Optimizing Performance
of Existing Stormwater Infrastructure Through Real Time Control Retrofits: A Minnesota Demonstration Site

Project Team:

David Roman, PE, CFM, CPESC

David Richardson, PE, PG

Geosyntec consultants

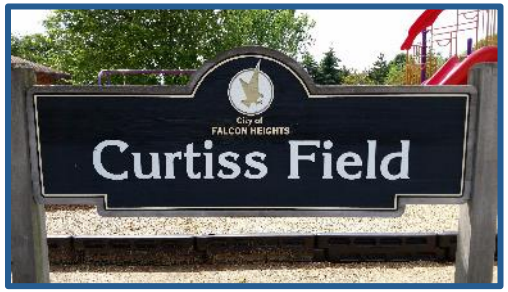
Scott Landers, PE, CPESC

Opti

Project Partners & Collaborators:

Capitol Region Watershed District

HoustonEngineering Inc.



Presented at:

NEW ENGLAND WATER ENVIRONMENT ASSOCIATION
NEWEA
WORKING FOR WATER QUALITY

Geosyntec consultants

engineers | scientists | innovators

January 25, 2016

Background

*Figure courtesy of Feasibility Study Report prepared by Houston Engineering, Inc. (2013)

Background

Capitol Region Watershed District
Curtiss Pond

- Falcon Heights Catch Basins
- Subwatersheds
- St. Paul Storm Sewer Pipes
- Falcon Heights Storm Sewer Manholes
- Falcon Heights Storm Sewer Pipes
- Drainage Area Outlets

Drainage Area	Area(in Acres)
DA 1	22
DA 2	3.4
DA 3	1.0
DA 4	7.2
DA 5	0.3
DA 6	0.8
DA 7	3.6

N W E S

0 125 250 500 Feet

Source: MN DOT, City of Falcon Heights, City of St. Paul
Imagery: 2009 Ramsey County Aerials

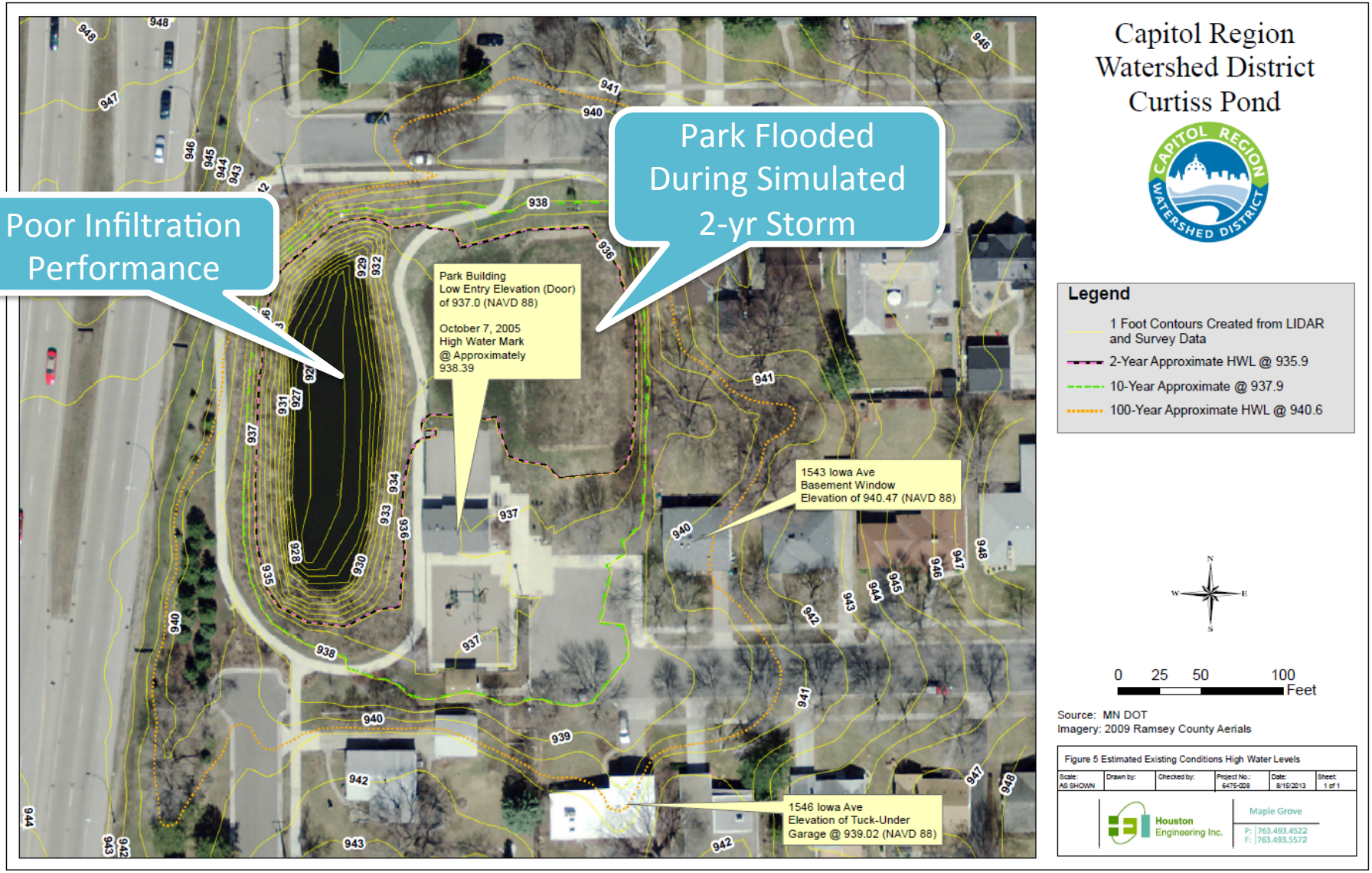
Figure 3 Drainage Areas Fully or Partially Contributing to Curtiss Pond

Scale:	Drawn by:	Checked by:	Project No.:	Date:	Sheet:
AS SHOWN	SMW		6475-008	8/15/2013	1 of 1

Houston Engineering Inc.
Maple Grove
P: 763.493.4522
F: 763.493.5572

*Figure courtesy of Feasibility Study Report prepared by Houston Engineering, Inc. (2013)

Background



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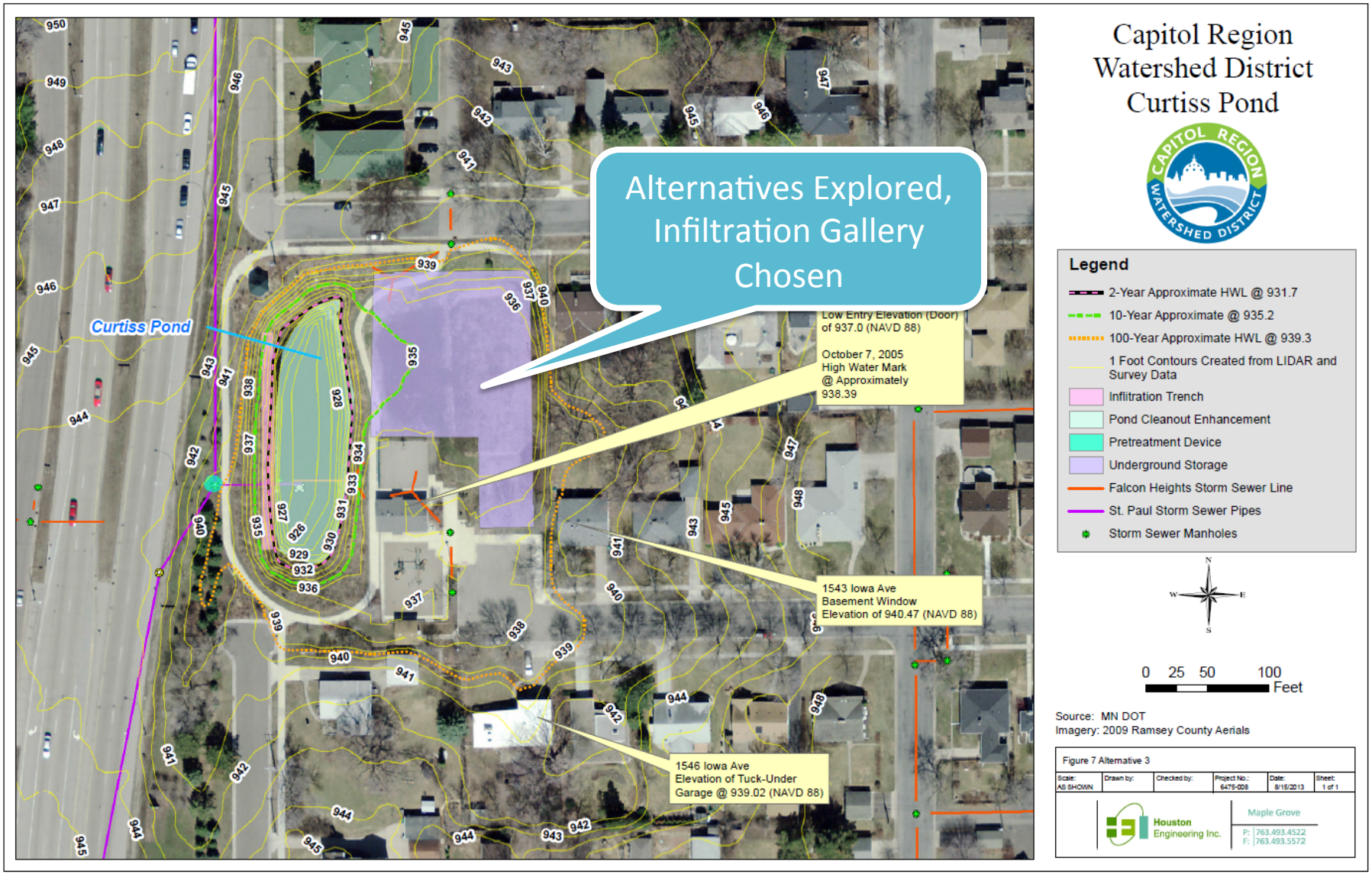

