Upper Mill Creek
Green Infrastructure Research

Update on U.S. EPA-ORD Projects

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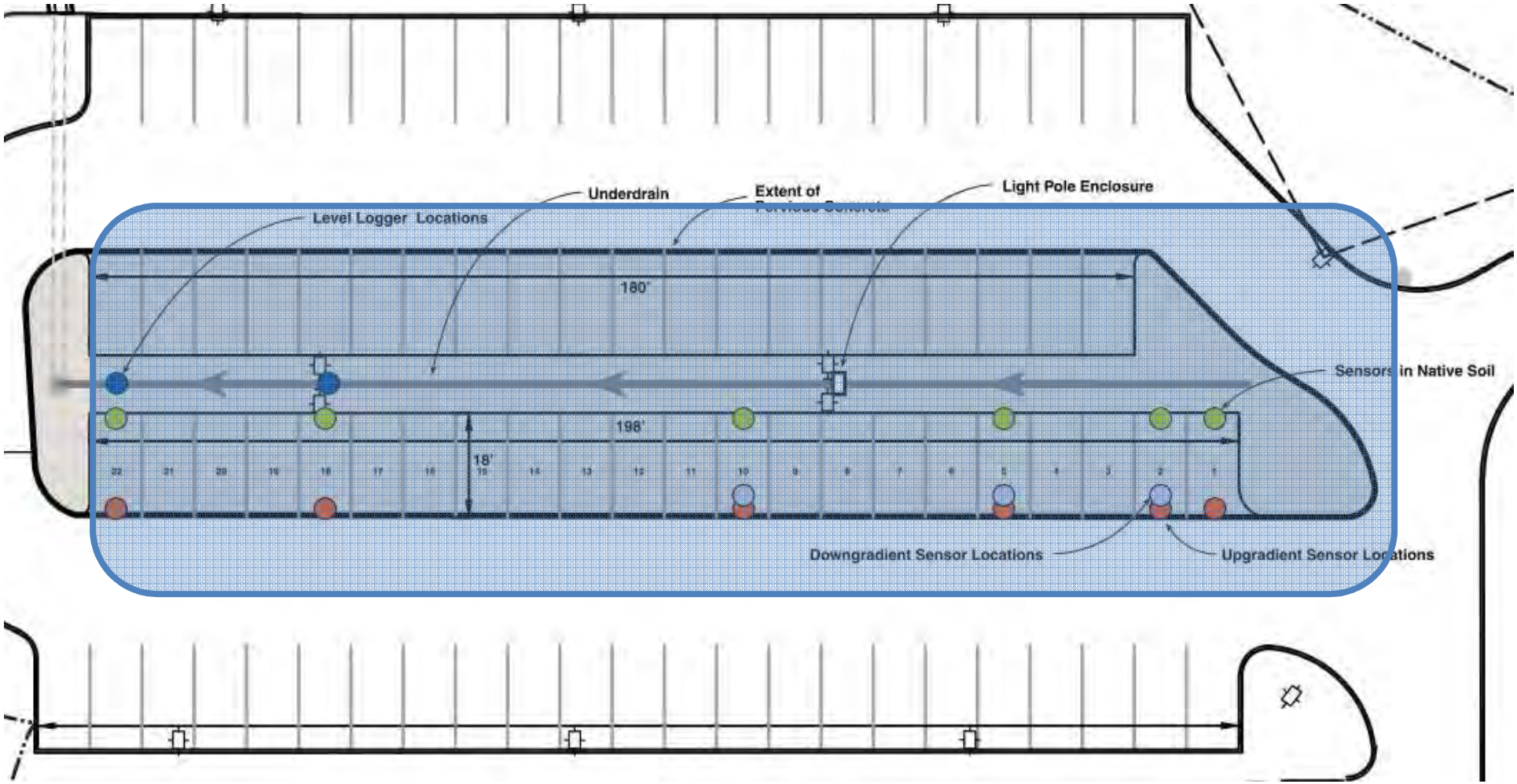
Cincinnati, Ohio

