |
| 12" LD | 10 | 8.35 | 5 |
| 18" | 15 | 12.53 | 7.5 |
| 27" | 22.5 | 18.79 | 11.25 |

| Cartridge Height | Mass Load Capacity (lb) | | |
|------------------|-------------------------|--------------------------|-----------------------|
| | 2 gpm/ft ² | 1.67 gpm/ft ² | 1 gpm/ft ² |
| 12" LD | 15 | 18 | 24 |
| 18" | 22.5 | 27 | 36 |
| 27" | 33.8 | 40.45 | 54 |



Features & Benefits of Filterterra

- Pre-engineered and pre-packaged stormwater bioretention treatment:
 - Pretreatment top layer (mulch)
 - Engineered high flow biofiltration Media (140"/hr)
 - Underdrain system
 - Landscape vegetation

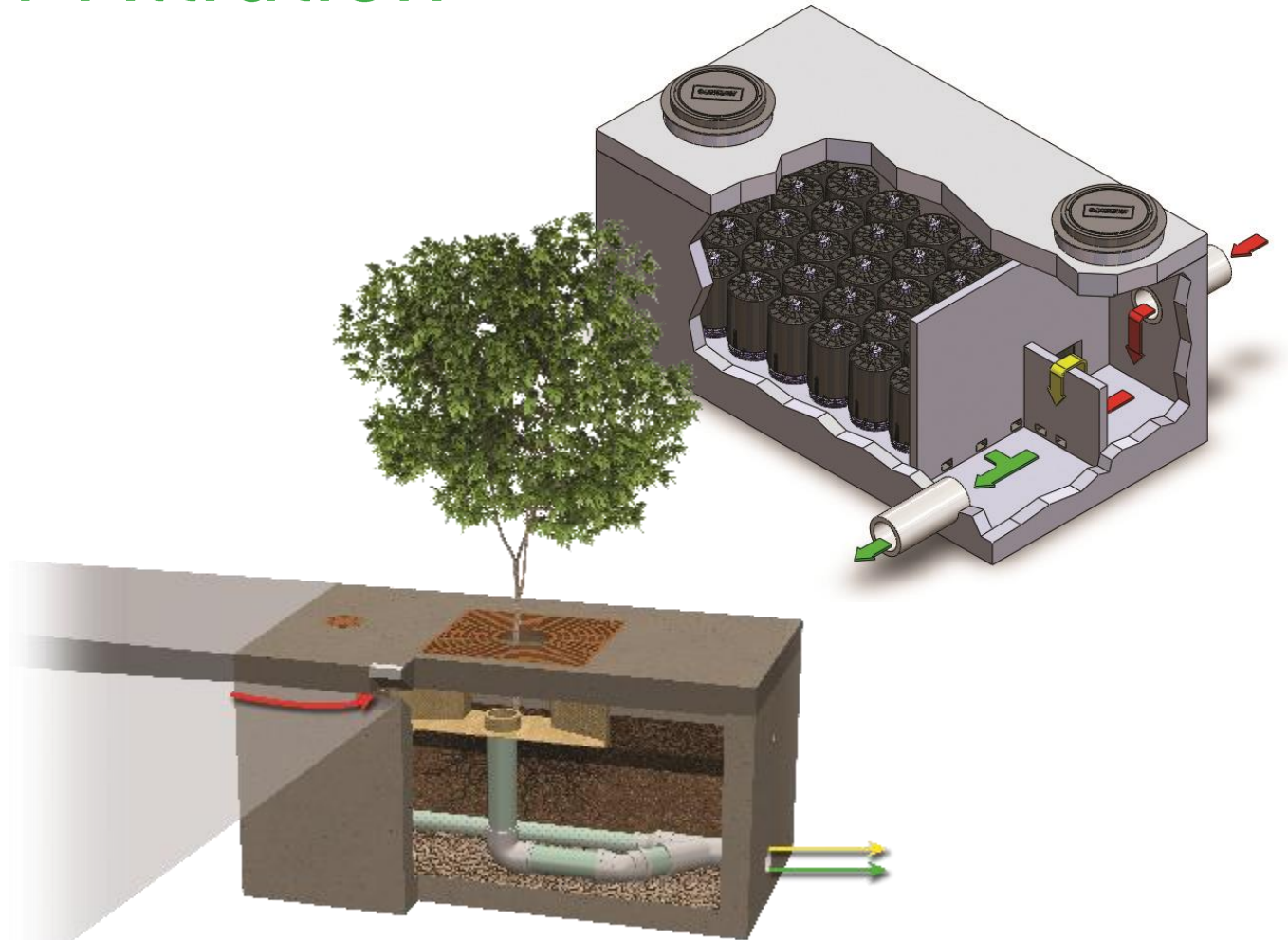


Using Filterterra as Pretreatment



Key considerations for Filtration

- Operating/ Driving head
- Online vs. Offline configuration
- Easement requirements
- Inspection and Maintenance access





