OPTImizing Stormwater Storage

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Why do we manage Stormwater?

"Humans began measurably and negatively impacting water quality in the Chesapeake Bay in the **first half of the 19th century**…"

– The University of Alabama

"Stormwater runoff is the fastest growing source of pollution

to the Chesapeake Bay. According to the Chesapeake Bay Program's Watershed Model, stormwater contributes

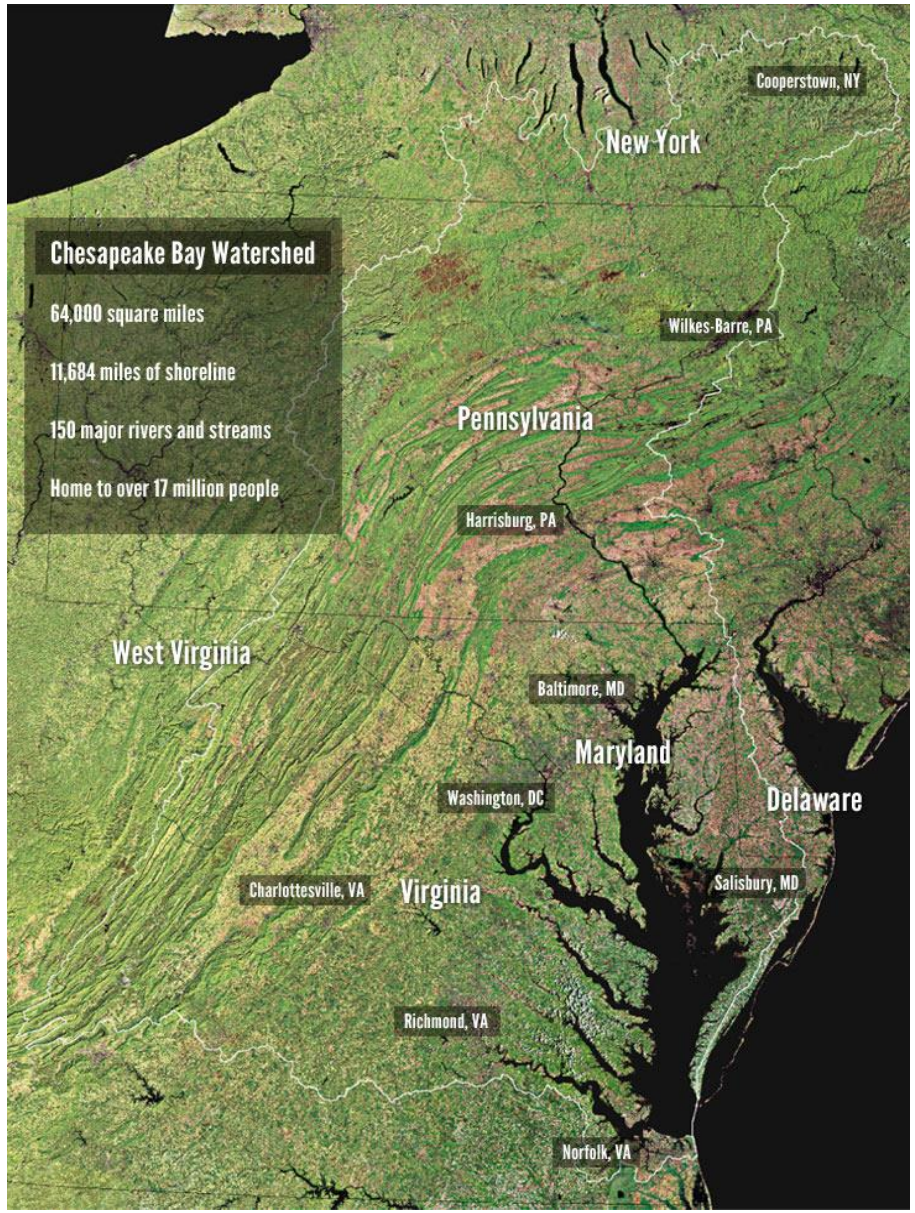
16 percent of nitrogen loads,

16 percent of phosphorous loads and

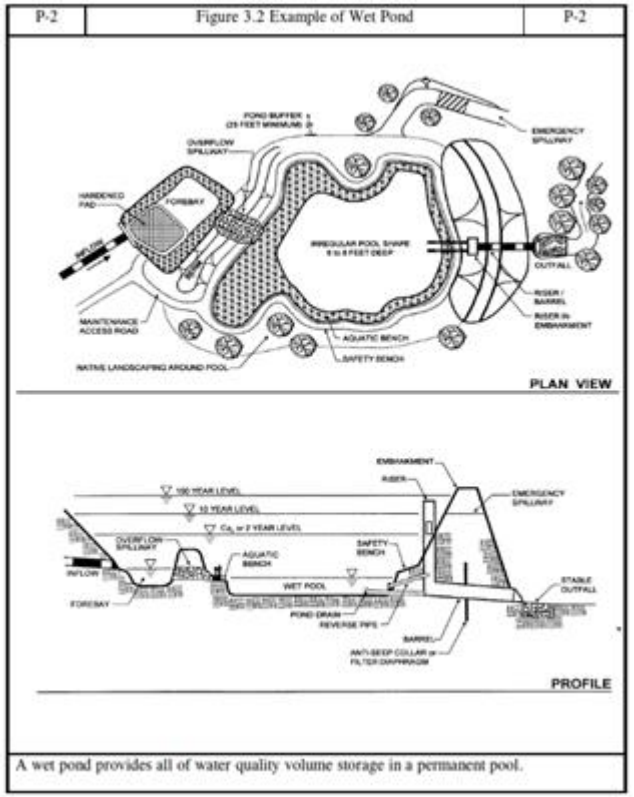
25 percent of sediment loads

to the Bay."