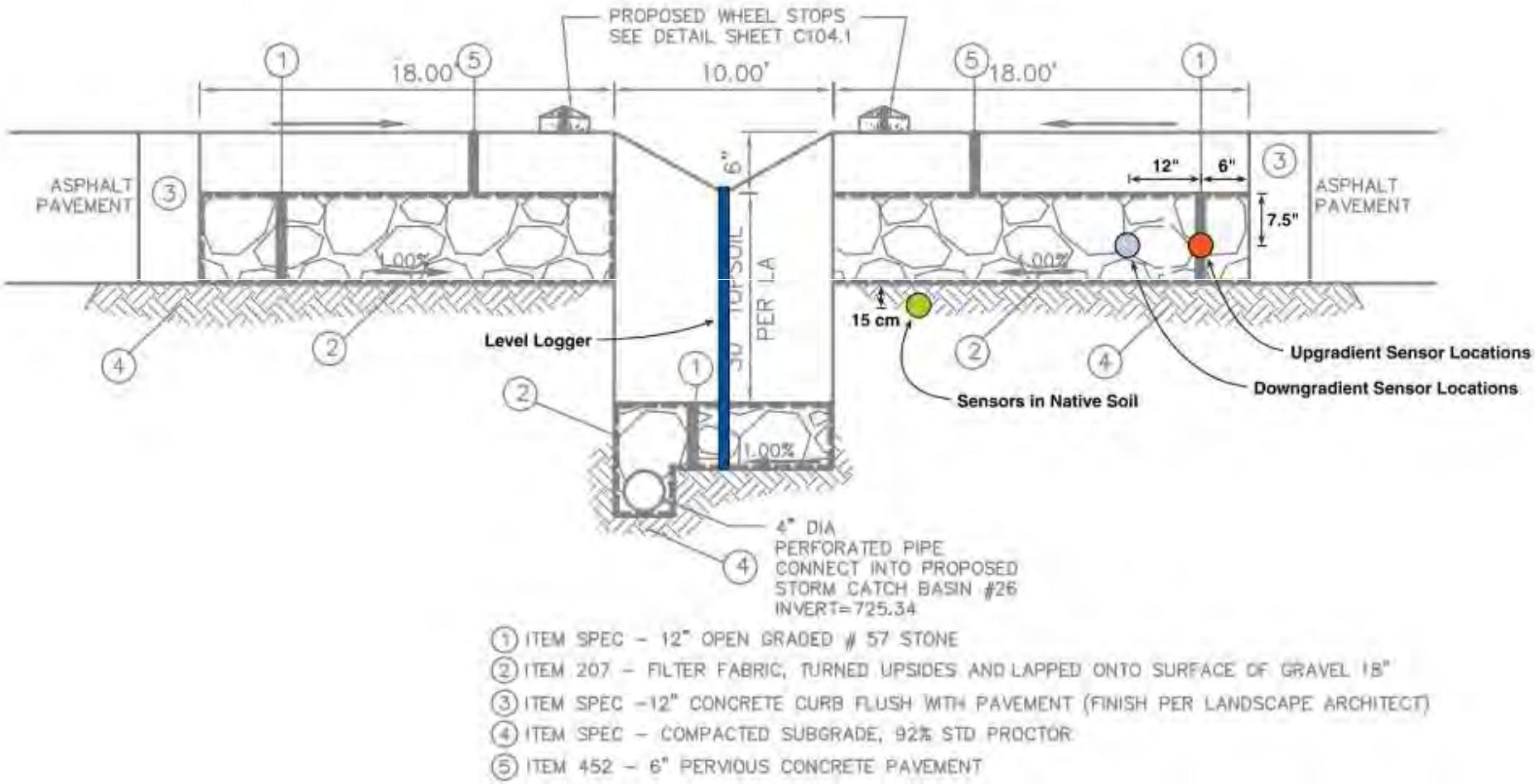
Project Summaries

- Collaborative research between EPA and MSD of Greater Cincinnati
  - MSD pilot projects to control CSOs
- Cincinnati Public Schools – Clark Montessori High School
  - Porous concrete parking lot and bio-infiltration performance monitoring and modeling, technology evaluation
- Cincinnati State Technical and Community College
  - Porous paver parking lot performance monitoring and modeling, technology evaluation
- Andrew W. Breidenbach Environmental Research Center
  - Site characterization, SWMM model development, green infrastructure selection, long-term monitoring