*Figure courtesy of Feasibility Study Report prepared by Houston Engineering, Inc. (2013)

Background

*Image Courtesy of: http://www.capitolregionwd.org/our-work/

Background

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Challenge for Capital Region Watershed District

- **Can System Performance be Further Improved to meet site needs?**

- **Hurdles:**

Cost Constraints	Limited Footprint	Site Constraints	No Outlet!

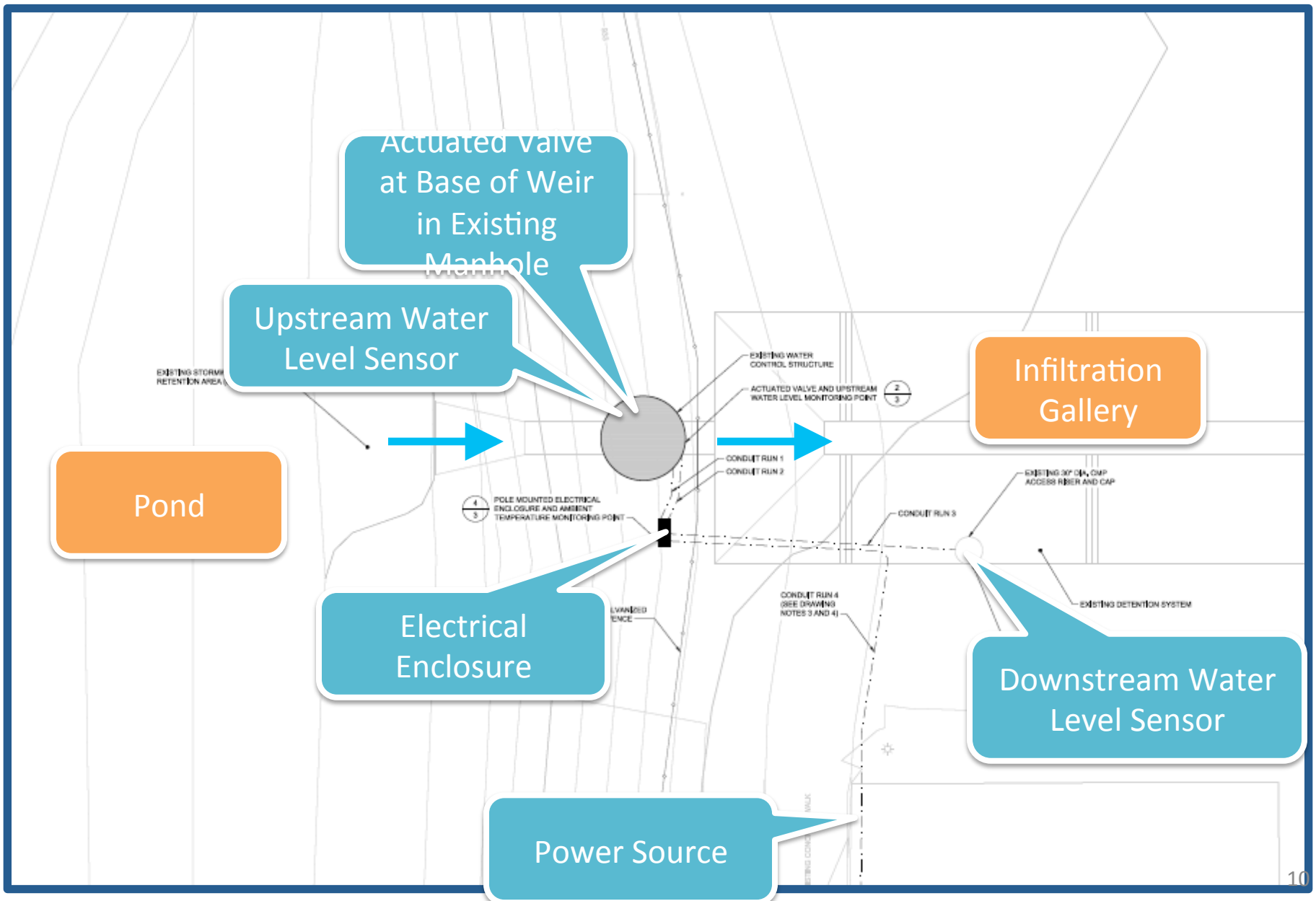
Solution: Intelligent Retention!

- **Primary Goal:**
  - Increase Efficiency and of Pond and Infiltration Gallery by Retrofitting with Real-Time Monitoring and Control

- **System Benefits:**

Minimize Flooding & Reduce Site Risk	Intelligent Infiltration
Minimal Maintenance	Remote Monitoring & Programming

Component Overview

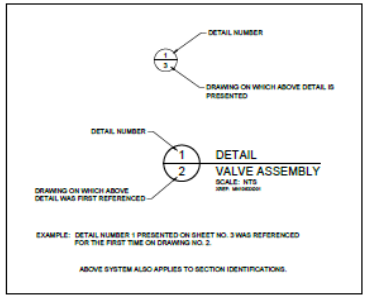


Design

MONITORING AND CONTROL SYSTEM FOR CURTISS POND

1551 WEST IOWA AVE FALCON HEIGHTS, MN 55108

FINAL DESIGN MARCH 2015 - BIDDING SET



DETAIL IDENTIFICATION LEGEND

SOURCE: MICROSOFT CORPORATION BING 2014

LIST OF DRAWINGS

DRAWING NO.	DRAWING TITLE
1	TITLE SHEET
2	PROPOSED SITE CONDITIONS
3	DETAILS I
4	DETAILS II

PREPARED FOR:

CAPITOL REGION WATERSHED DISTRICT
1410 ENERGY PARK DRIVE, SUITE 4
SAINT PAUL, MN 55108

PREPARED BY:

Geosyntec consultants

GEOSYNTEC CONSULTANTS
100 WASHINGTON AVENUE SOUTH, SUITE 1590
MINNEAPOLIS, MN 55401
PHONE: 612.253.8200

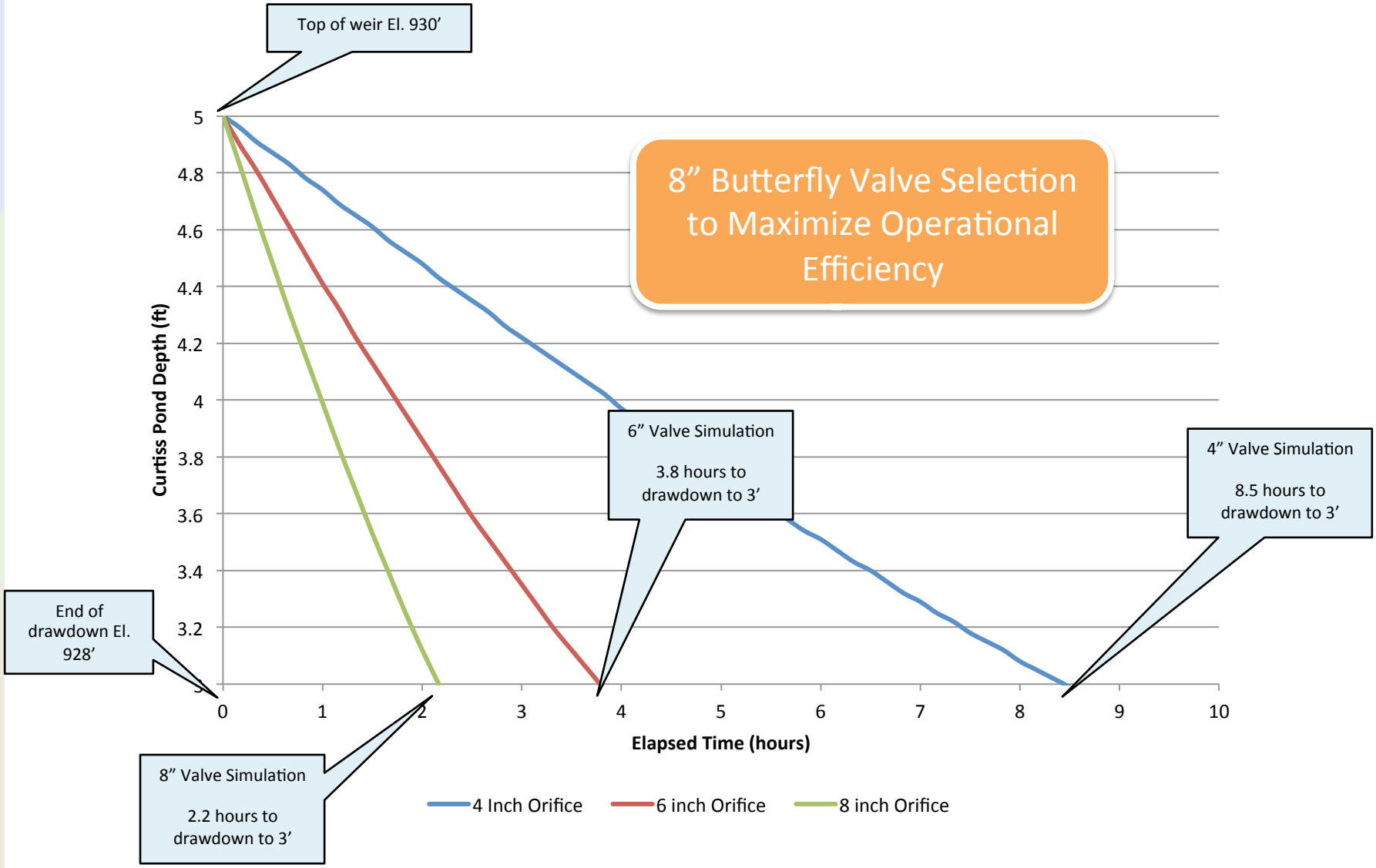
REV	DATE	DESCRIPTION	ORN	APP

Geosyntec consultants
100 WASHINGTON AVENUE SOUTH, SUITE 1590 MINNEAPOLIS, MN 55401

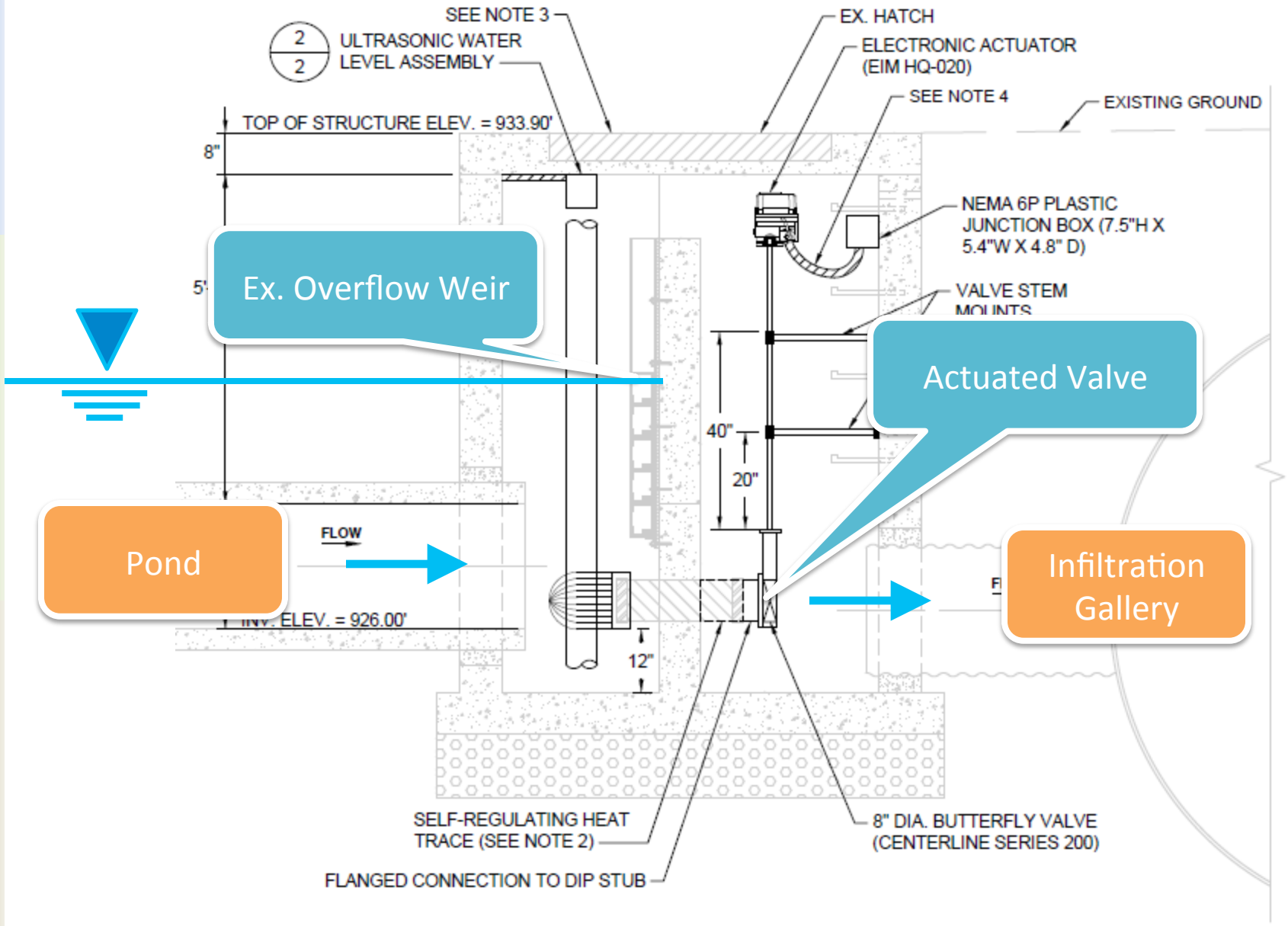
TITLE: TITLE SHEET
PROJECT: MONITORING AND CONTROL SYSTEM FOR CURTISS POND
SITE: 1551 WEST IOWA AVE FALCON HEIGHTS, MN 55108

DESIGN BY:	DCR	DATE:	MARCH 2015
DRAWN BY:	SRN	PROJECT NO.:	MN1063
CHECKED BY:	DCR	FILE:	MN1063F001
REVIEWED BY:	DLR	DRAWING NO.:	1 OF 4
APPROVED BY:	DLR		