About Contech

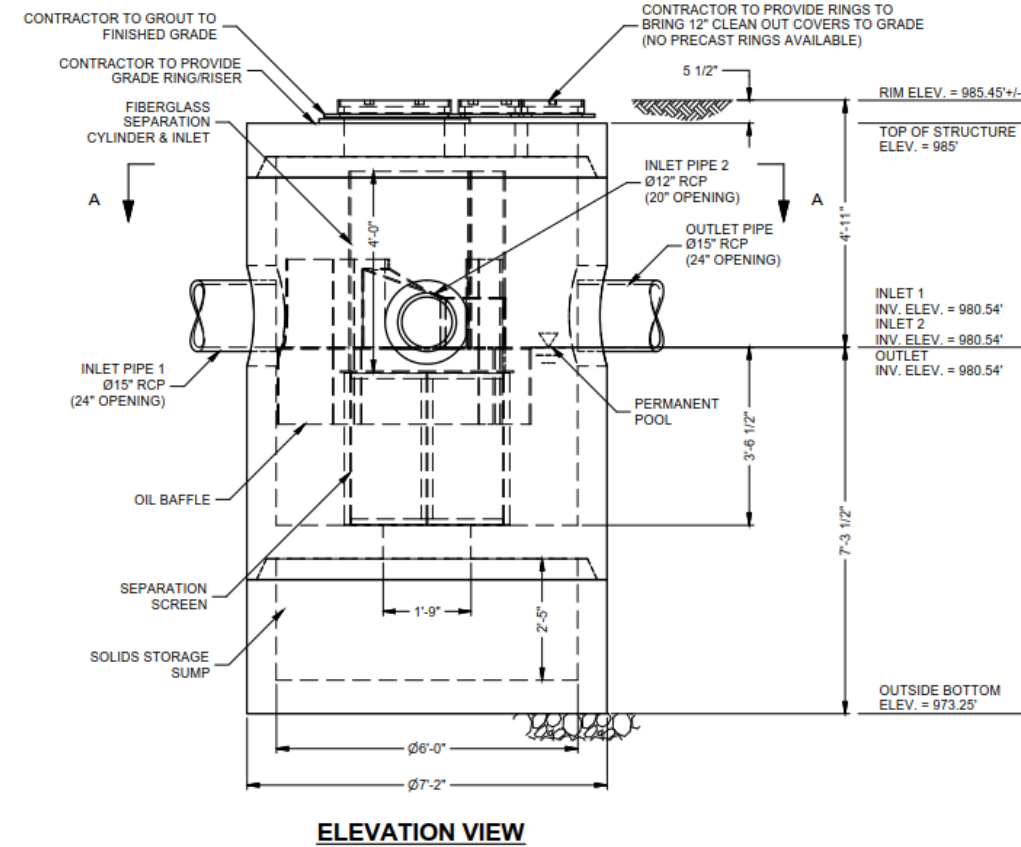
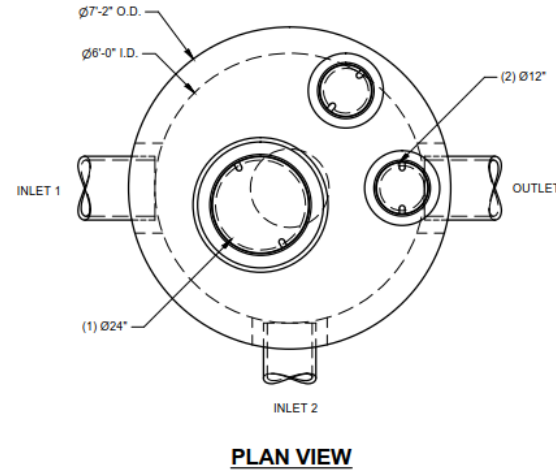