CPS Clark Plan View



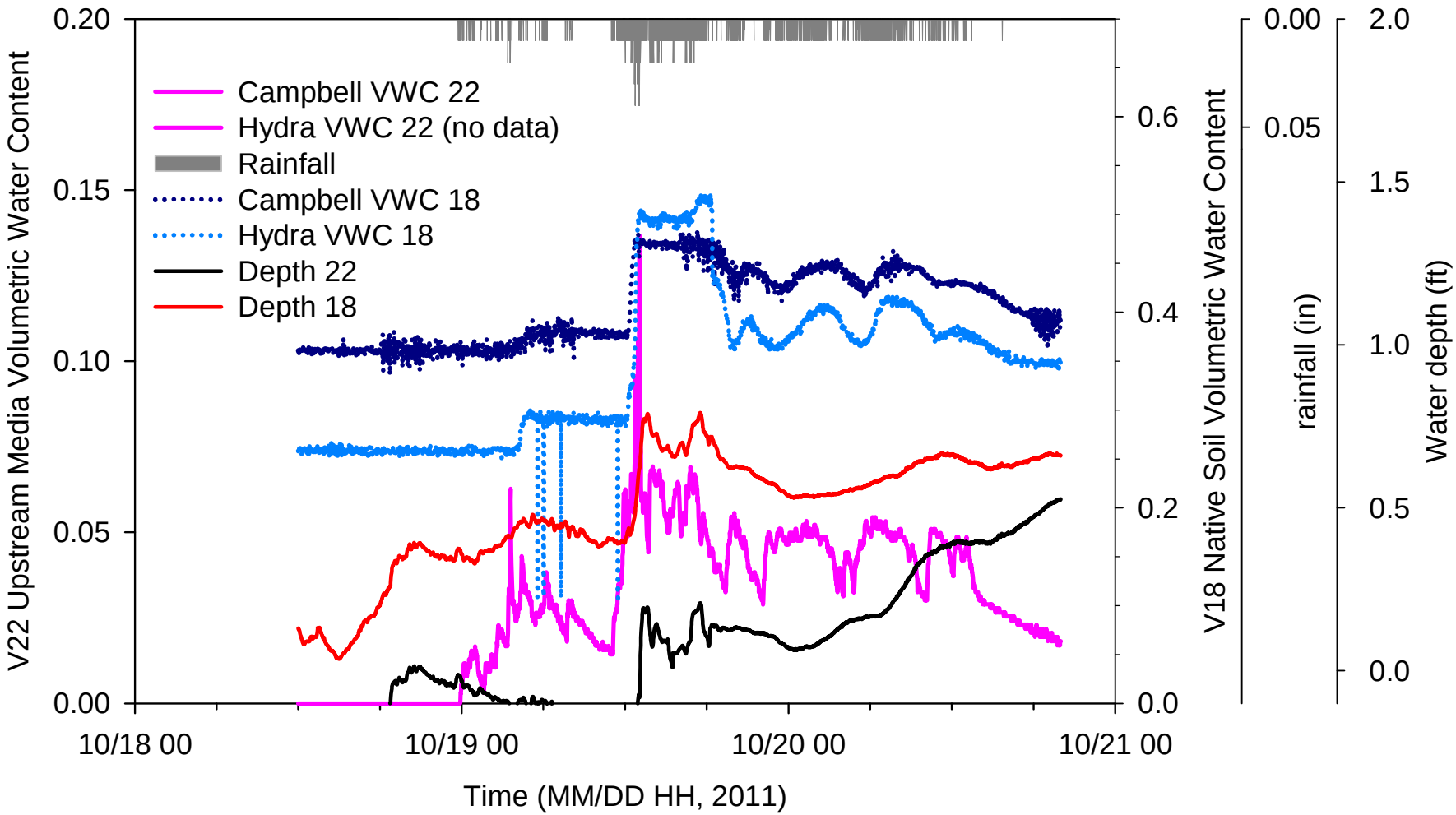
Cross Section CPS Clark



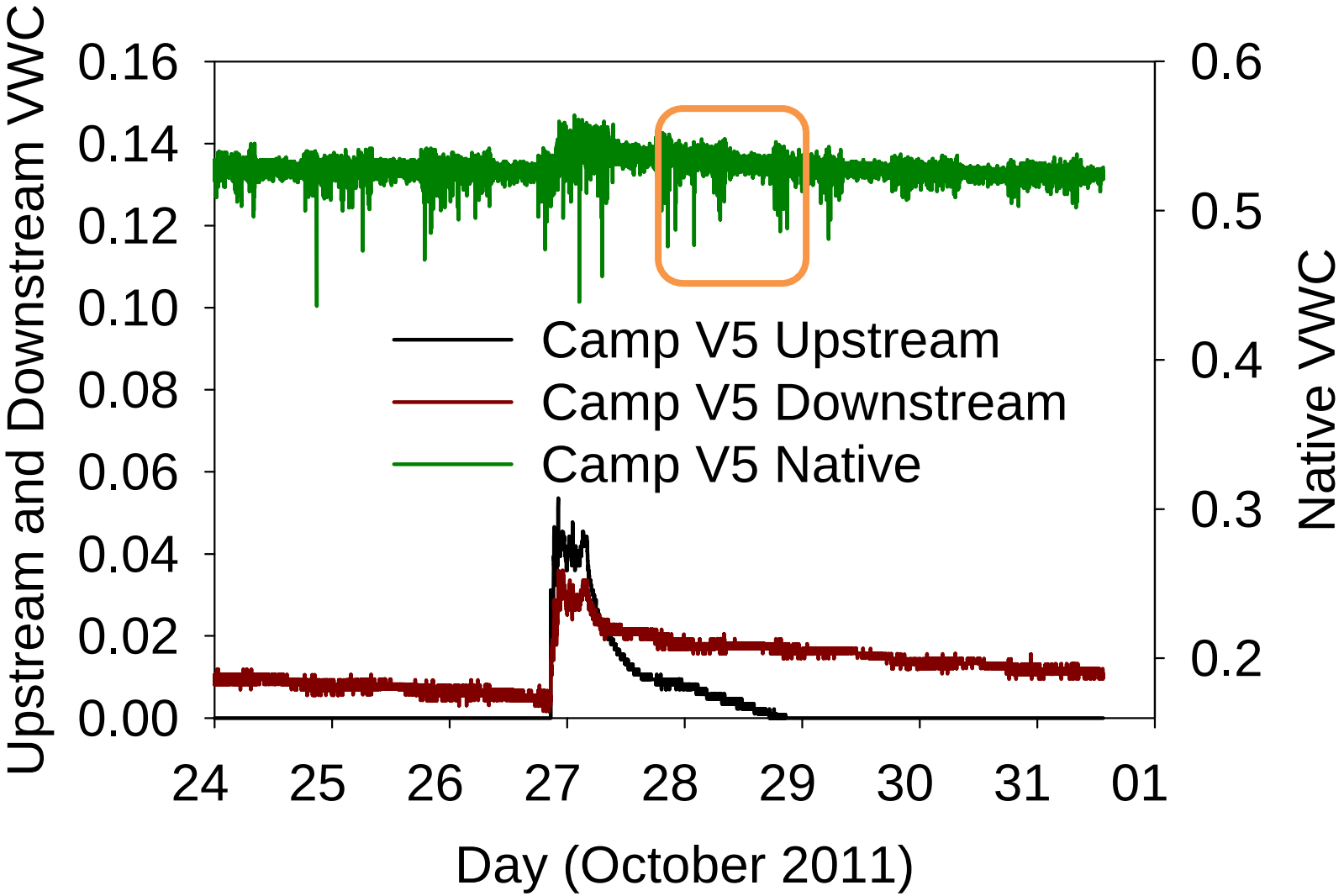
03/19/2009

FDQ 3912
