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Case Studies
Rain & Storm Water Management at the Cincinnati Zoo and Botanical Gardens

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The challenge:

- Treat Stormwater to acceptable quality for beneficial reuse for:
  - Polar Bear makeup water
  - Bird House irrigation
  - Lion Moat make up water
  - Cheetah Moat make up water
  - Africa exhibit irrigation
  - Restaurant lower-level restroom toilet-flushing (possible future)

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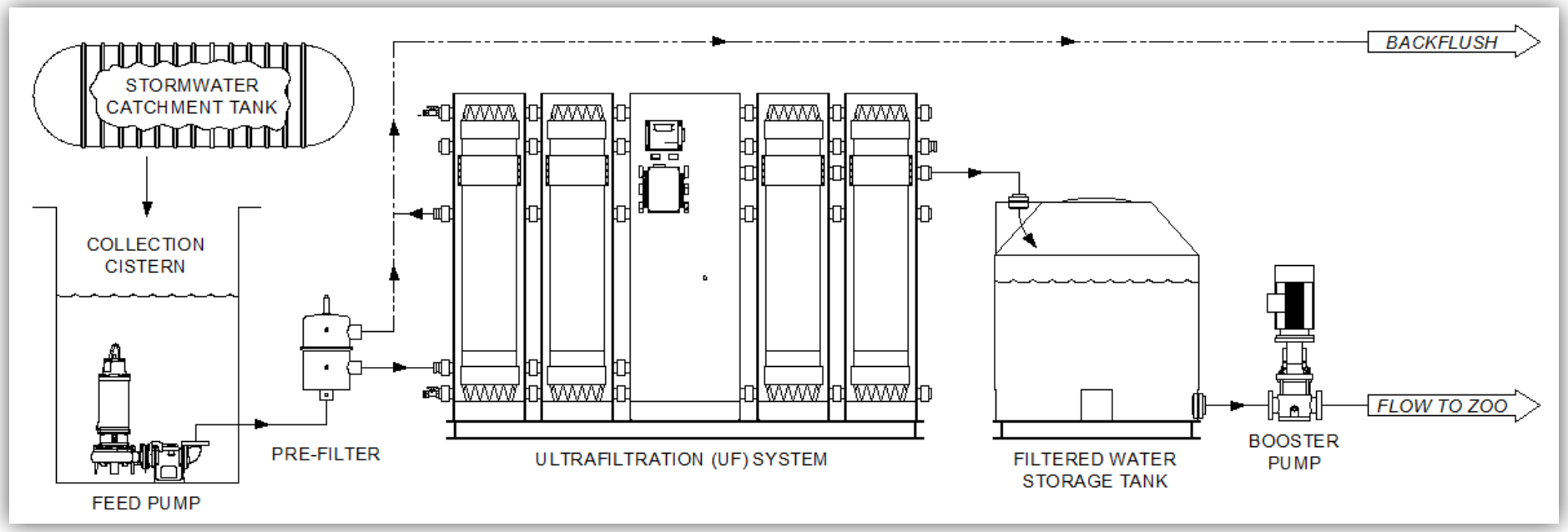
The solution:

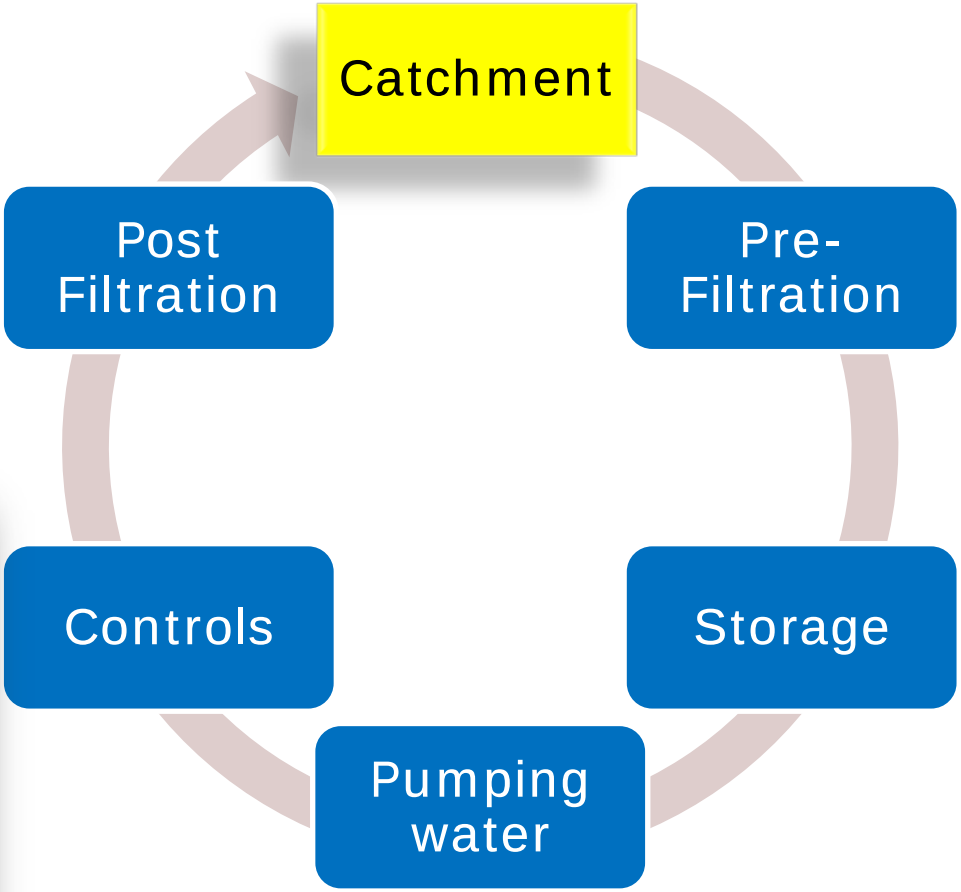
- Treats harvested Stormwater to desired quality
- Delivers reuse quality water at 60 GPM @ 65 psig