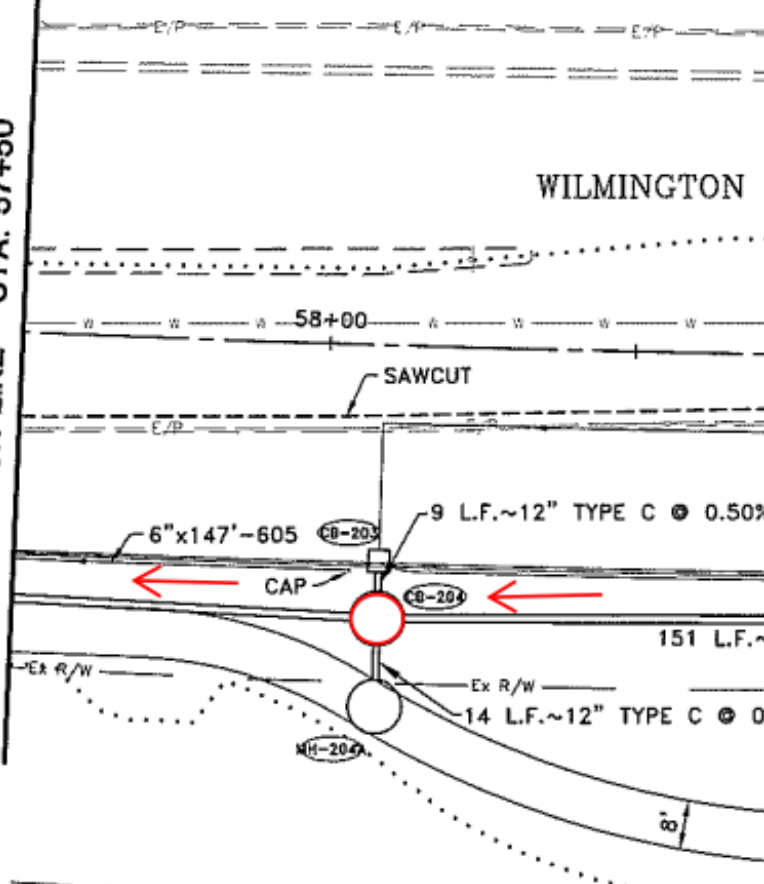
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