SUPERIOR
CN99ZY
CINCINNATI

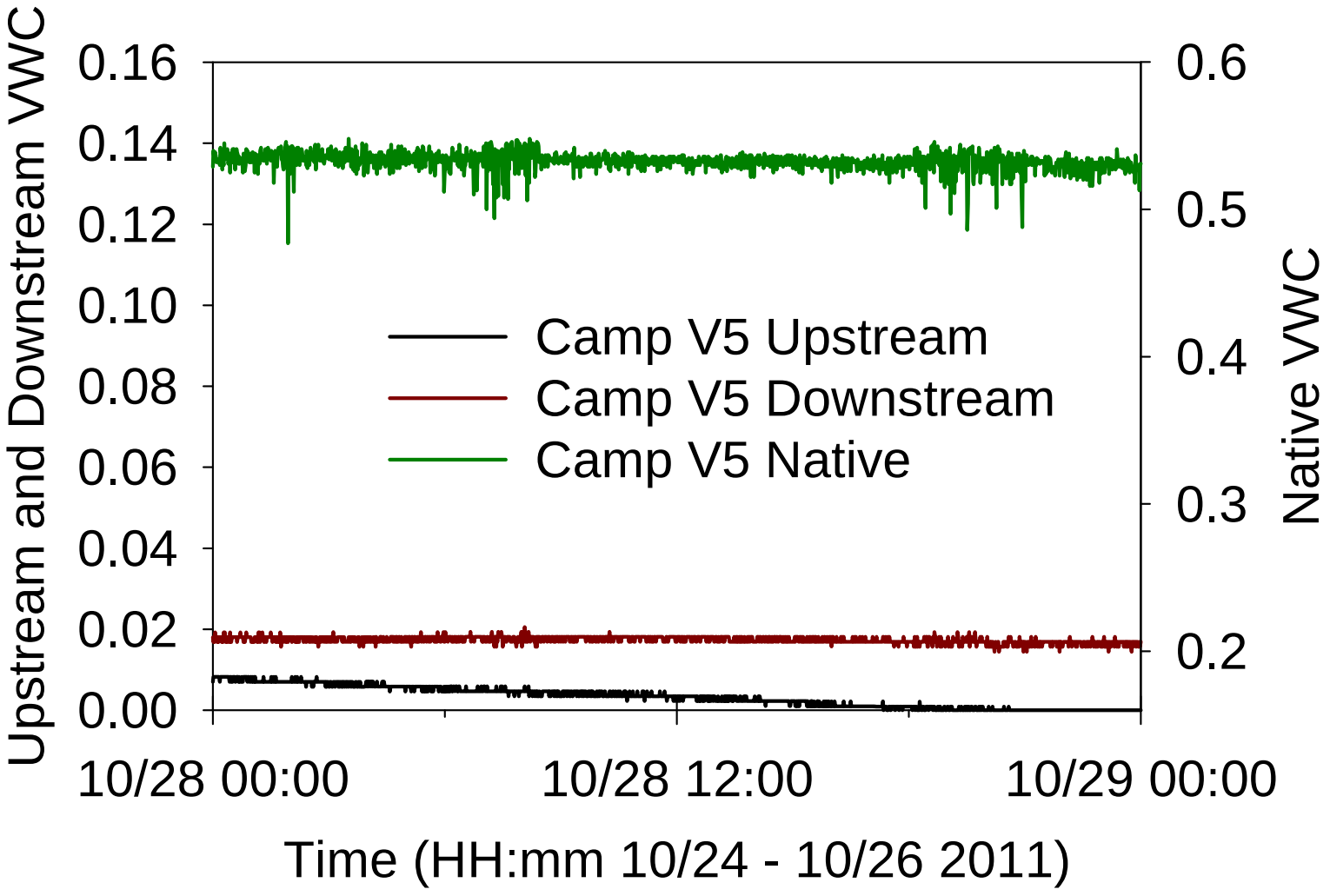
Storm Event Response



Native vs. Engineered Media

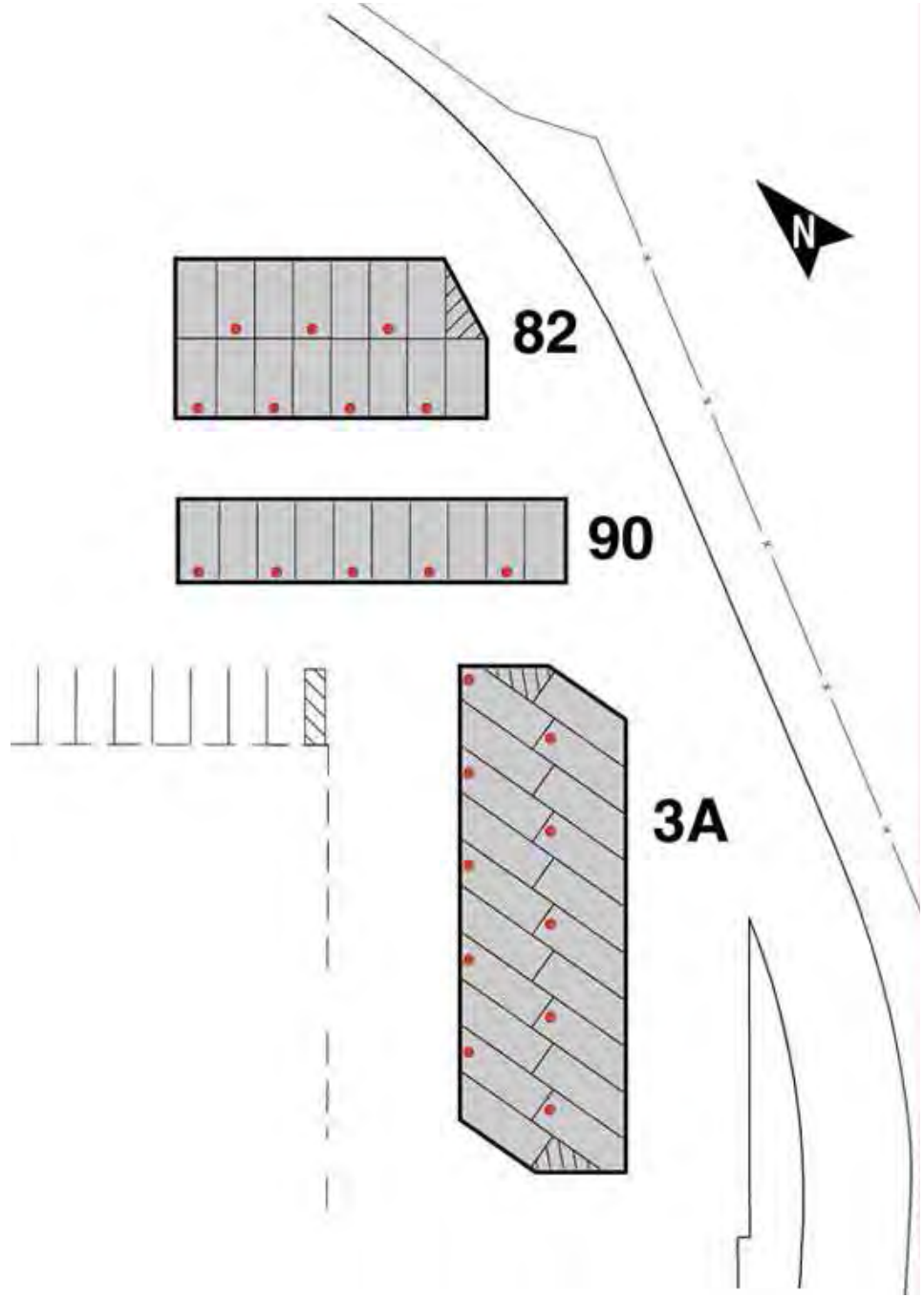