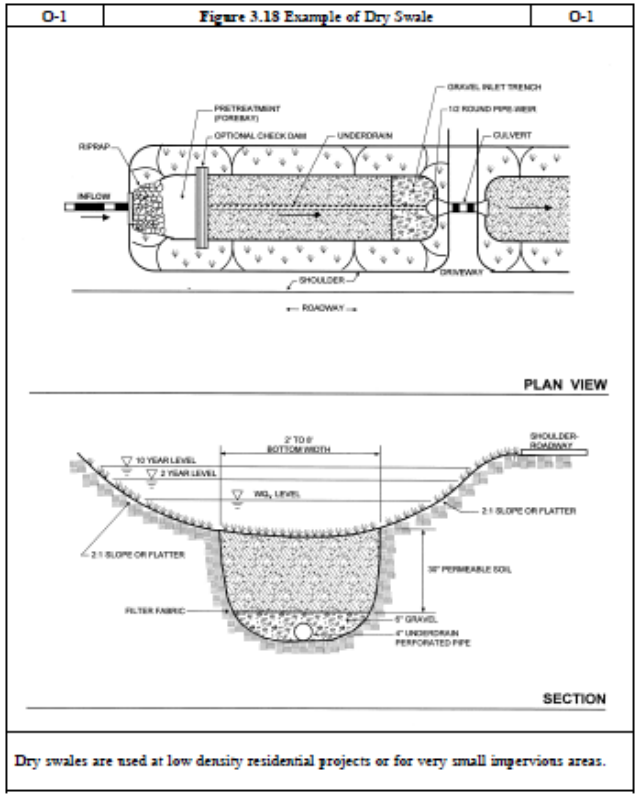
– Chesapeake Bay Program



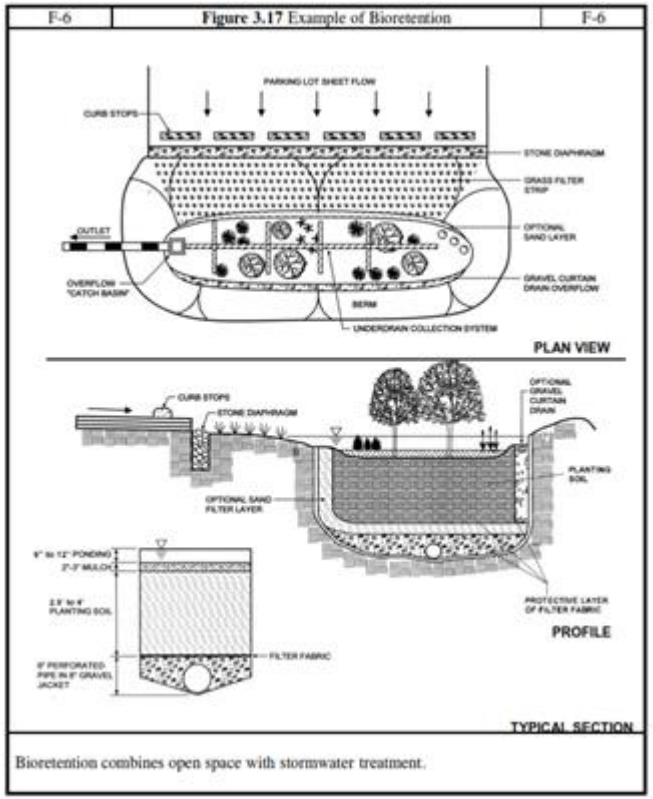
Traditional Stormwater Control Measures



Wet Pond