System Diagram



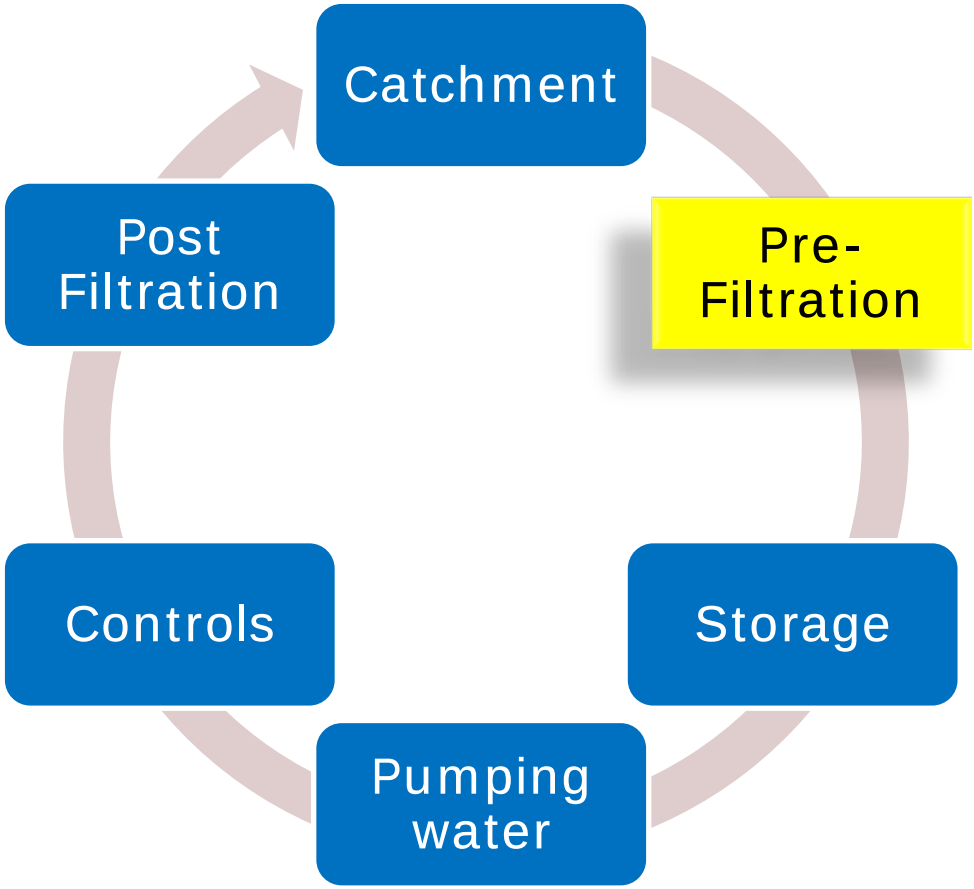
Catchment

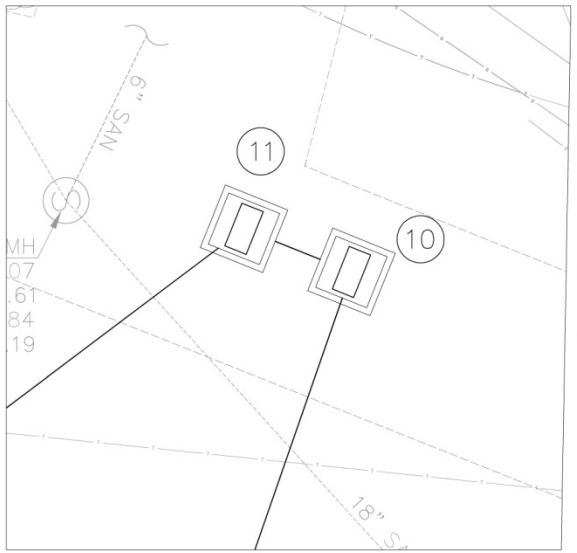
- Water sources
  - 60+% parking lot
  - Catch basins, roof drains, walking paths of pervious pavement, and exhibit space