Noise in Data Uncovered



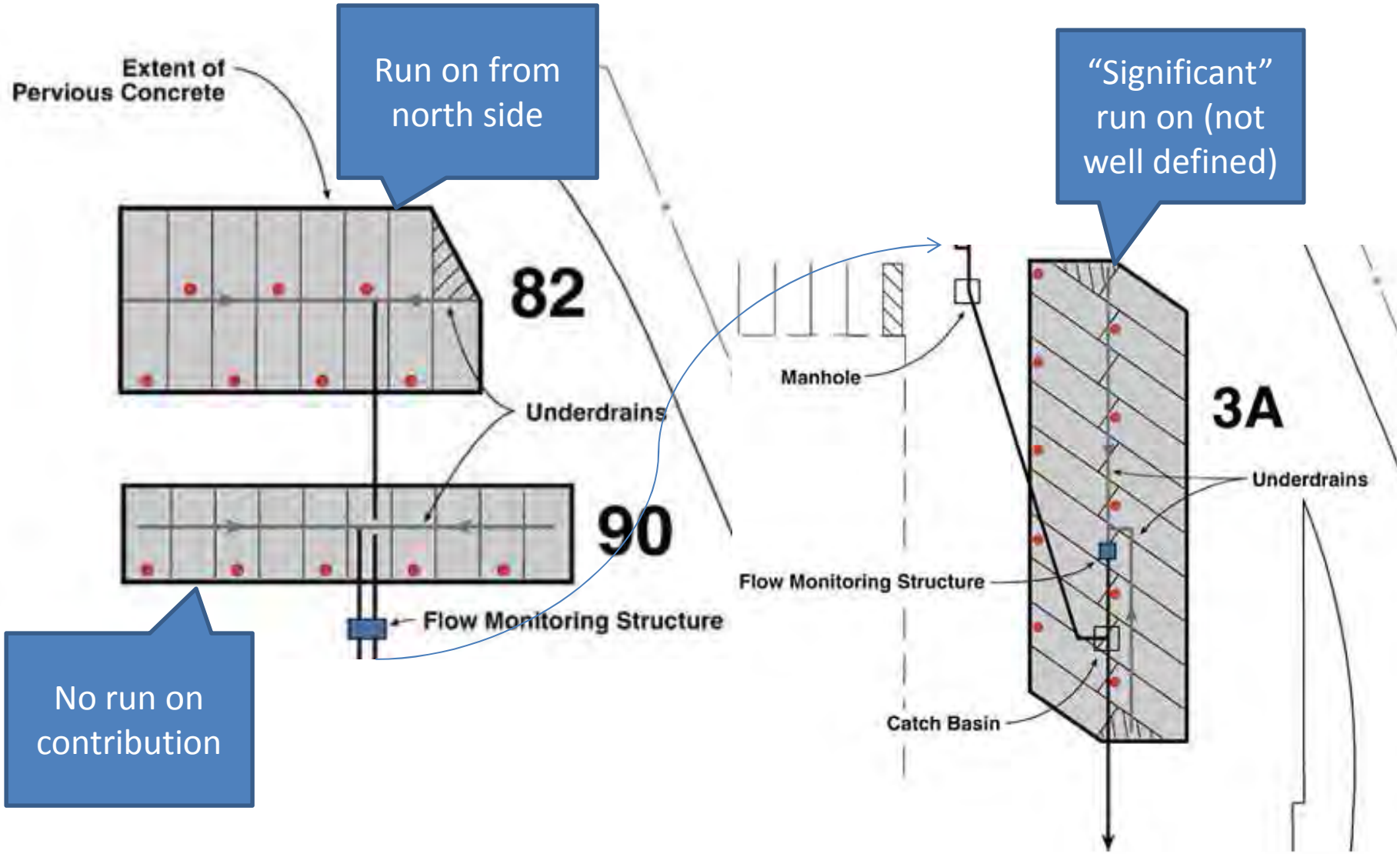
Cincinnati State Installation

- Moisture
- Temperature
- Flow Monitoring