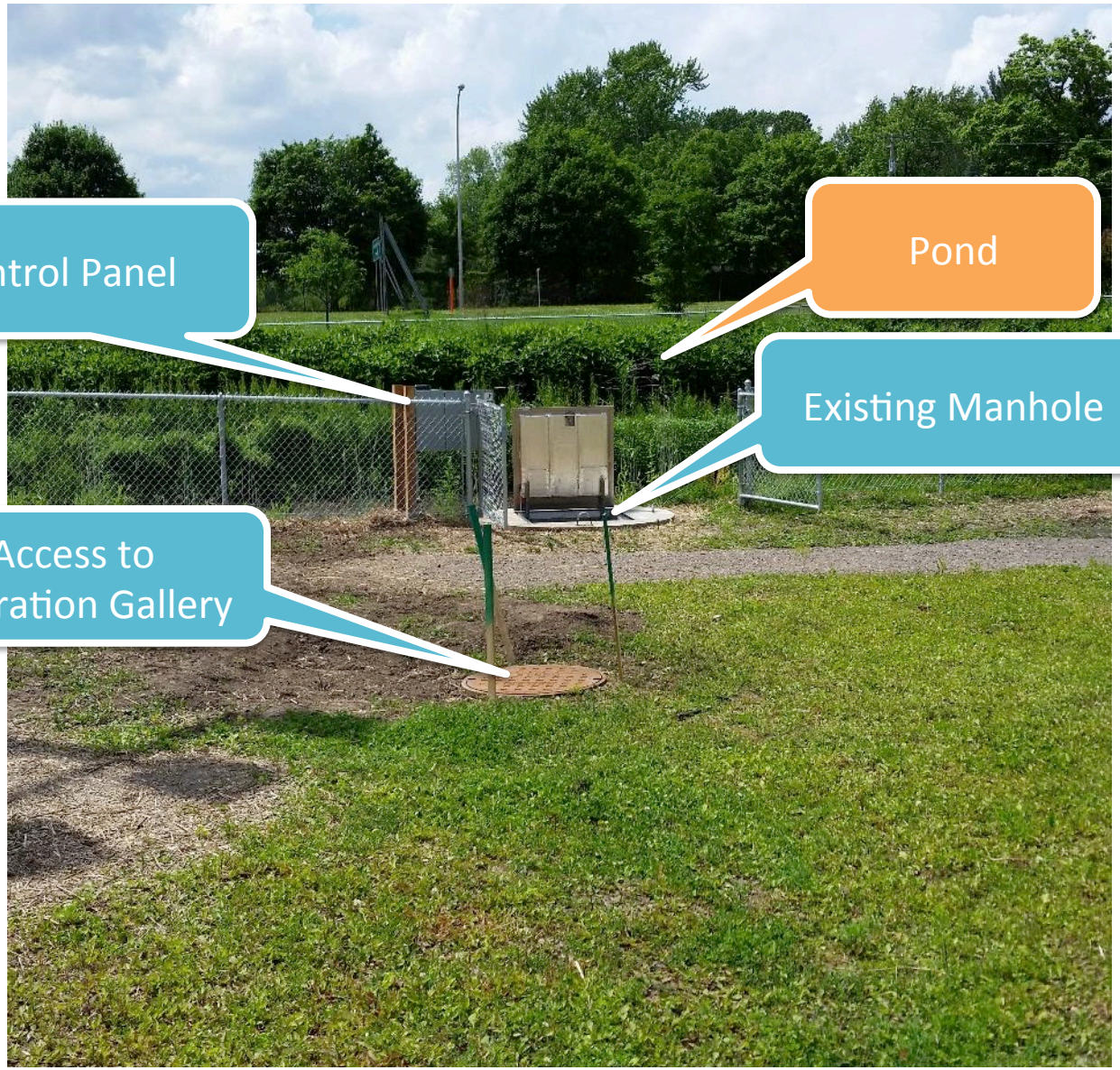
Valve Sizing



Manhole Detail

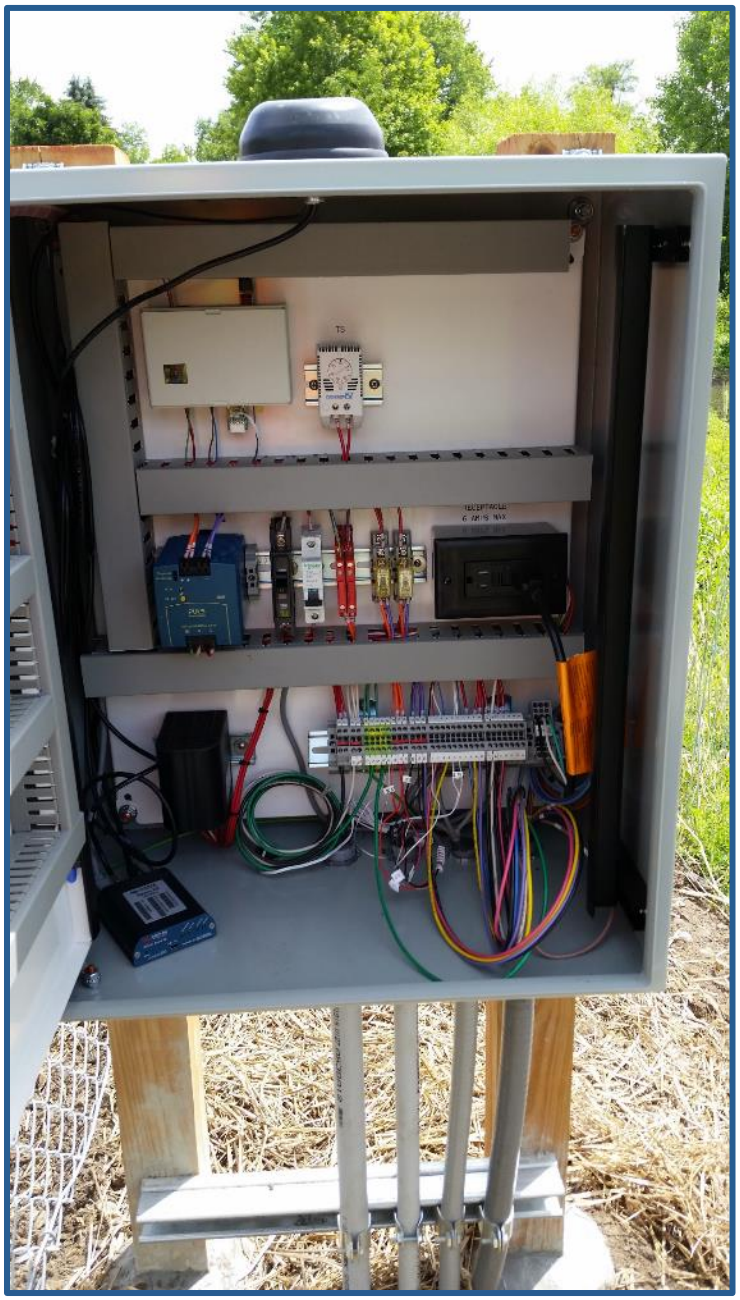


Commissioning

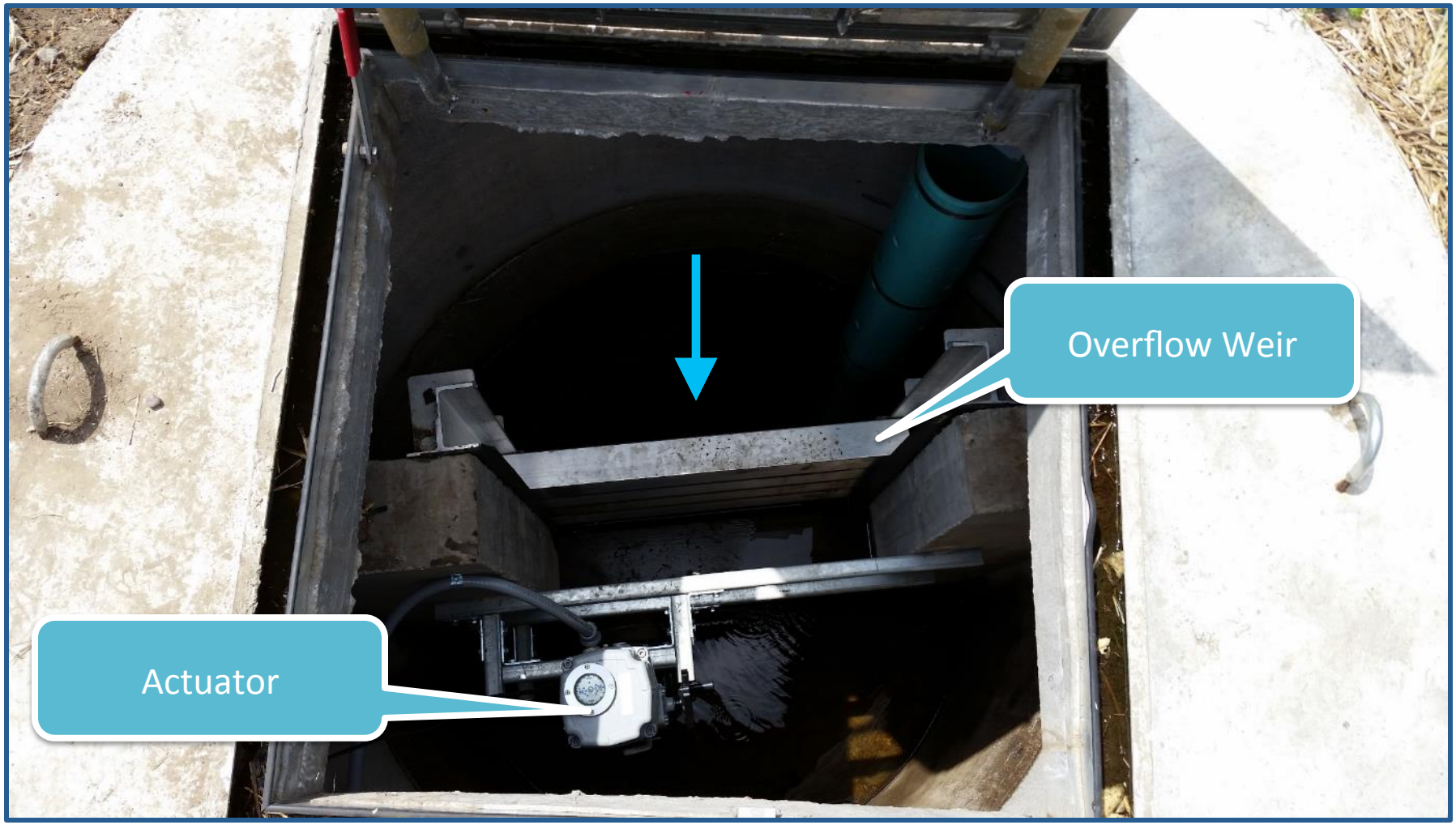


Commissioning

Commissioning



Commissioning



Commissioning

Commissioning

O&M and Training

Geosyntec consultants

Opti

Monitoring and Control System for Curtiss Pond

Operations and Maintenance Manual

Prepared for

Capitol Region Watershed District
1410 Energy Park Drive
Suite 4
Saint Paul, MN 55108

Prepared by

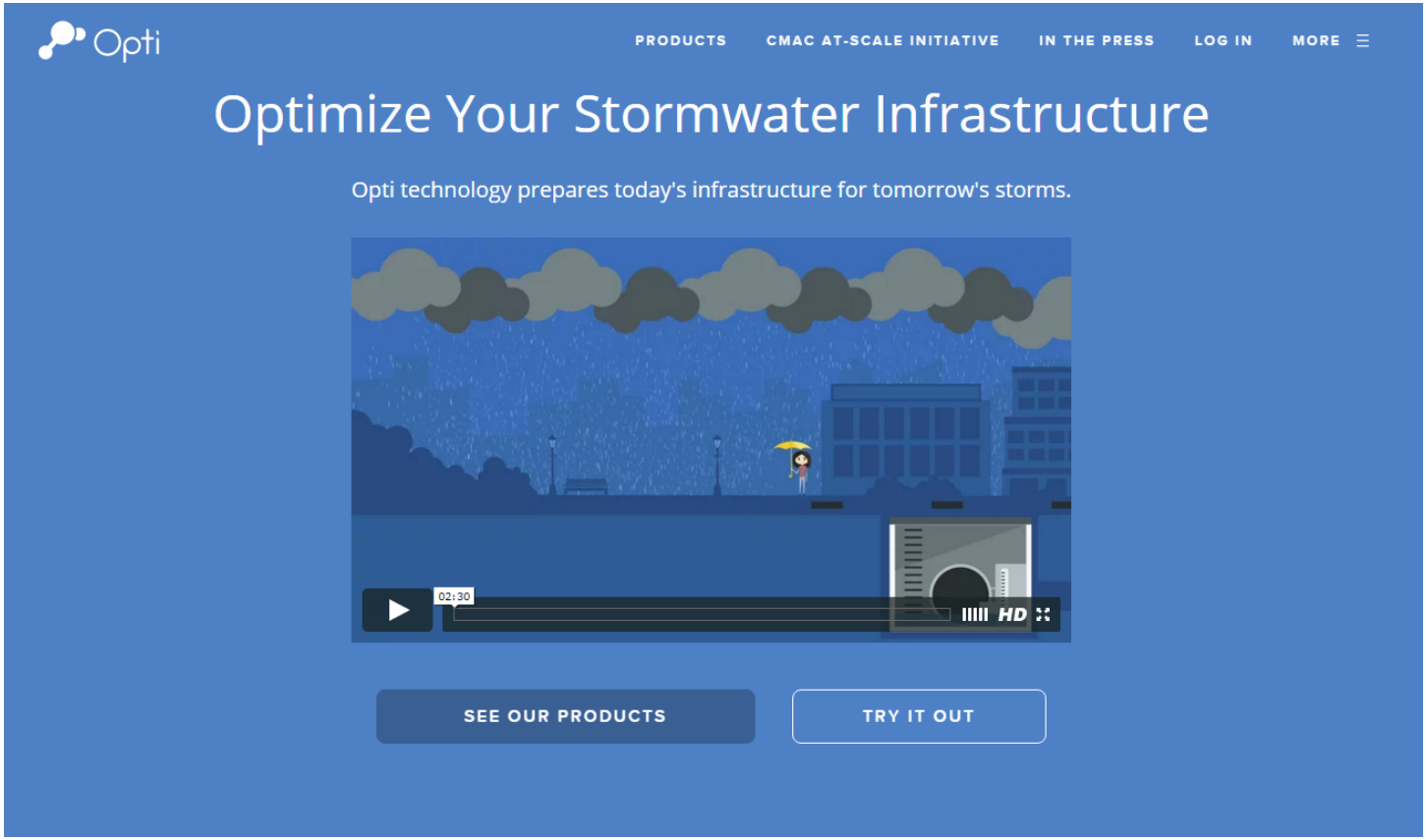
Geosyntec Consultants
1330 Beacon Street
Brookline, MA 02446

OptiRTC, Inc.
356 Boylston Street
2nd Floor
Boston, MA 02116

July 2015

How Does the System Function?

- **OptiRTC** is a cloud-native platform that uses sensor data, forecast information, & modeling to actively control and/or maintain/monitor water infrastructure.
- https://www.optirtc.com/



Traditional Infrastructure

- Stormwater runoff is managed with passive infrastructure designed for a single purpose and design storm
- Performance and maintenance needs of stormwater infrastructure are manually calculated or unknown