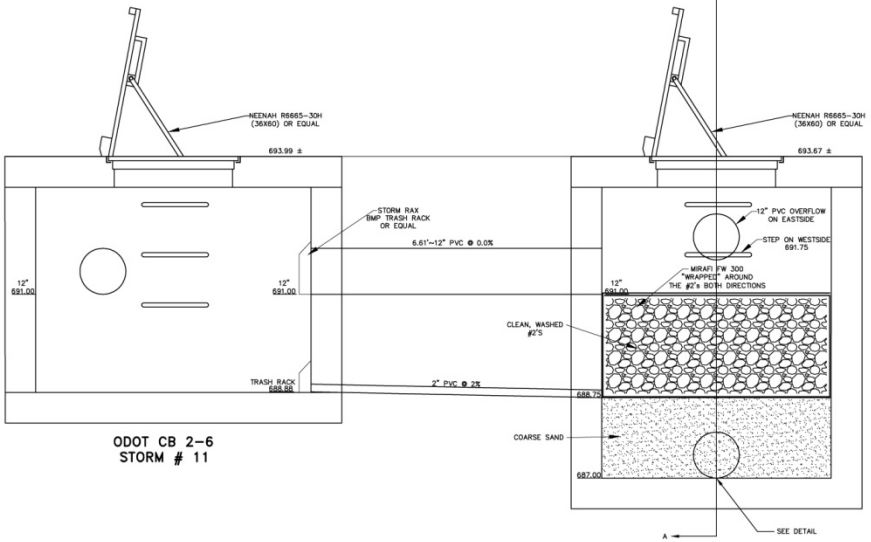
Pre-Filtration

- First Flush
- Pre-filter/Sand/Debris filter
- The best way to filter the water is at the source!



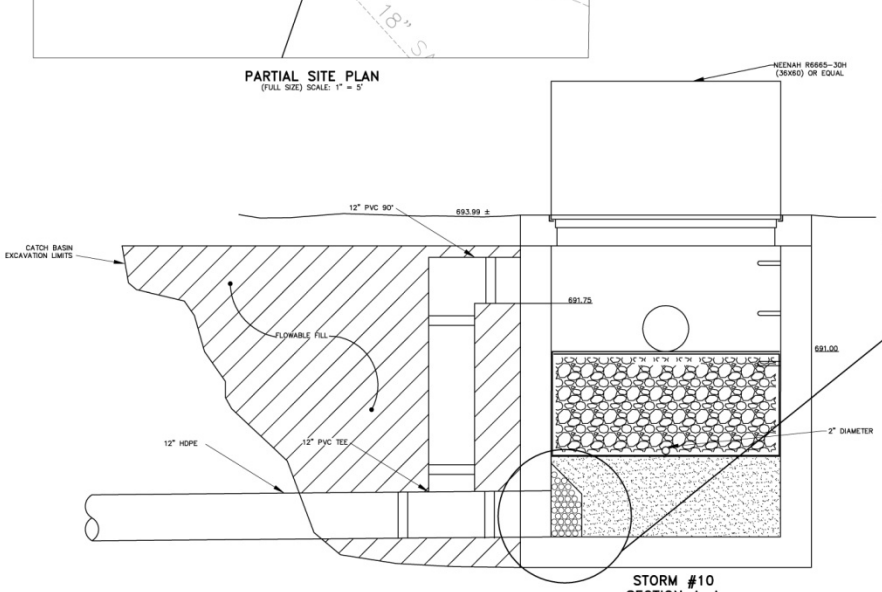


PARTIAL SITE PLAN
(FULL SIZE) SCALE: 1" = 5'

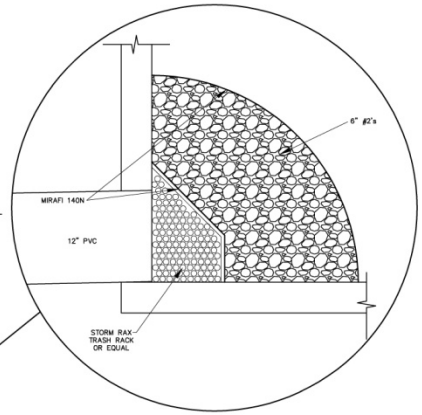


ODOT CB 2-6
STORM # 11

ODOT CB 2-6
STORM # 10



STORM #10
SECTION A-A



SOUTLET DETAIL
NO SCALE

GRAPHIC SCALE
0 2 1/2 5 10
(IN FEET)
1 inch = 5 ft.

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SUBMISSION/REVISION:
1/10/11 60% REVIEW SET
2/1/11 RESPONSE TO MSD GRANT COMMENTS
06/24/11 REVISIONS
08/12/11 RESPONSE TO MSD GRANT COMMENTS
08/26/11 RESPONSE TO MSD GRANT COMMENTS

REVISION:

CINCINNATI ZOO & BOTANICAL GARDEN
Adventure • Conservation • Education

STAMP:

CINCINNATI ZOO AND BOTANICAL GARDEN

AFRICA SAVANNAH PHASE IIIa

CINCINNATI, OH

DESIGN	DRAFT	CHECK
HEB	TDW	JBK

ME NO.: 08-265
DATE: January, 2011
SCALE: HORIZONTAL: 1" = 5'