Swale



Bioretention

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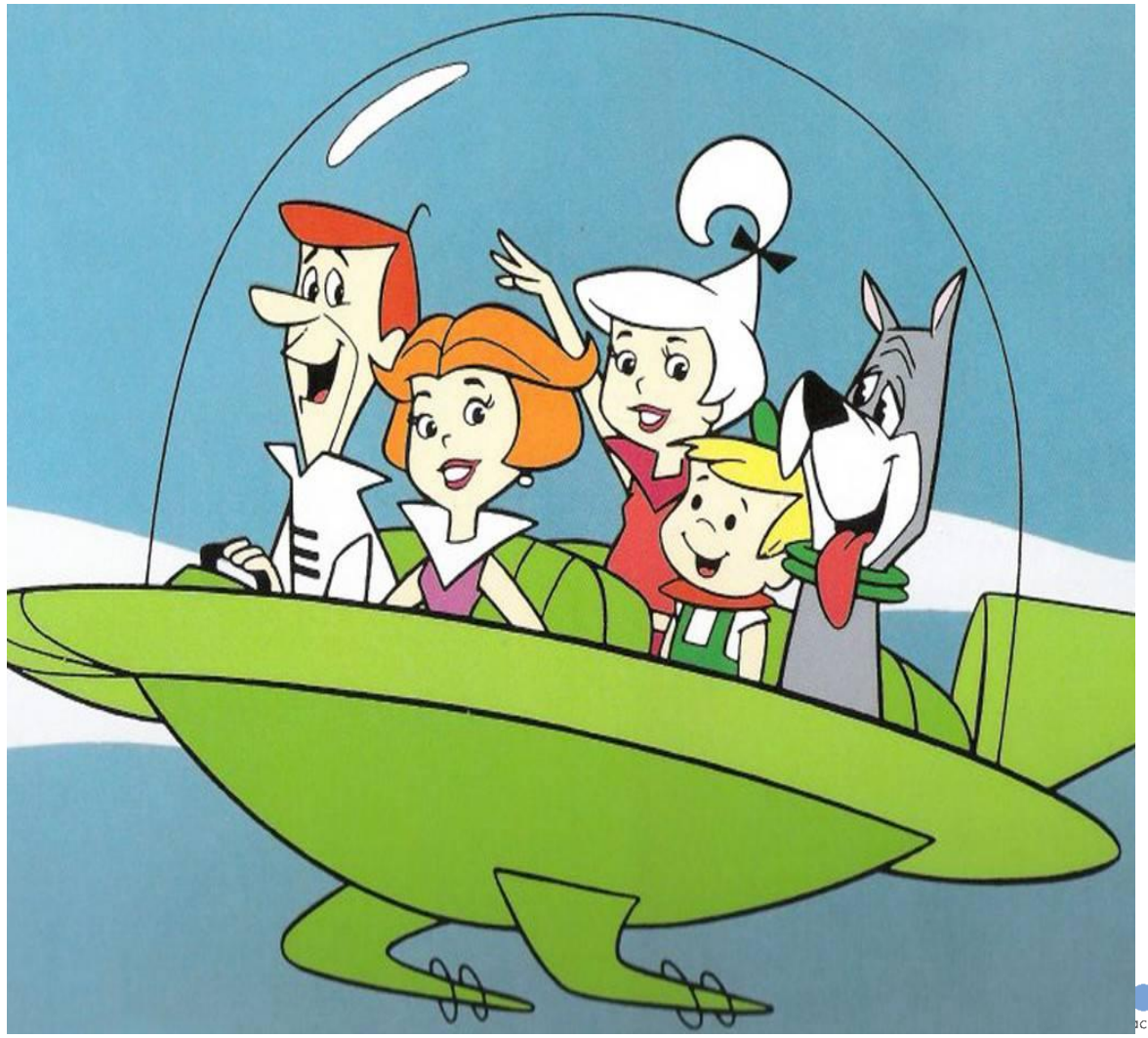
Best Management Practices... of the Past