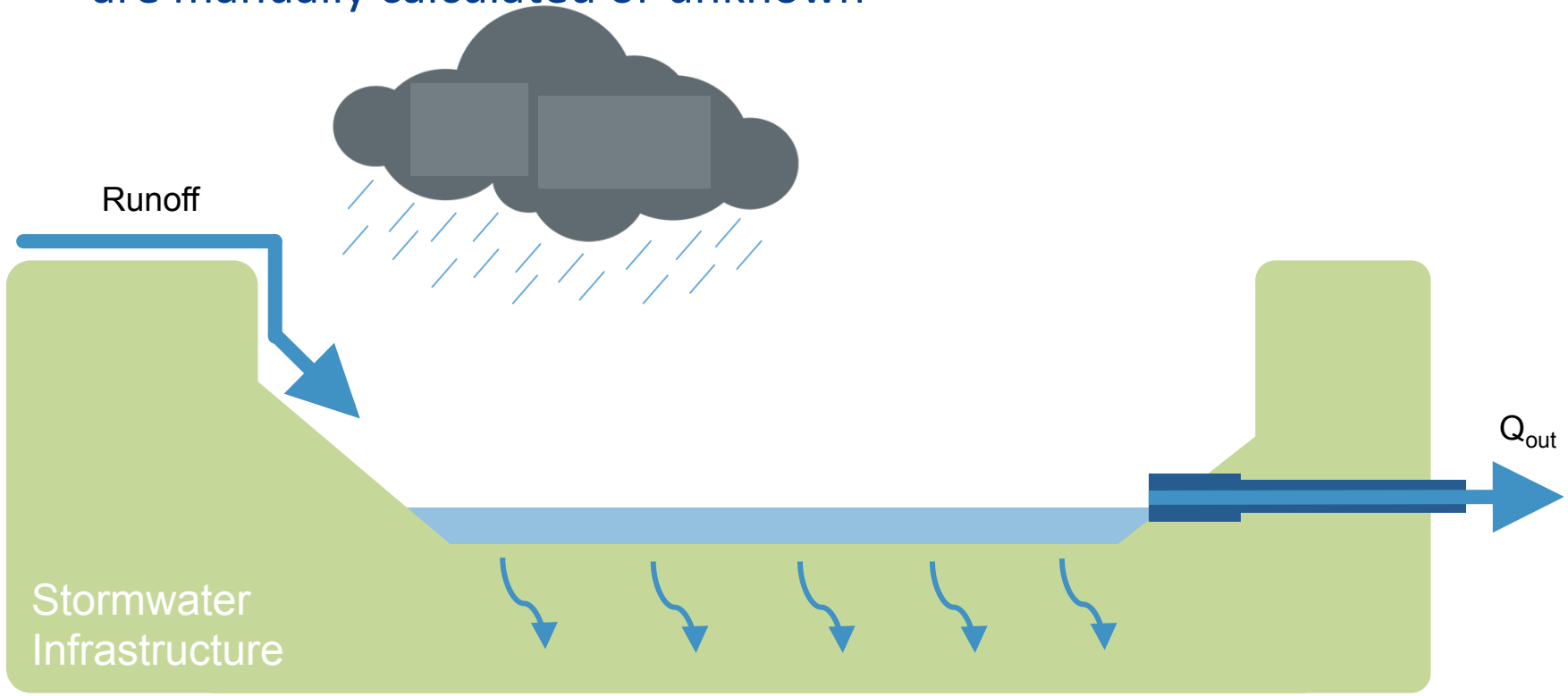


*Image Courtesy of OptiRTC

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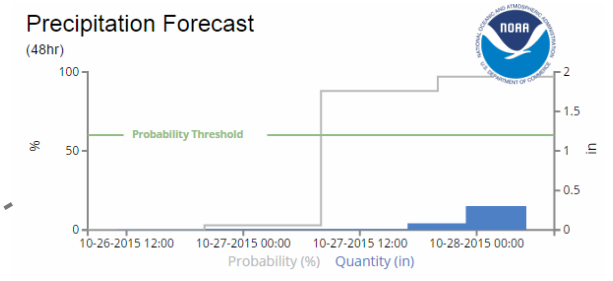
Continuous Monitoring and Adaptive Control