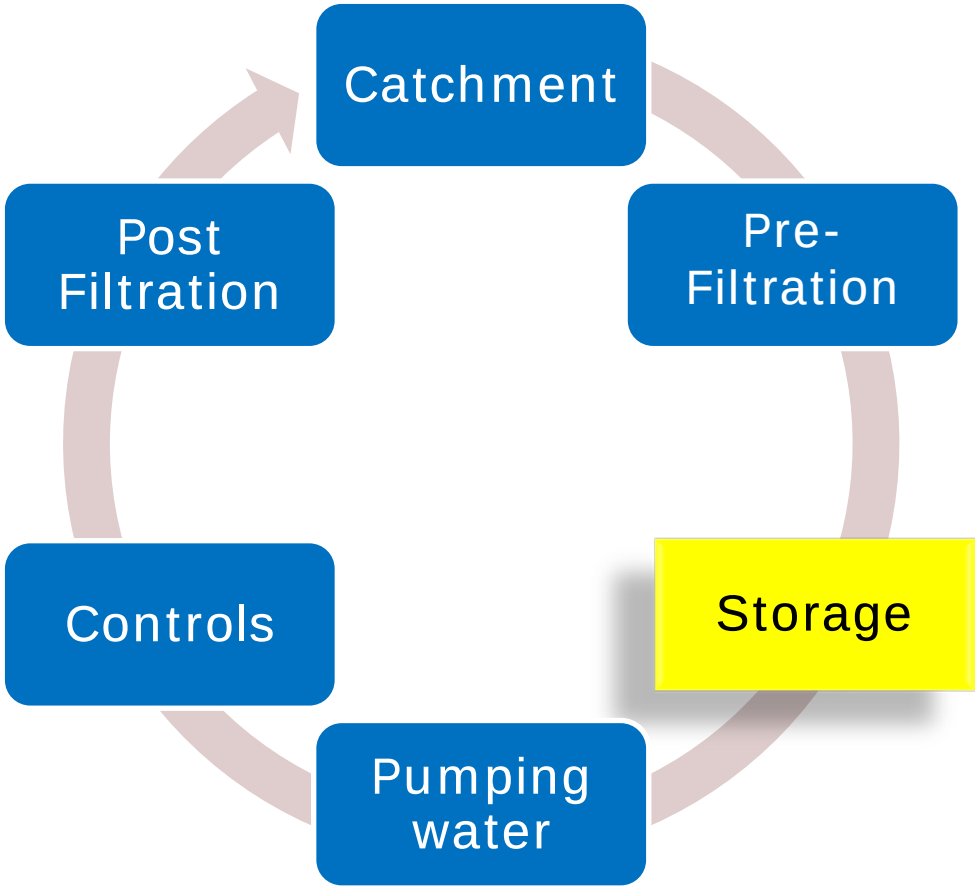
SHEET TITLE:
PRE-FILTER

SHEET NO.: 8/12

OHIO Utilities Protection SERVICE
811 or 1-800-362-2764 Call Before You Dig

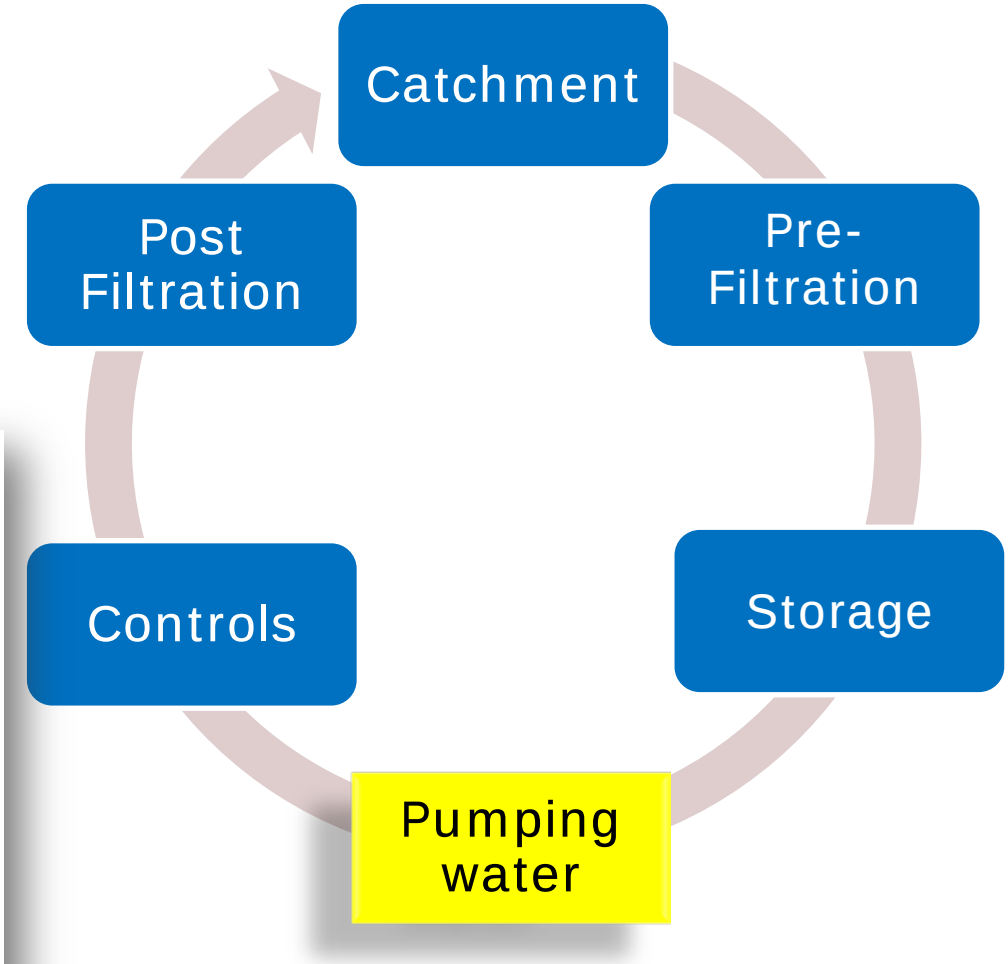
Storage

- 300,000 gallon below ground

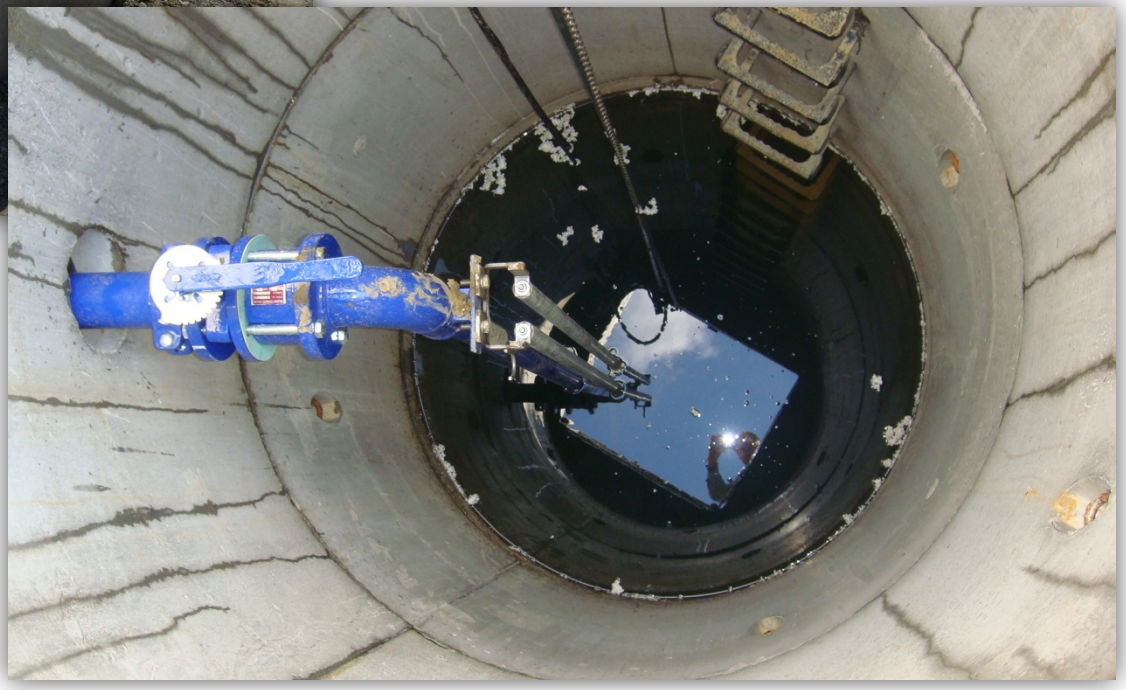


Pumping Water

- Submersible in cistern