Best Management Practices... of the Future

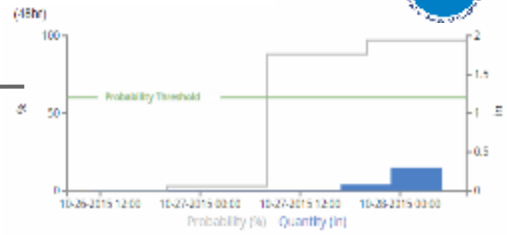


Continuous Monitoring and Adaptive Control (CMAC)

web-based dashboard

Opti
cloud software

NWS forecast



control panel

runoff

Adaptive use of Storage

water level sensor

actuated valve outlet

stormwater infrastructure

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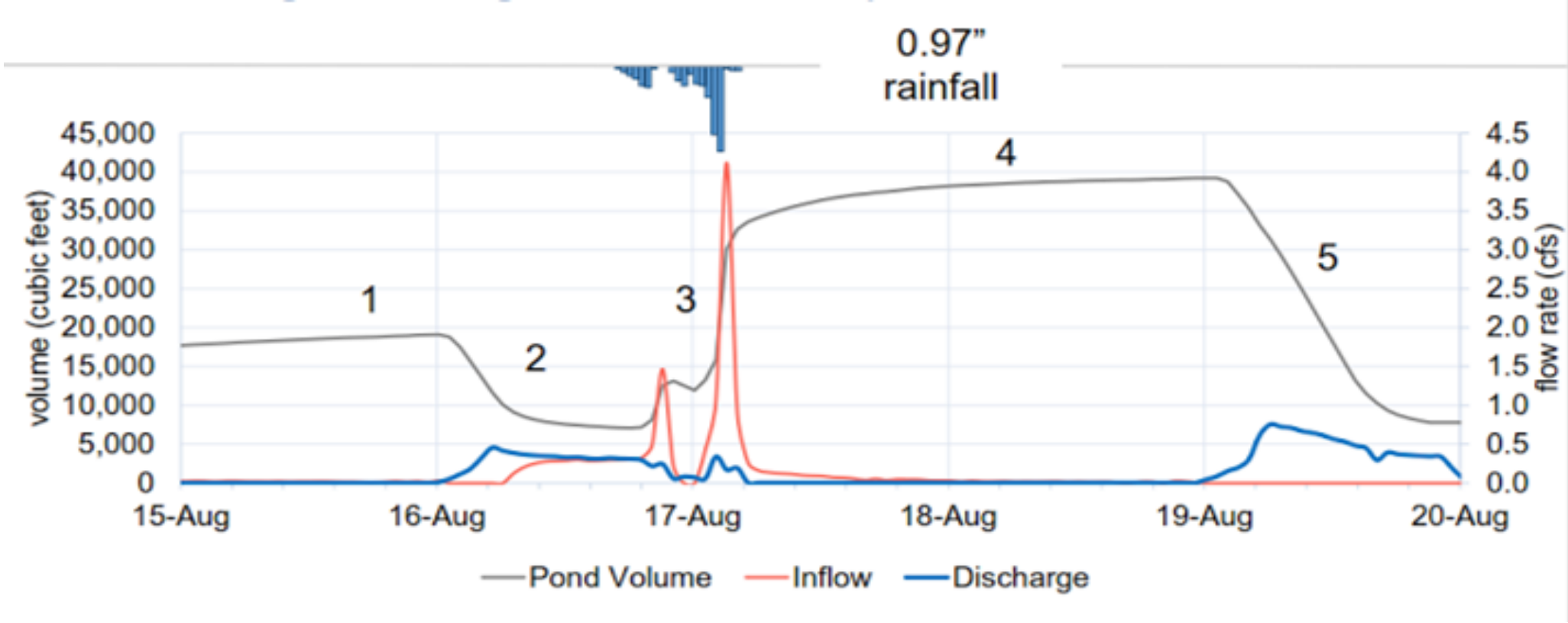
How CMAC Works

1. Read forecast
2. Prepare for incoming runoff
3. Manage discharge during wet weather
4. Meet retention goals
5. Manage discharge to return to dry weather level