Parking Cell 82 Construction

Three Cells

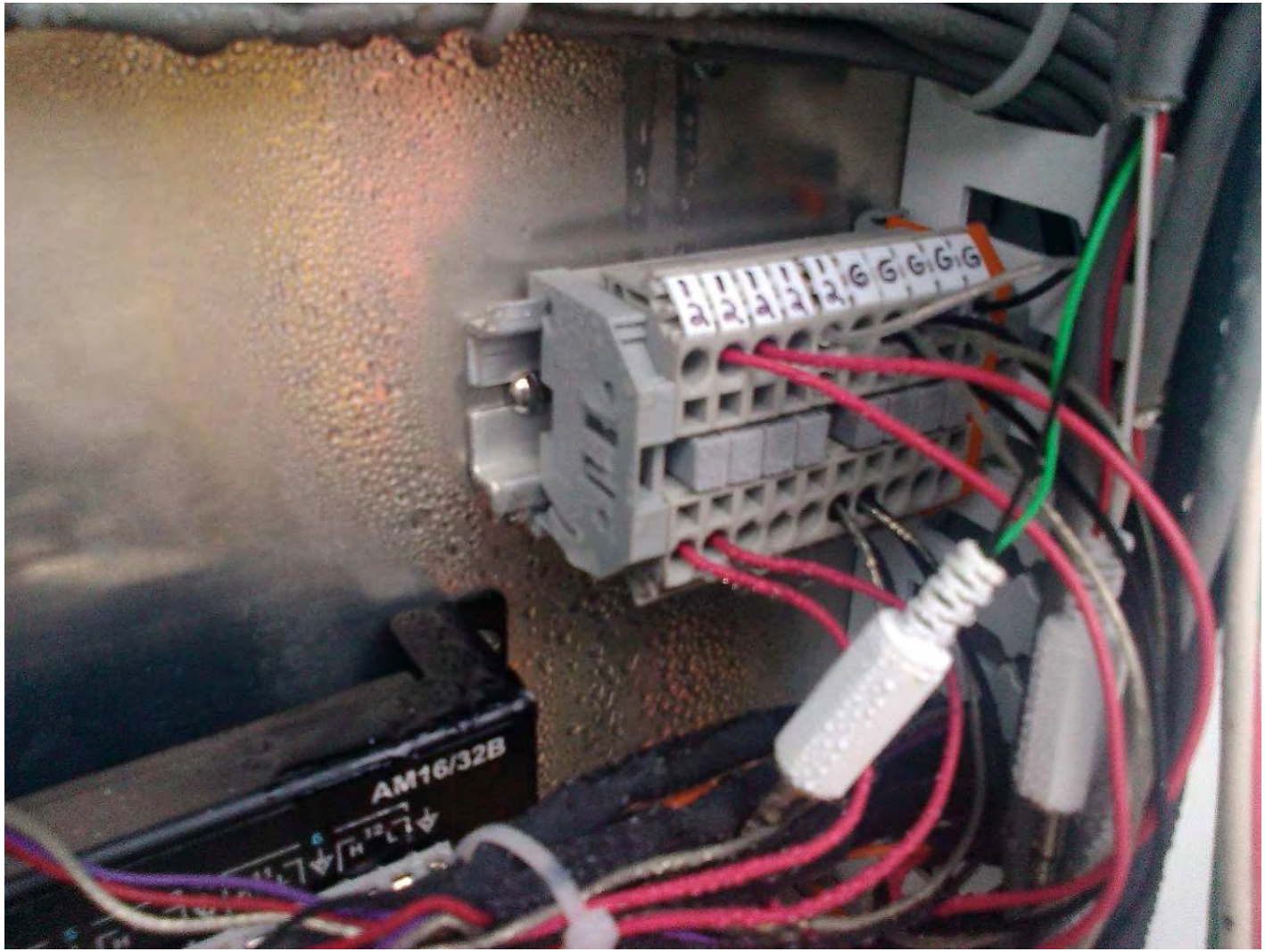

Extent of Pervious Concrete
Run on from north side
82
Underdrains
90
Flow Monitoring Structure
No run on contribution
Manhole
"Significant" run on (not well defined)
3A
Underdrains
Flow Monitoring Structure
Catch Basin