- 5 HP Grinder Pump
- VFD Controlled
- On/Off based upon day tank level

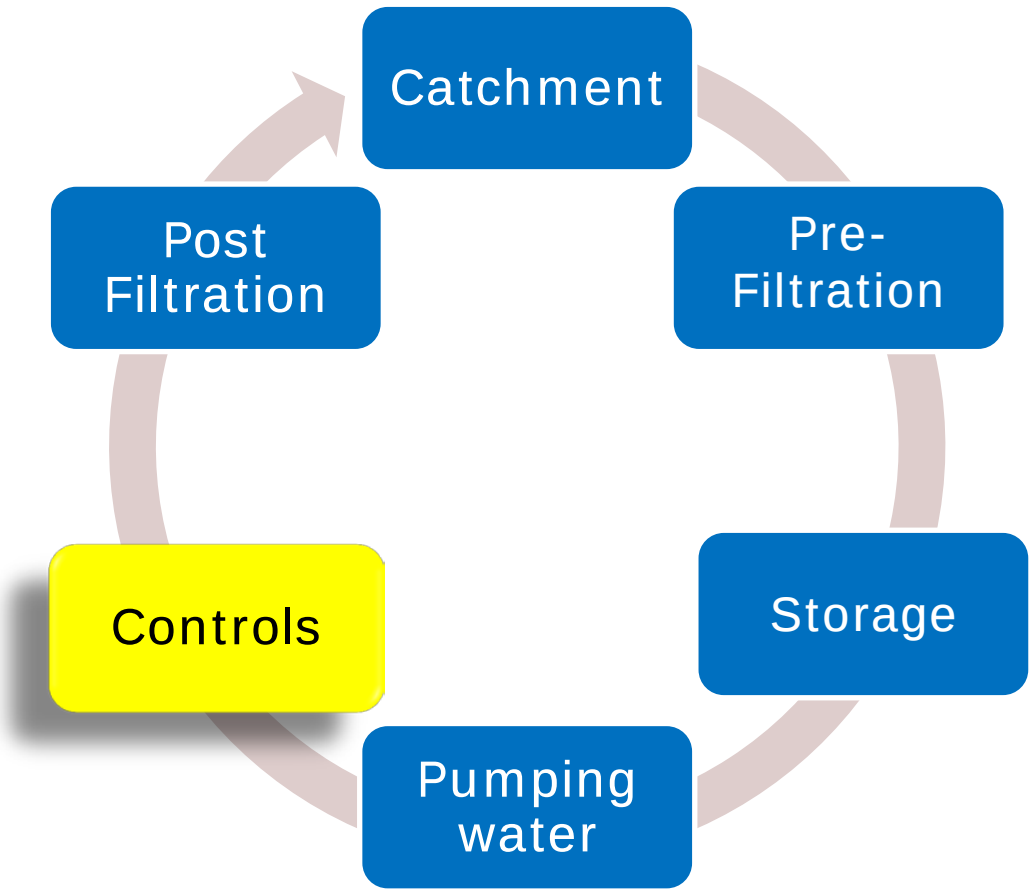


Transfer Pump Install



Controls

- Color touch screen
- Membrane flush/integrity
- Transfer pump
- UF pre-filter flush
- Buffer tank level
- Distribution pump
- Pressure regulation
- Outdoor tank level