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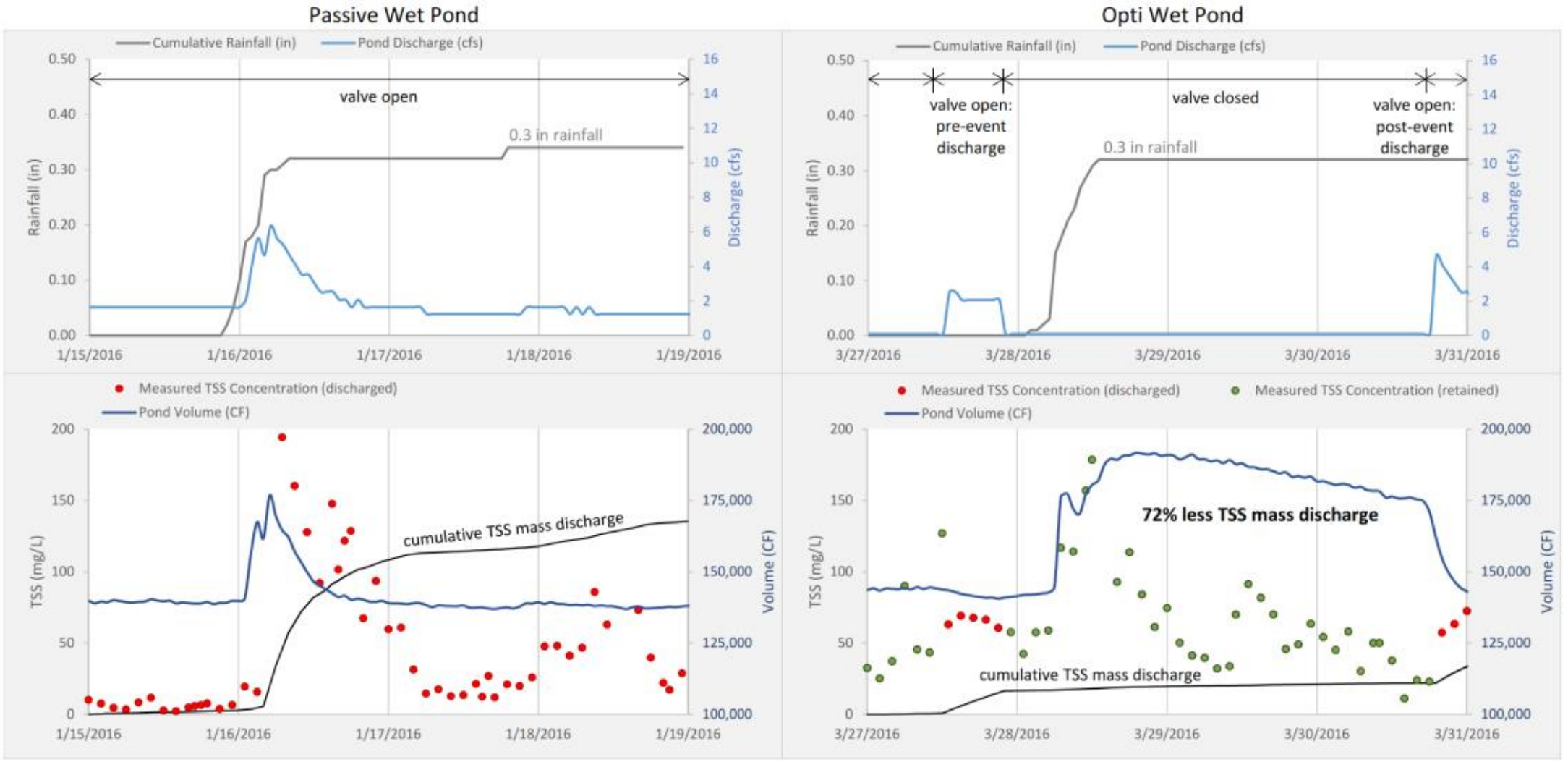
Passive vs Active Control



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Retrofit Hardware Components

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The Web Dashboard Provides Visibility and Control