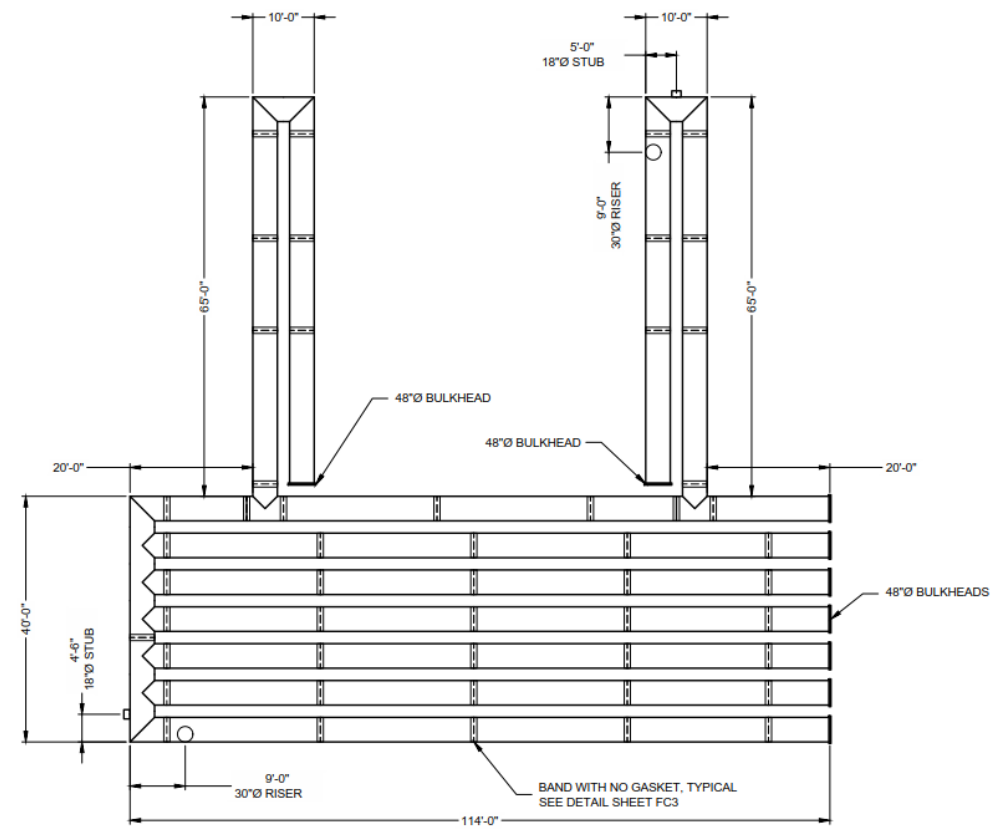
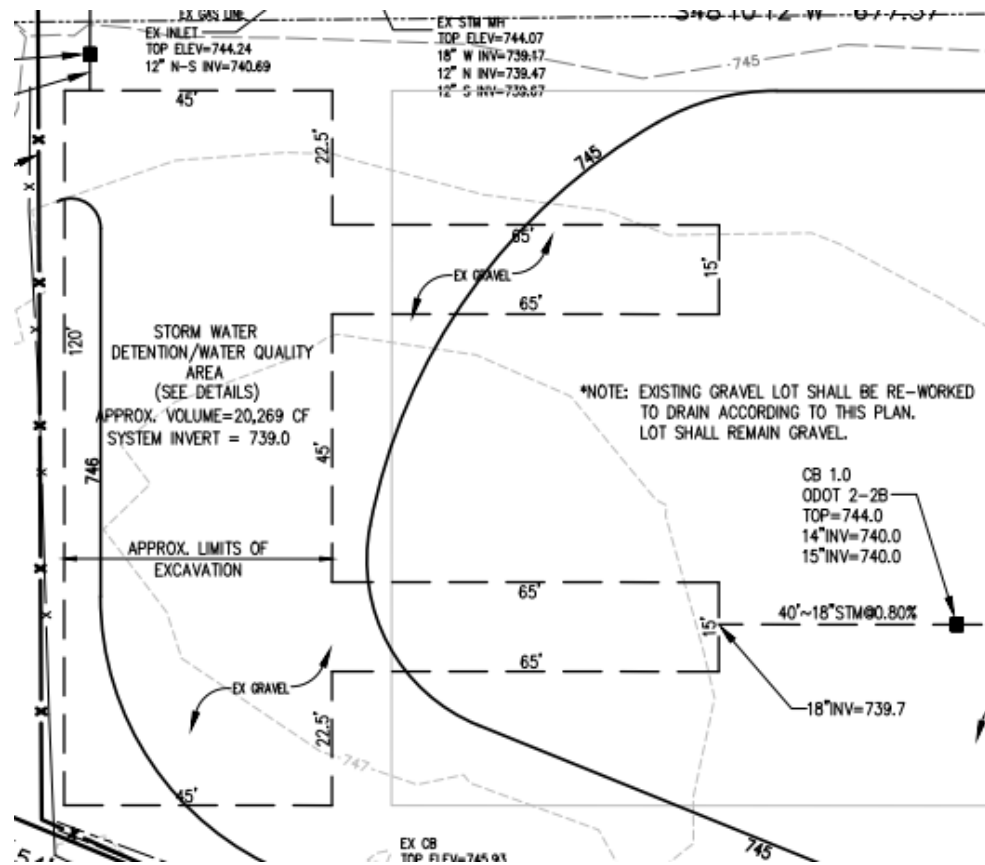
Case Studies/ Project Highlights