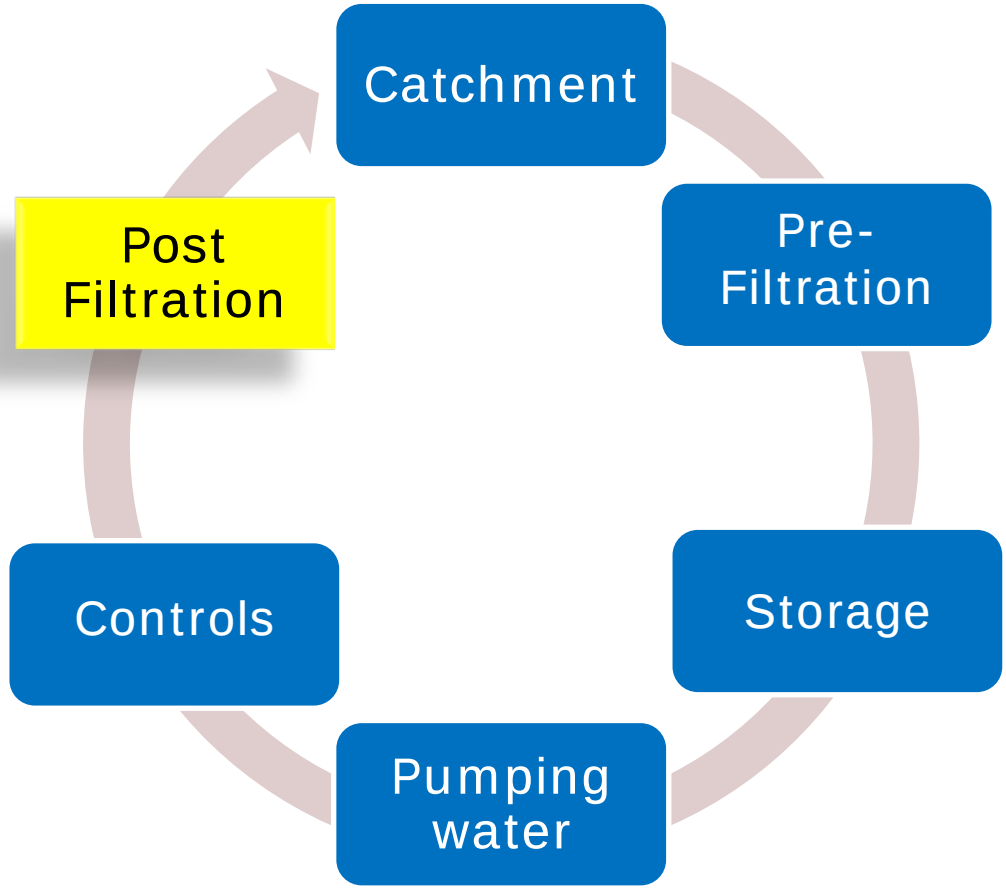


Control Panel Install

Water Quality

Ultra Filtration

- Pre-Ultra Filtration: 100 micron automatic self-flushing filter
- 2580 SQ-FT total UF membrane filtration surface area
- 0.02 micron pore size delivers >80% TSS removal
- Automatic back-flushing/cleaning



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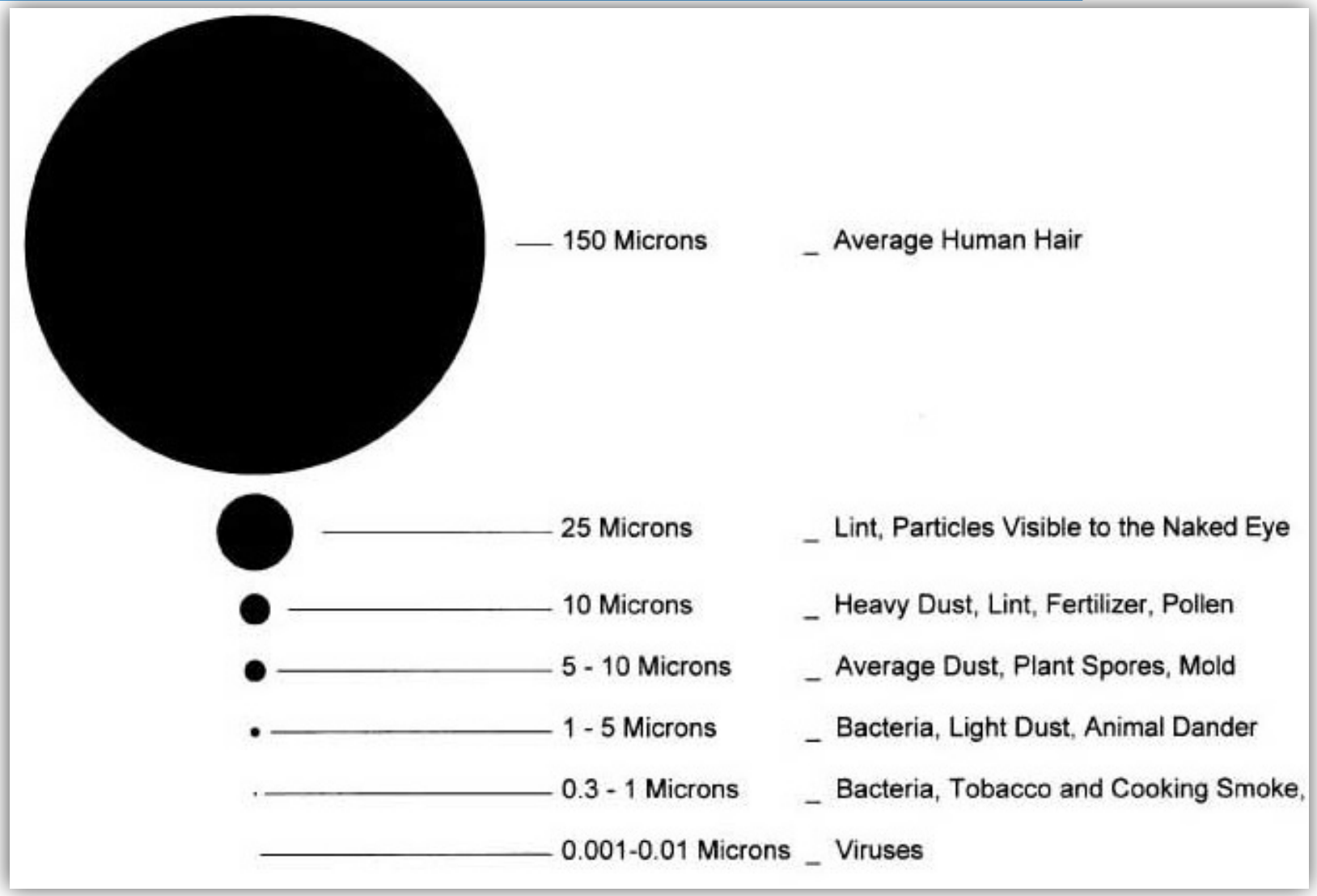
What is Ultrafiltration?