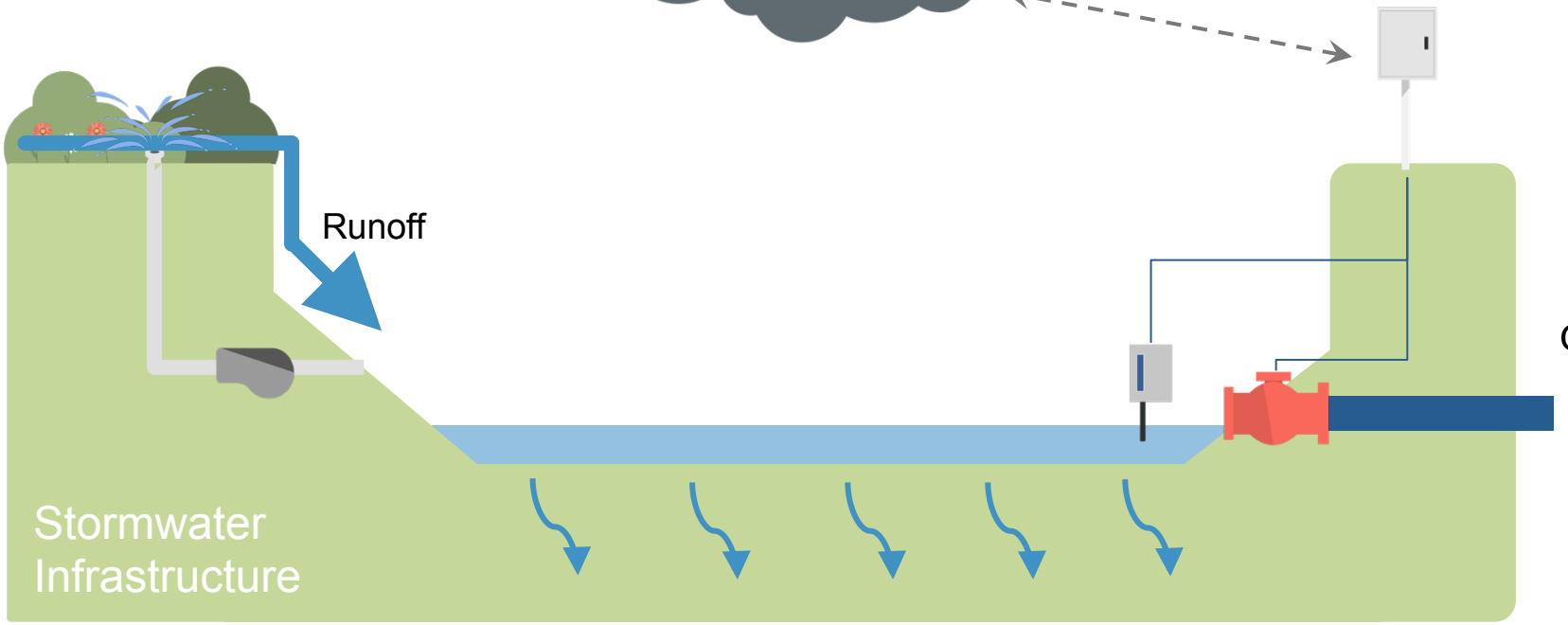


*Image Courtesy of OptiRTC

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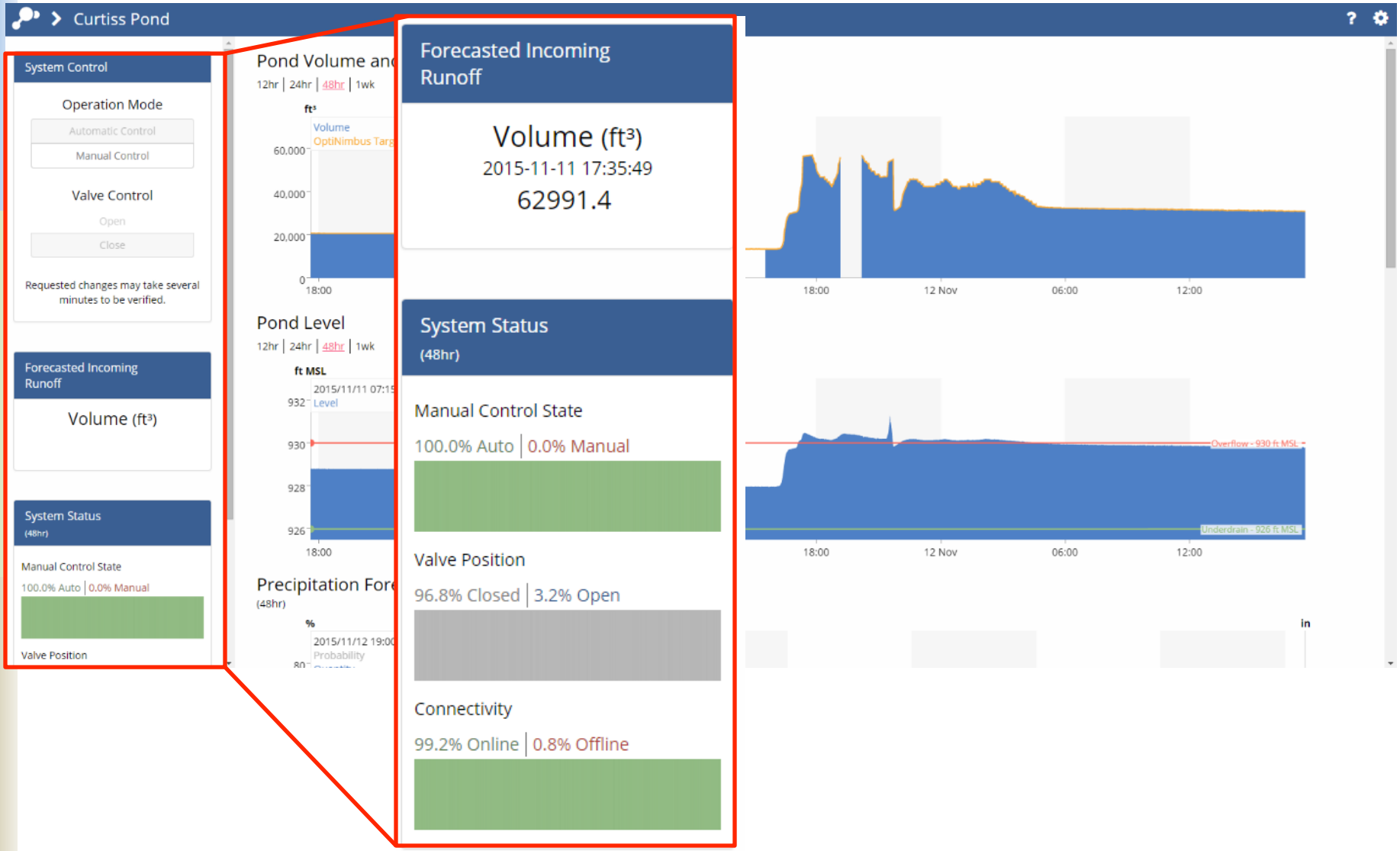
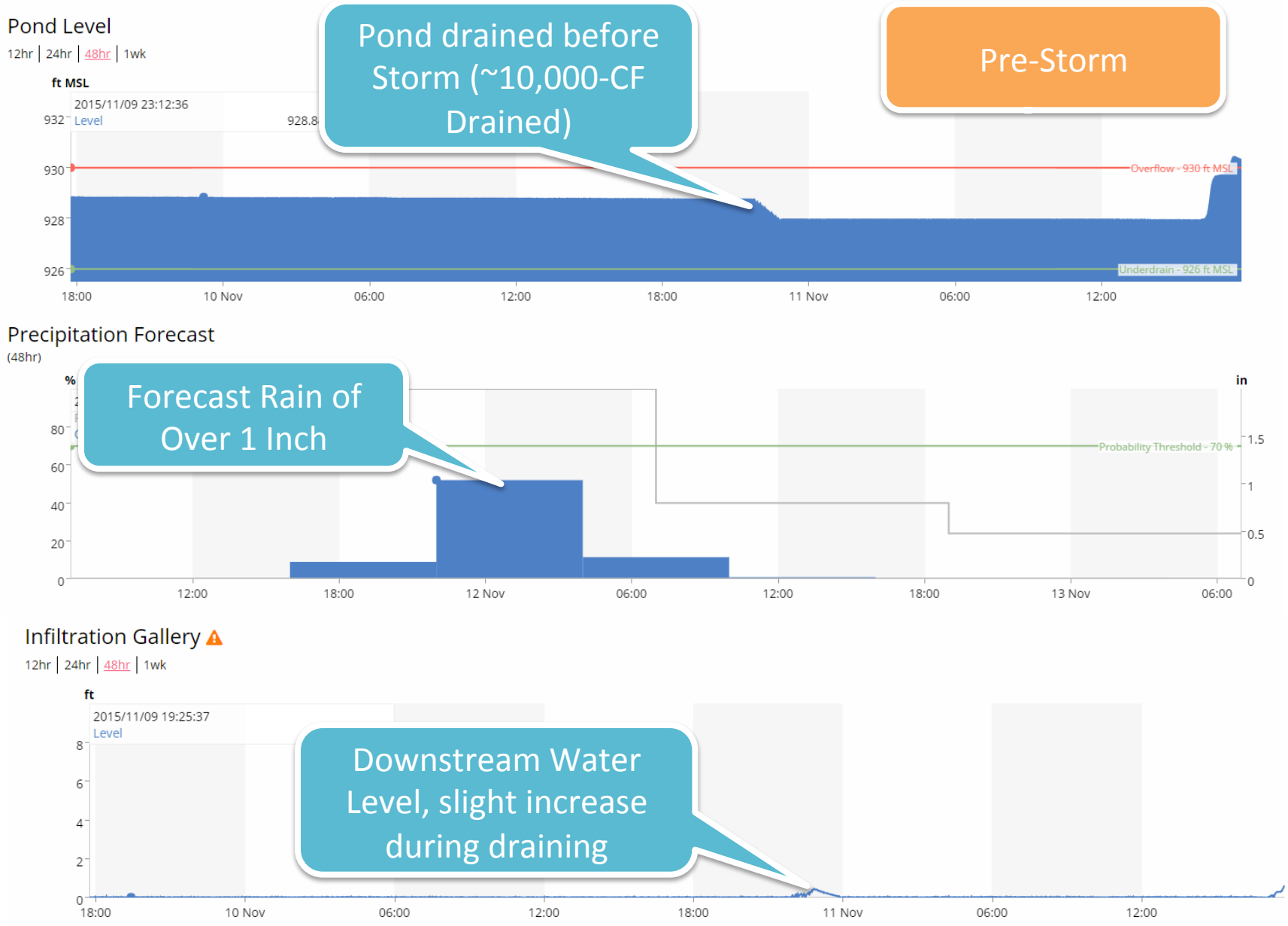
System Operational Sequence

Example Dashboard Visualization

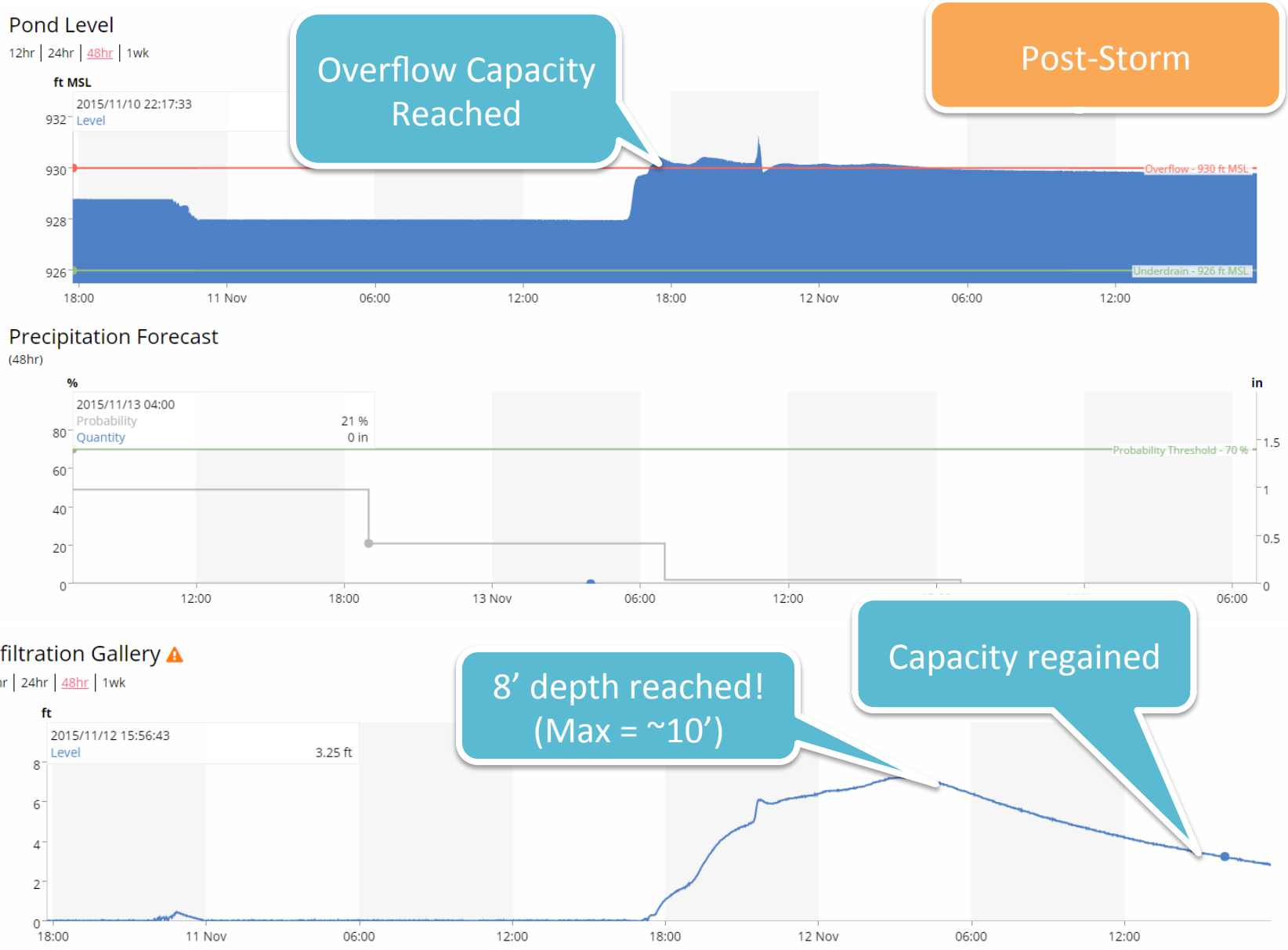
Example Dashboard Visualization



Example Dashboard Visualization



Example Dashboard Visualization



How much of a difference can these systems make?