SEE PREVIOUS SHEET
MATCH LINE - STA. 57+50



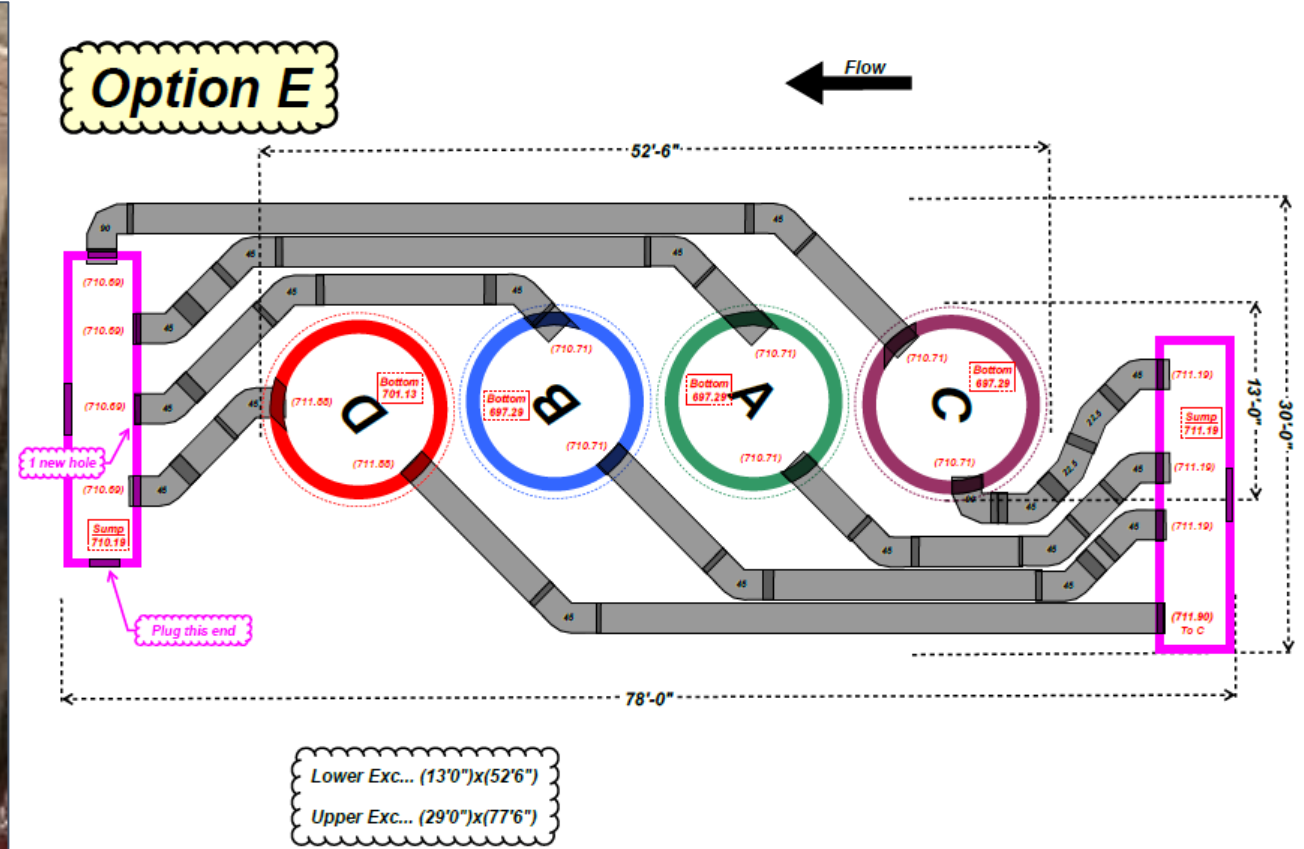
Wilmington Pike Improvements – Dayton, OH

A CDS3030-6 was used to treat 1.2 cfs with internal bypass to accommodate the 25-year peak event. Placing the CDS online eliminated the need for a junction and bypass structure to externally bypass the peak event.



Dayton Children's West Parking – Dayton, OH

A 48" diameter perforated CMP system provided approximately 20,200 cf of stormwater storage under a gravel lot next to the staff parking garage. Placing the stormwater storage underground allowed the gravel lot to still be used.