- Ultrafiltration, or UF, is a variety of membrane filtration that forces liquid at a pressure against a semi-permeable membrane material.
- This process “screens” out microscopic suspended solids (TSS) and various virus, bacteria, and pathogens like E-coli, Giardia, and Cryptosporidium from the water source!
- Membrane filtration pores are at a microscopic size. **Typically 3000 times smaller than a human hair!**

Micron Size Comparison



Intro To Ultrafiltration

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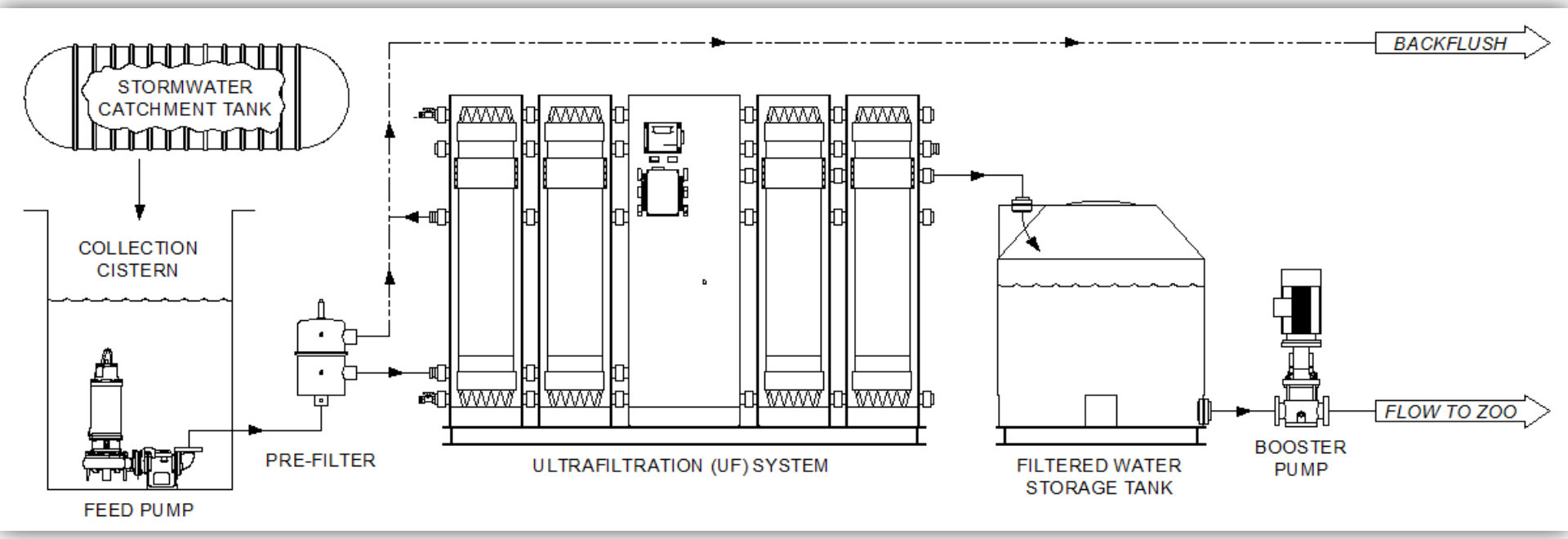
Typical UF Membrane Construction