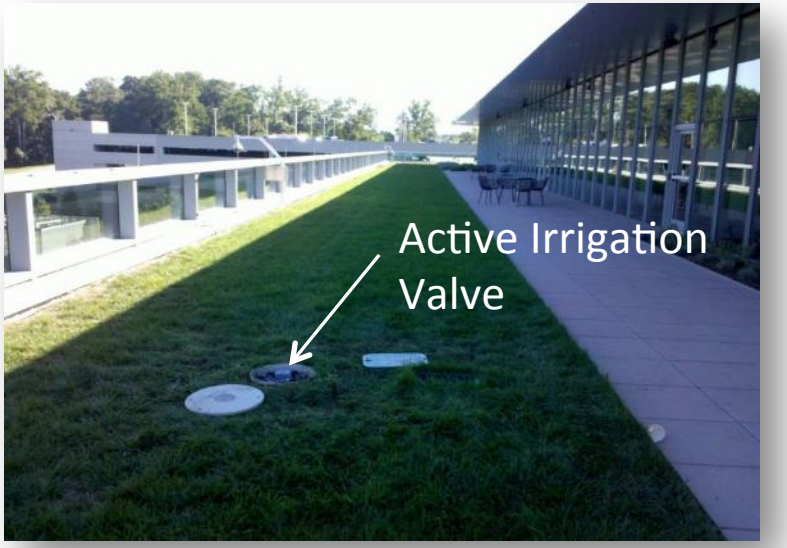
Results from a similar system at NC State University:

	Observed (With Controls)	Modeled (No controls)
Overall Wet Weather Discharge Volume Reduction	86%	21%
Mean Peak Flow Reduction	93%	11%
Overflow Frequency	18%	58%

*DeBusk, 2013

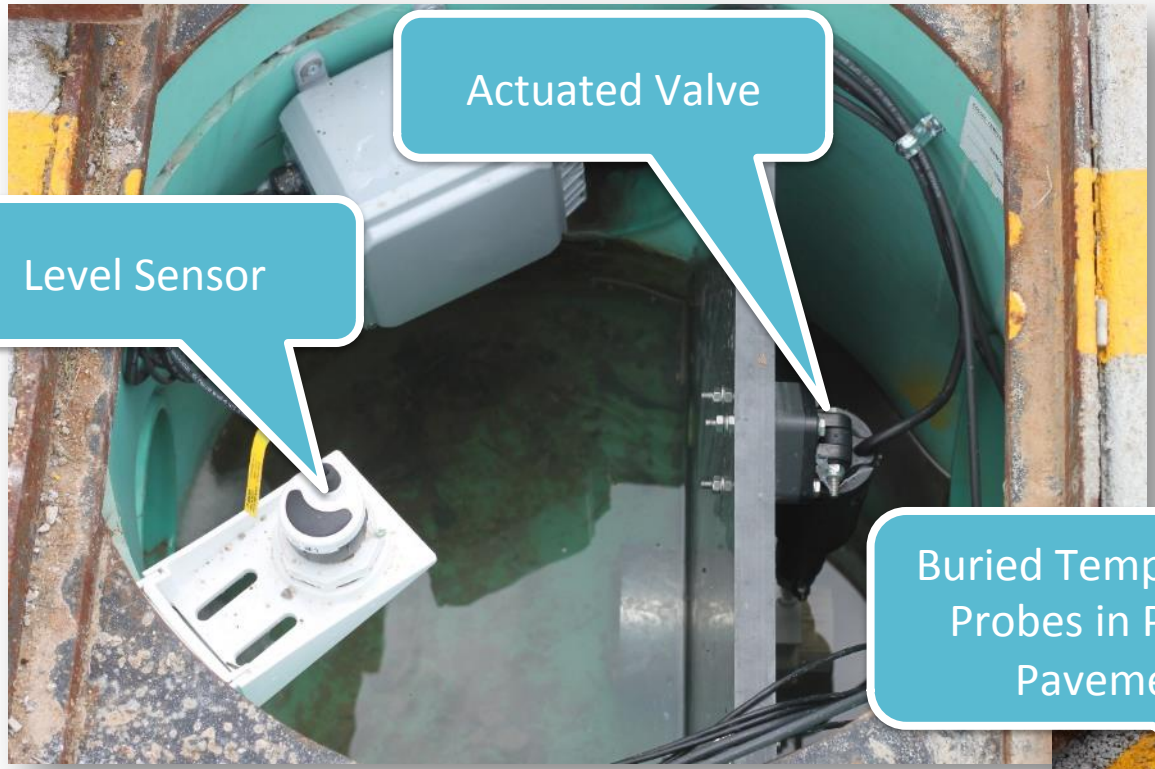
Many Other Applications

- **Green Roofs**



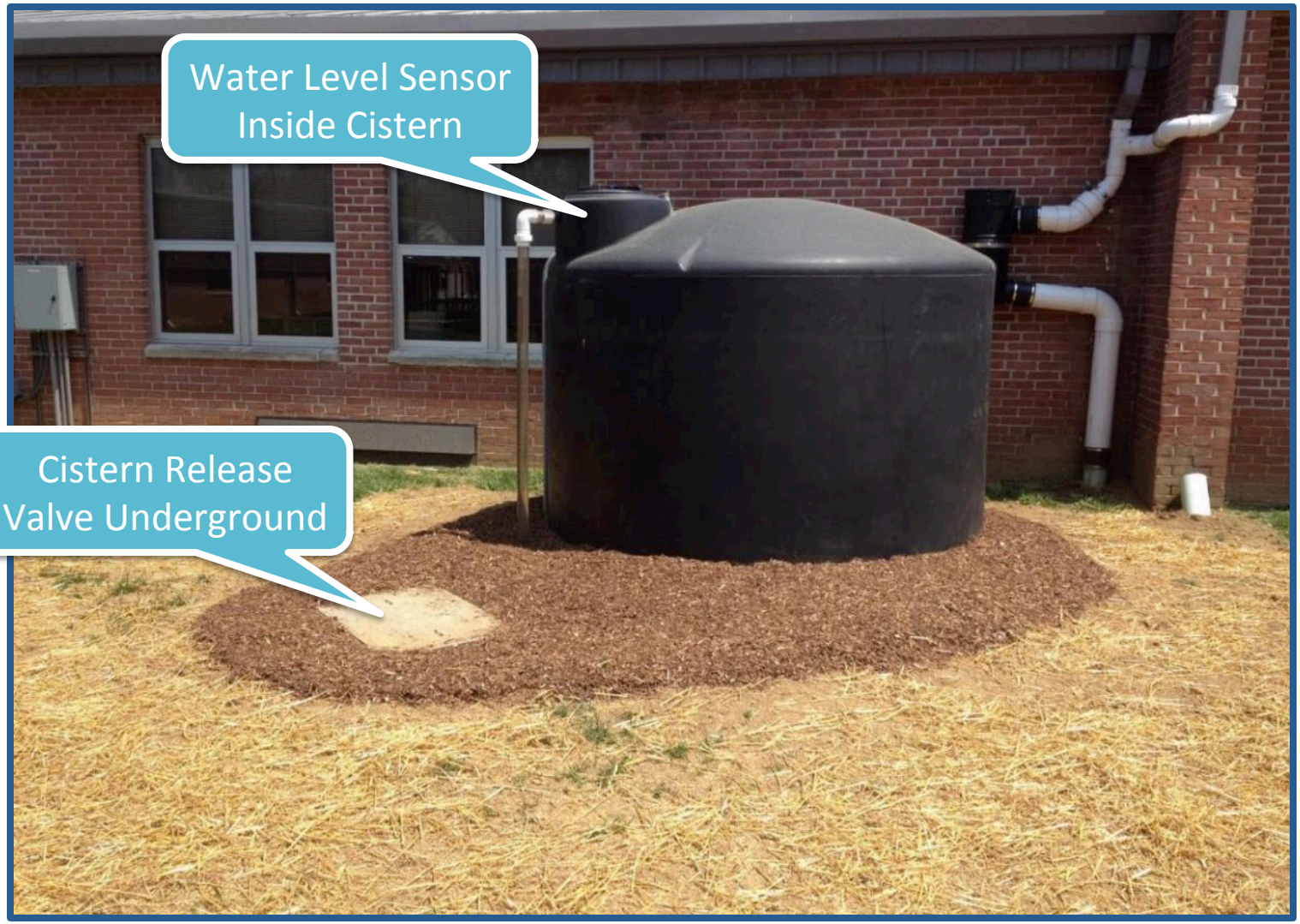
Many Other Applications

- **Porous Pavement**



Many Other Applications

- **Rainwater Harvesting**



Thank you for your time!

Contact:
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(droman@geosyntec.com)

Geosyntec consultants

Special Thanks to:

CAPITOL REGION WATERSHED DISTRICT

HoustonEngineering Inc.

Opti