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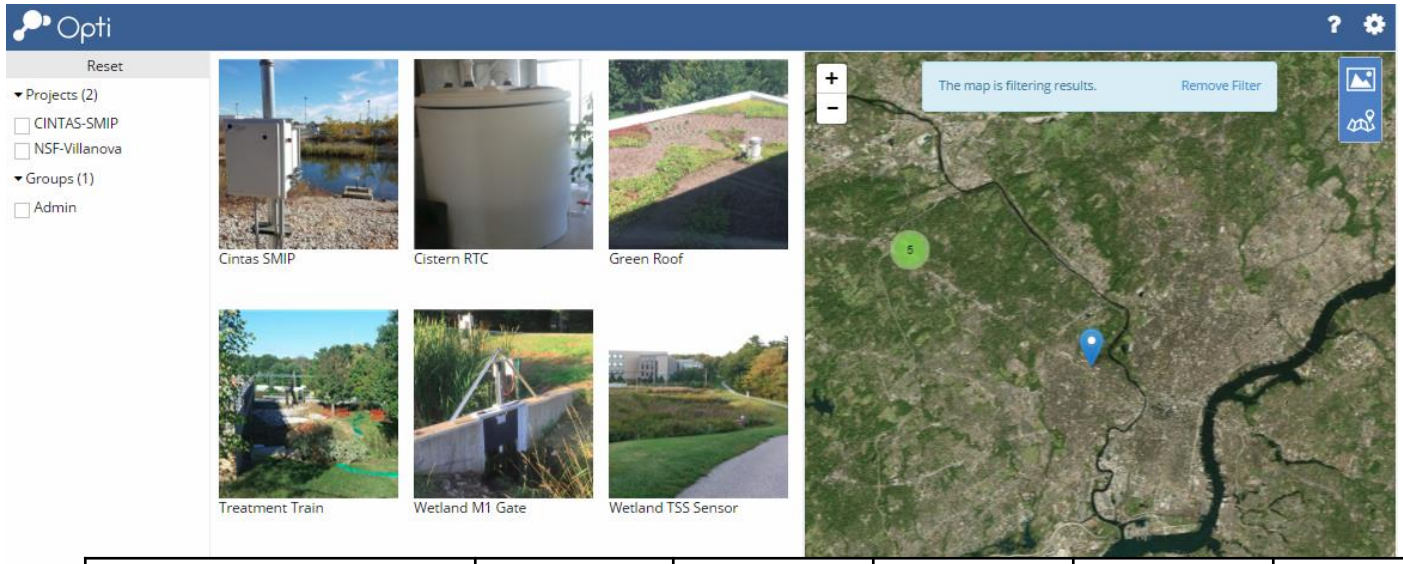
Software Control Parameters



Software is configured based on watershed characteristics and stakeholder goals

Control Parameters							
Forecast Duration			hours	*how far into the future to look at the weather forecast*			
Forecast Buffer (after storm events)			hours	*how long after the forecast shows no precipitation, to wait before believing it is dry weather*			
Maximum Wet Weather Target Water Level			feet	*OptiNimbus will modulate flow to avoid allowing water to rise above this level*			
Maximum Allowable Flow Rate Through Valve			cfs	*the estimated flow rate through the valve at the maximum valve % open and maximum wet weather target water level*			
Post-Storm Retention Time			hours	*how long to wait after wet weather ends to start release stored runoff*			
Post-Retention Drawdown Period			hours	*after the retention time, how long to spend draining the pond*			
Maximum Post-Retention Drawdown Flow Rate			cfs	*the highest target flow rate during the drawdown period, assuming the pond is full*			

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Wet Pond Enhancement

- Drainage Area – 33 acres
  - Impervious Area – 27 acres
- Existing Credits Claimed
  - 0.39 acre-feet treated at P=0.5 inches
  - Impervious Area Treated=13 Acres
- Surface Area – 0.56 acres
- Depth – 4 feet