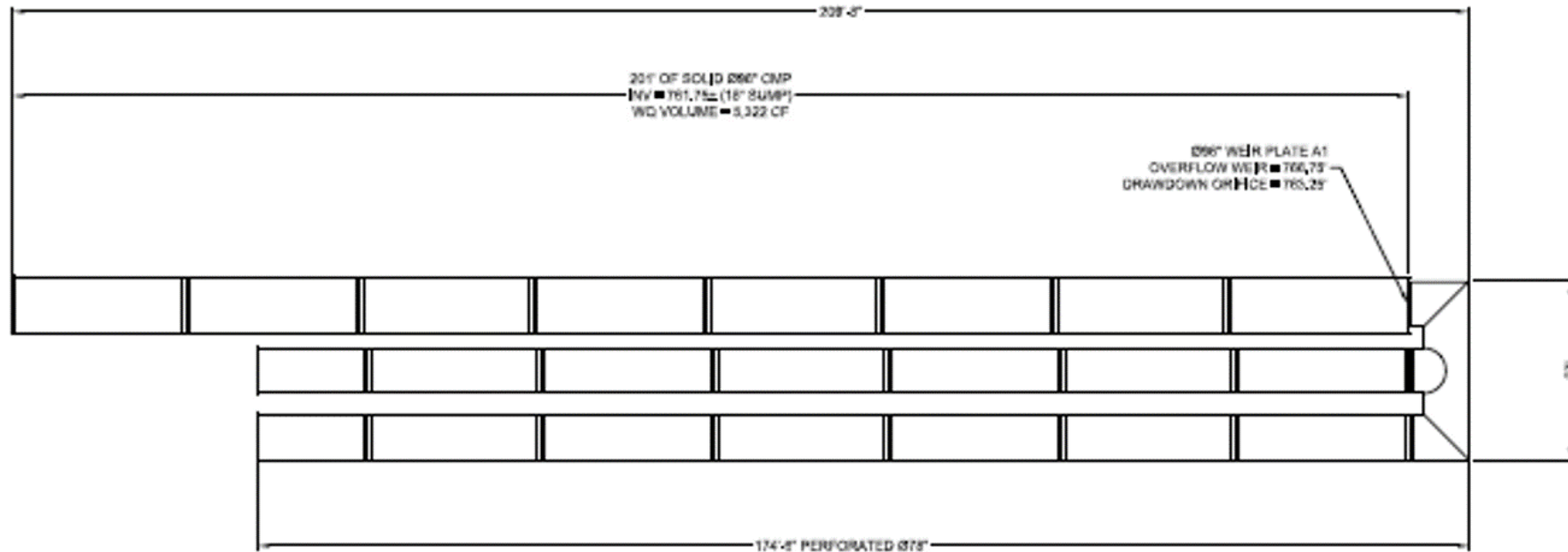
ODOT I-71/70 Interchange

Four 10-foot diameter CDS units were used to provide water quality treatment for 75 cfs of stormwater. Using the ODOT QPL for sizing and a placing the CDS units in parallel configuration provided large treatment capacity in a narrow footprint.