600SQFT TO 1200SQFT Surface Area Range

Ultra-Filtration

System Summary



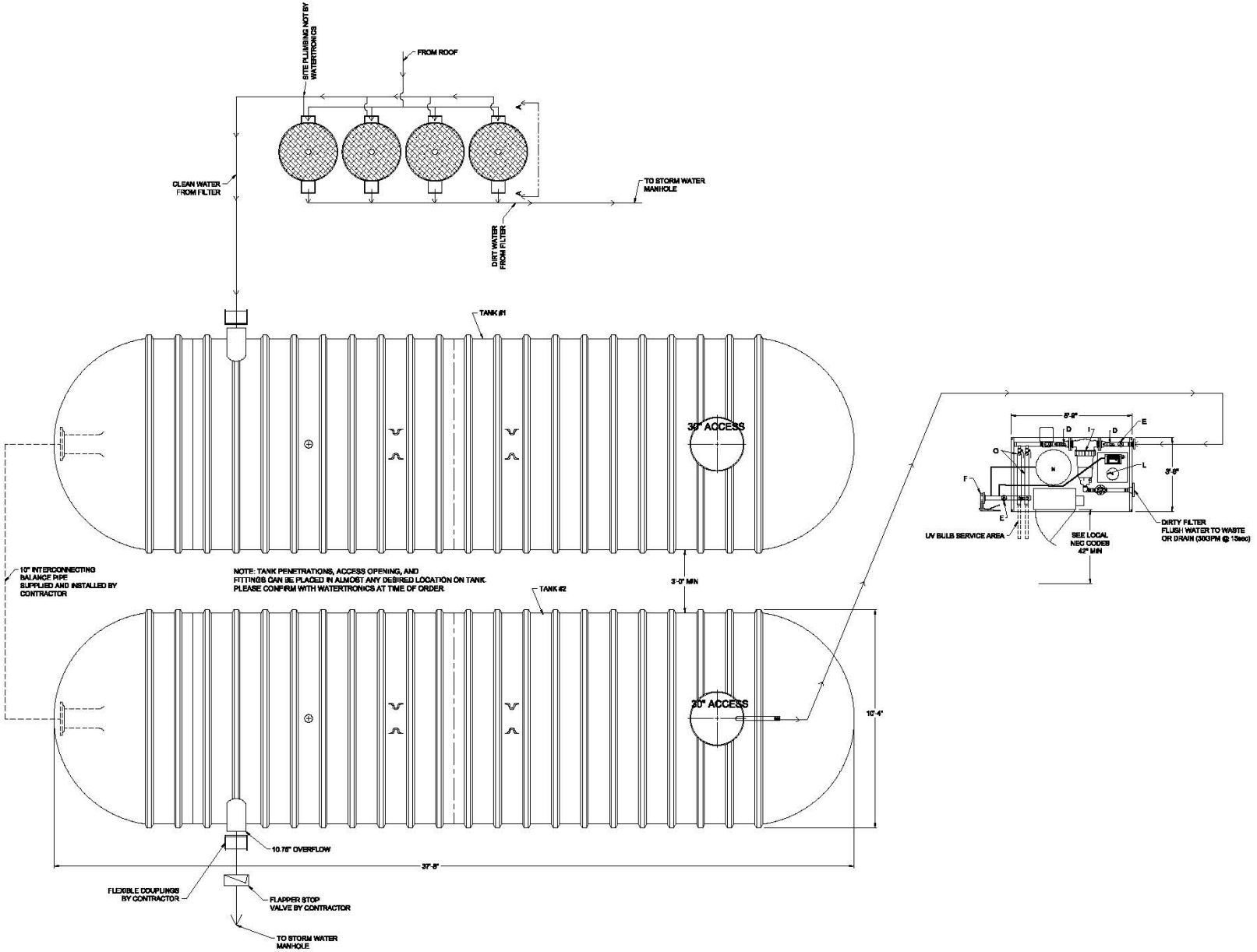
End Result

Other Applications

- Toilet Flushing
  - Ohio specific
    - (Vantage Career Center Van Wert, Otsego School Findlay, Glenwood School Glenwood)
- Vehicle Washing

Otsego School - Ohio

- (2) 20,000 gal below ground tanks
- Submersible pump in tank
- Harvested water from a school roof
- City water plumbed direct for back up
- Flushes all toilets in high school
- 5 micron filtration and UV & dye


SITE PLUMBING NOT BY WATERTRONICS
FROM ROOF
CLEAN WATER FROM FILTER
TO STORM WATER MANHOLE
DIRT WATER FROM FILTER
TANK #1
30" ACCESS
10" INTERCONNECTING BALANCE PIPE SUPPLIED AND INSTALLED BY CONTRACTOR
NOTE: TANK PENETRATIONS, ACCESS OPENING, AND FITTINGS CAN BE PLACED IN ALMOST ANY DESIRED LOCATION ON TANK. PLEASE CONFIRM WITH WATERTRONICS AT TIME OF ORDER.
3'-0" MIN
TANK #2
20" ACCESS
10'-4"
10.75" OVERFLOW
37'-5"
FLEXIBLE COUPLINGS BY CONTRACTOR
FLAPPER STOP VALVE BY CONTRACTOR
TO STORM WATER MANHOLE
5'-9"
3'-6"
UV BULB SERVICE AREA
SEE LOCAL NEC CODES 42" MIN
DIRTY FILTER FLUSH WATER TO WASTE OR DRAIN (30GPM @ 15psi)

Oakville Transit – Wash Application

- 30k Below ground storage tank
- Submersible pump in tank
- Control skid with filtration
- Back up water direct to wash system

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Thank you