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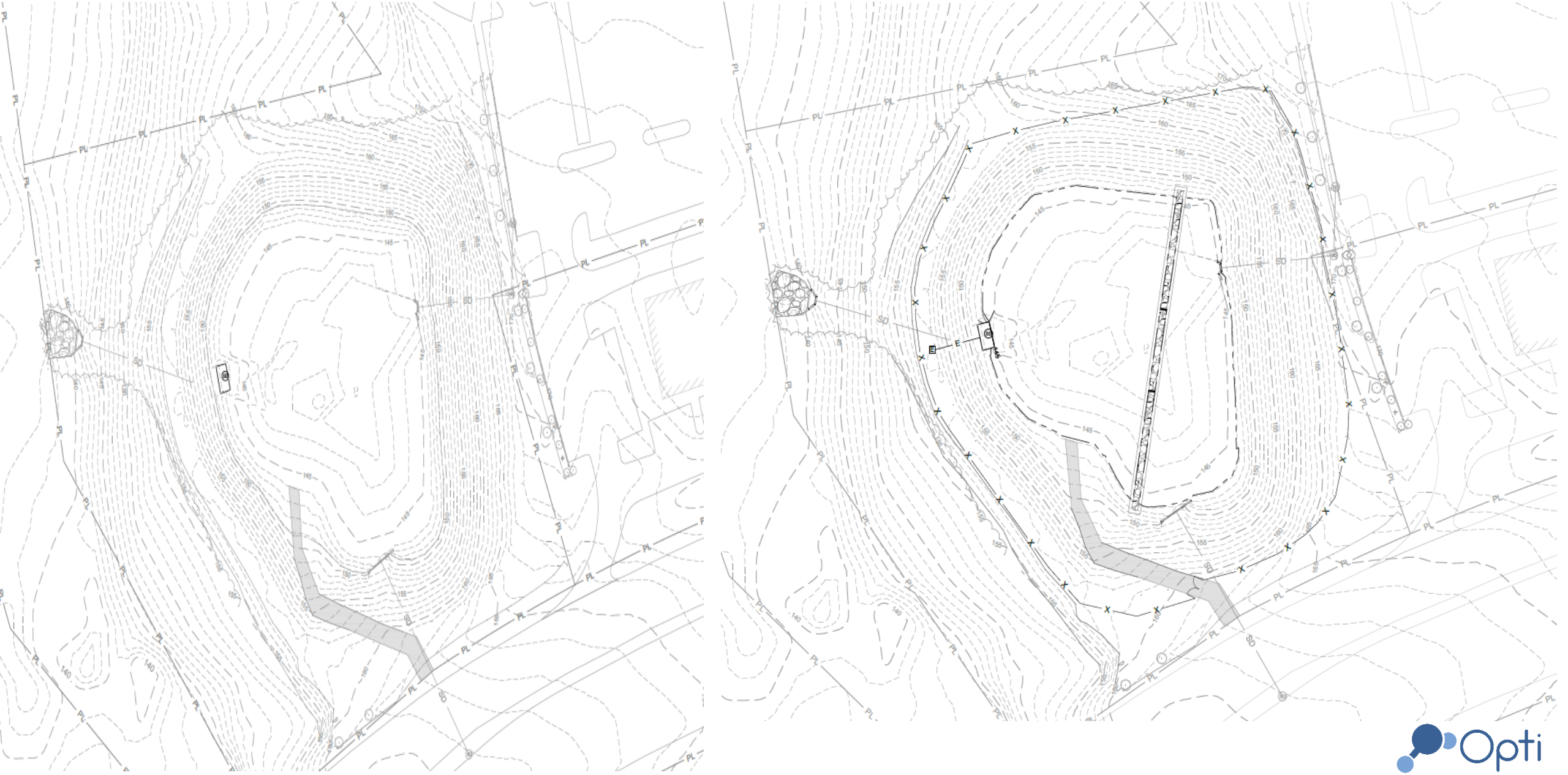