UPS Trabue Rd– Columbus, OH

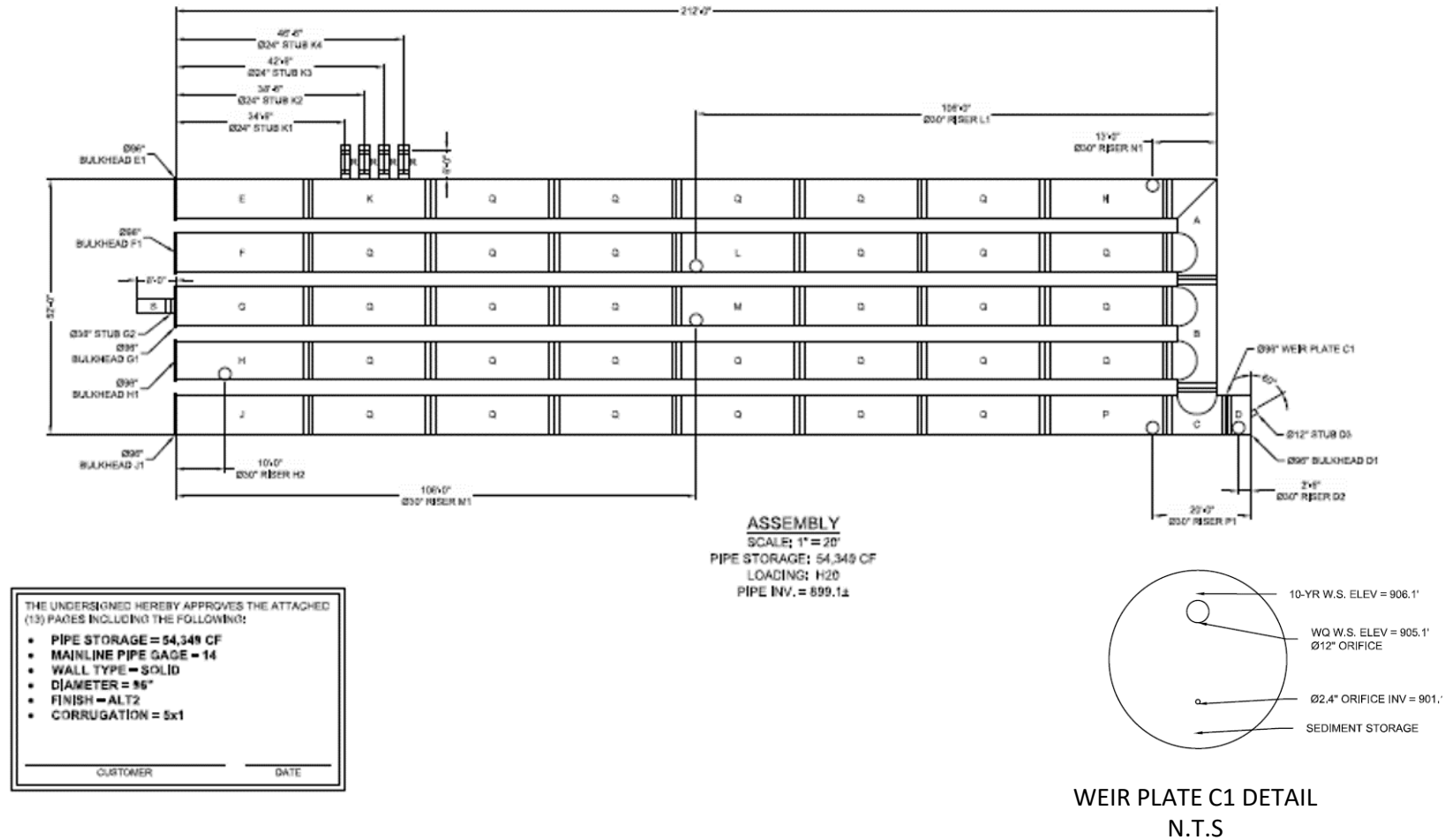
An underground wetpond style system designed to treat a WQv of approximately 55,000 cf within 96" diameter solid wall CMP and additional detention of approximately 77,000 cf within 78" perforated CMP .