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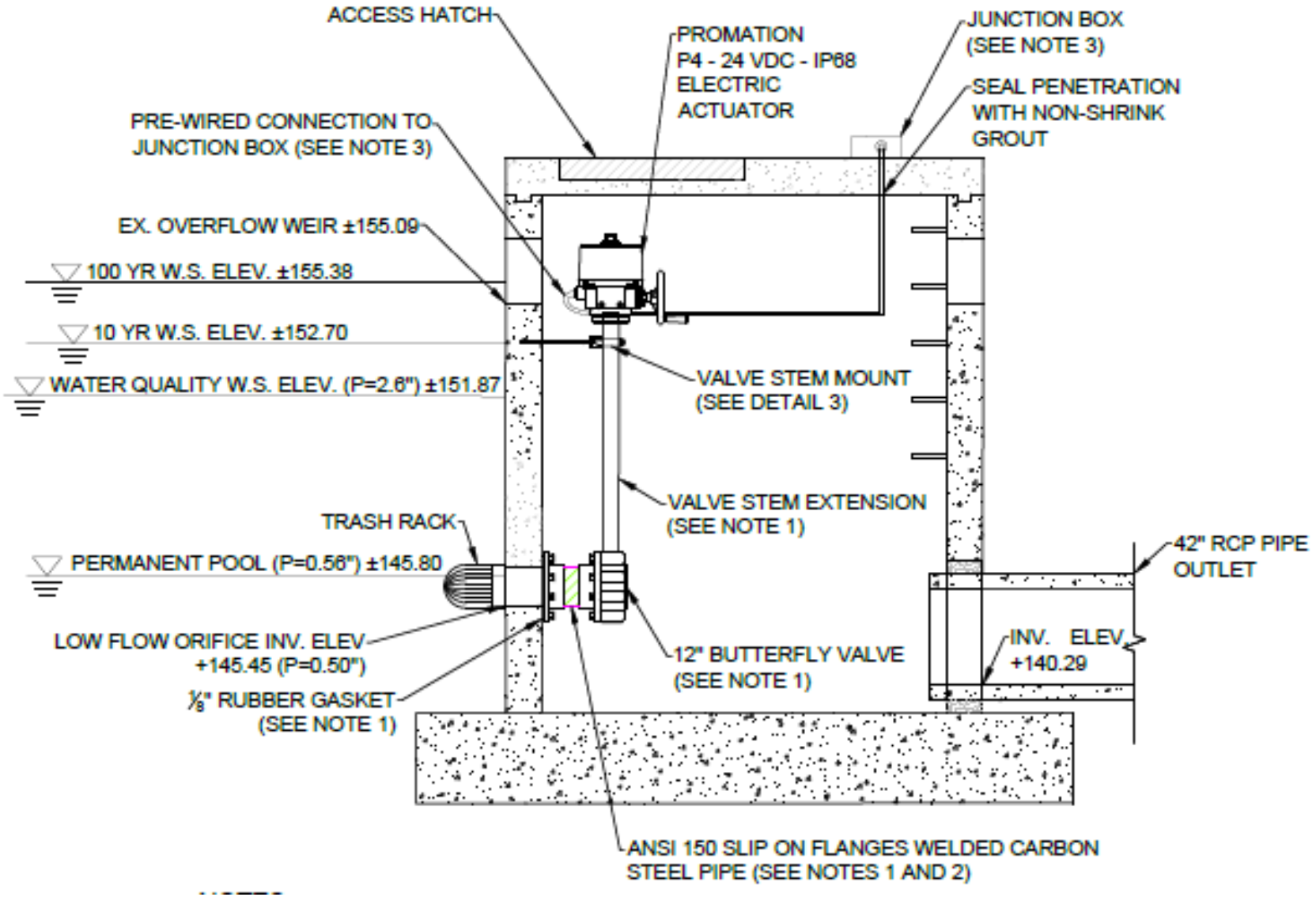
ACCESS HATCH
PROMATION
P4 - 24 VDC - IP68
ELECTRIC
ACTUATOR
JUNCTION BOX
(SEE NOTE 3)
SEAL PENETRATION
WITH NON-SHRINK
GROUT
PRE-WIRED CONNECTION TO
JUNCTION BOX (SEE NOTE 3)
EX. OVERFLOW WEIR ±155.09
100 YR W.S. ELEV. ±155.38
10 YR W.S. ELEV. ±152.70
WATER QUALITY W.S. ELEV. (P=2.6") ±151.87
VALVE STEM MOUNT
(SEE DETAIL 3)
VALVE STEM EXTENSION
(SEE NOTE 1)
TRASH RACK
PERMANENT POOL (P=0.56") ±145.80
42" RCP PIPE
OUTLET
LOW FLOW ORIFICE INV. ELEV
+145.45 (P=0.50")
⅛" RUBBER GASKET
(SEE NOTE 1)
12" BUTTERFLY VALVE
(SEE NOTE 1)
INV. ELEV
+140.29
ANSI 150 SLIP ON FLANGES WELDED CARBON
STEEL PIPE (SEE NOTES 1 AND 2)

Upgrade

- Drainage Area – 33 acres
  - Impervious Area – 27 acres
- Proposed Credits Claimed
  - Impervious Area Treated=37 acres
  - 5.59 acre-feet stored at P=2.6 inches
  - Increased Pollutant Removal
    - TN=203, TP=31, TSS=20,874
      - Pounds per Year

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Cost & Benefits

Rainfall Depth Treated (inches)	Pollutant Removal Efficiency		
	Total Nitrogen	Total Phosphorus	Total Suspended Solids
0.5	26%	41%	52%
1.0	33%	52%	66%
2.6	40%	63%	80%

	Impervious Area Credits (acres)	Total Phosphorus Removal (lbs/year)
Existing (P=0.5 in)	13.40	19.79
Proposed (P=2.6 in)	37.52	31.86
Approx. Cost per Credits Claimed (Year 1)	$10,000	$12,000
Approx. Cost per Credits Claimed (Year 2+)	$150	$160

- Shorter Permitting Time Period
- Shorter Construction Time
- Construction Cost ($373,000)
- Retrofit within pond's existing footprint

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Stormwater Storage OPTImized

Thank You

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