WQv = 5,322 cf
Storage volume = 25,407 cf

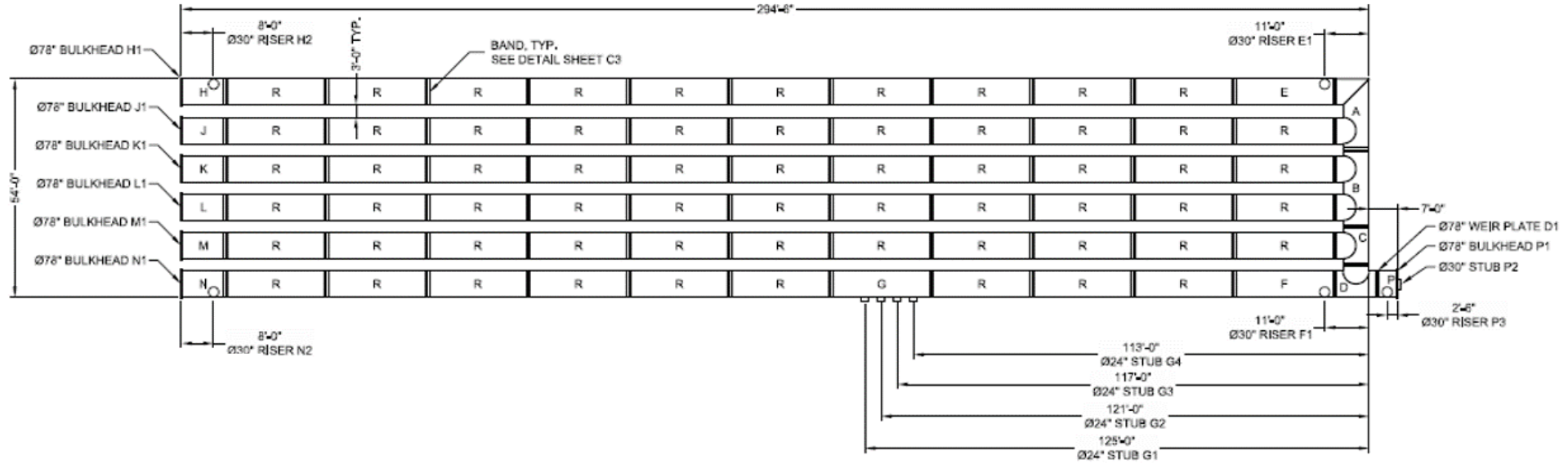
UPS Trabue Rd– Columbus, OH

Water Quality Volume



UPS Trabue Rd– Columbus, OH

Detention Volume



SCALE: 1" = 30'

SCALE: 1" = 30'

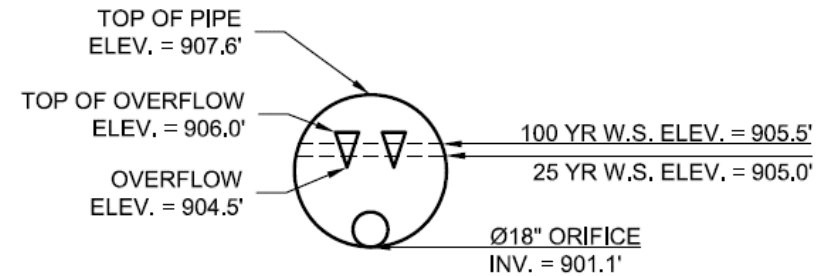
PIPE STORAGE: 59,365 CF

STRUCTURAL BACKFILL STORAGE: 19,517 CF
INCLUDES 12" PERIMETER STONE WITH 40% VOIDS

TOTAL STORAGE PROVIDED: 78,652 CF

LOADING: H20/H25

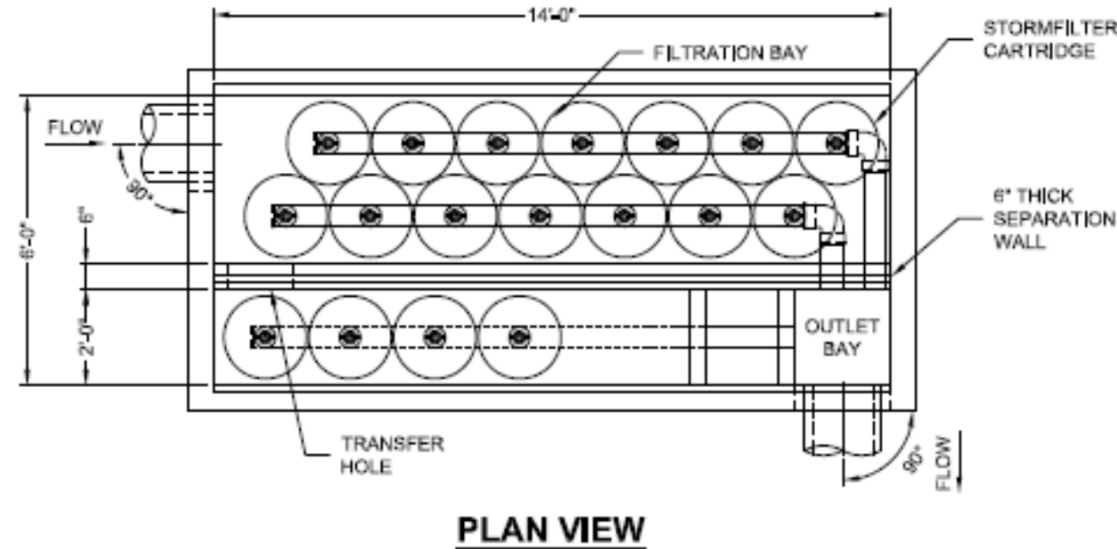
PIPE INV. = 901.1'±



WEIR PLATE D1 DETAIL

N.T.S.

UPS Trabue Rd– Columbus, OH



Alliance Hospitality – Cleveland, OH

A Linear Grate StormFilter equipped with (18) 18" tall cartridges provided water quality treatment for 0.57 cfs while meeting the tight depth and footprint constrictions. A grated top was used to eliminate an upstream catch basin.



Thank you!

Questions?