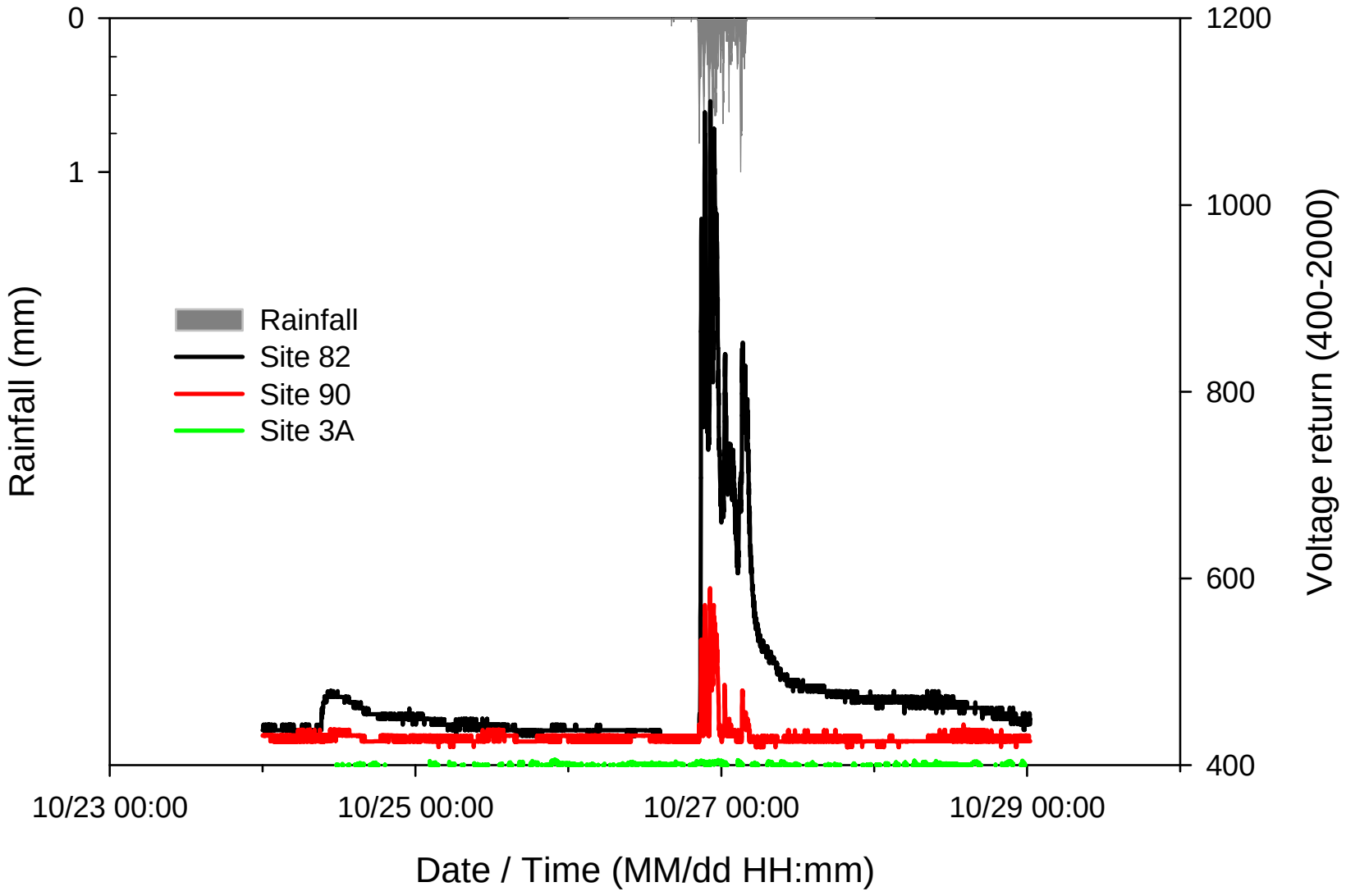
Cell 3A with Run-on

Flow Measurement Flumes

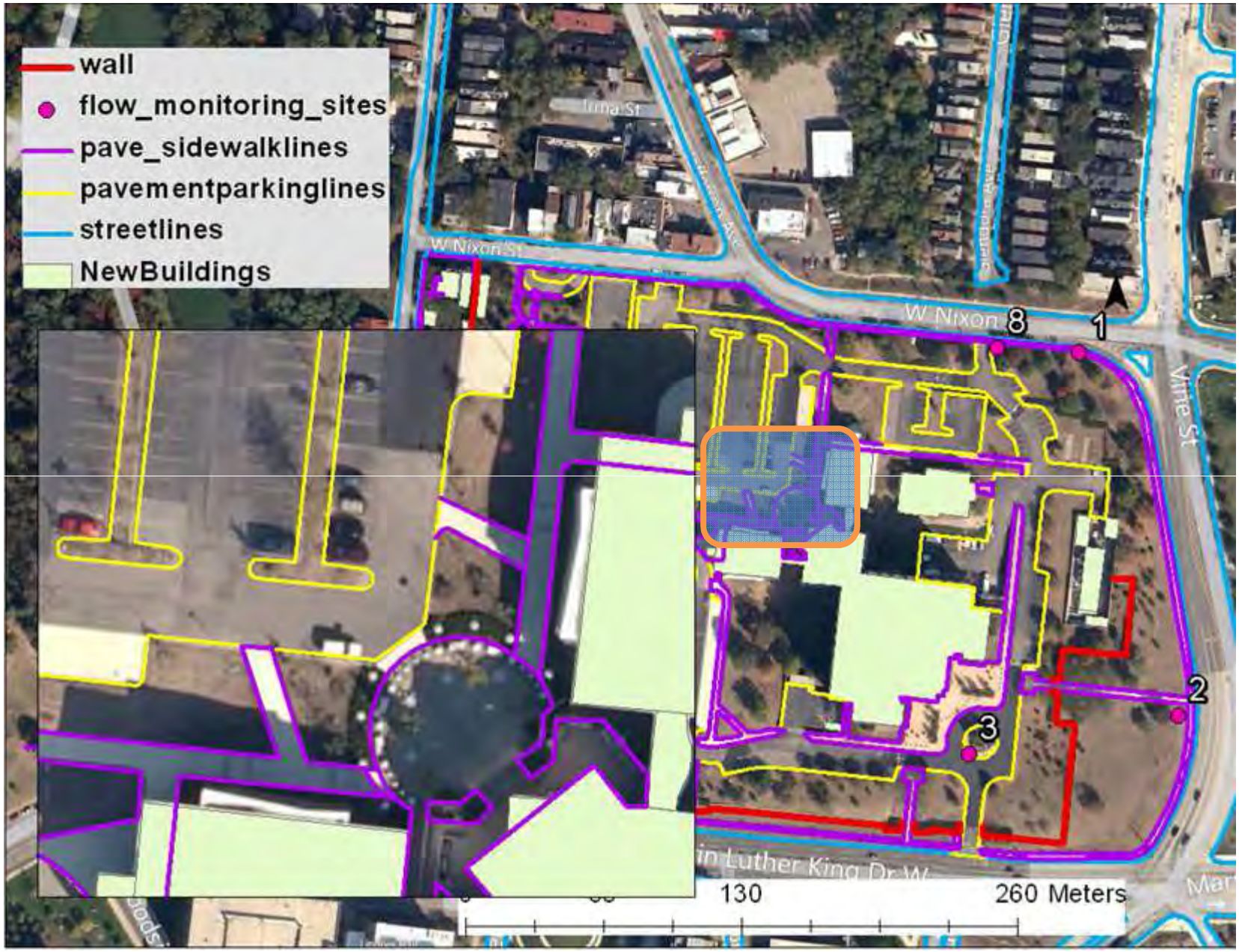
Construction Debris

Moisture Issues



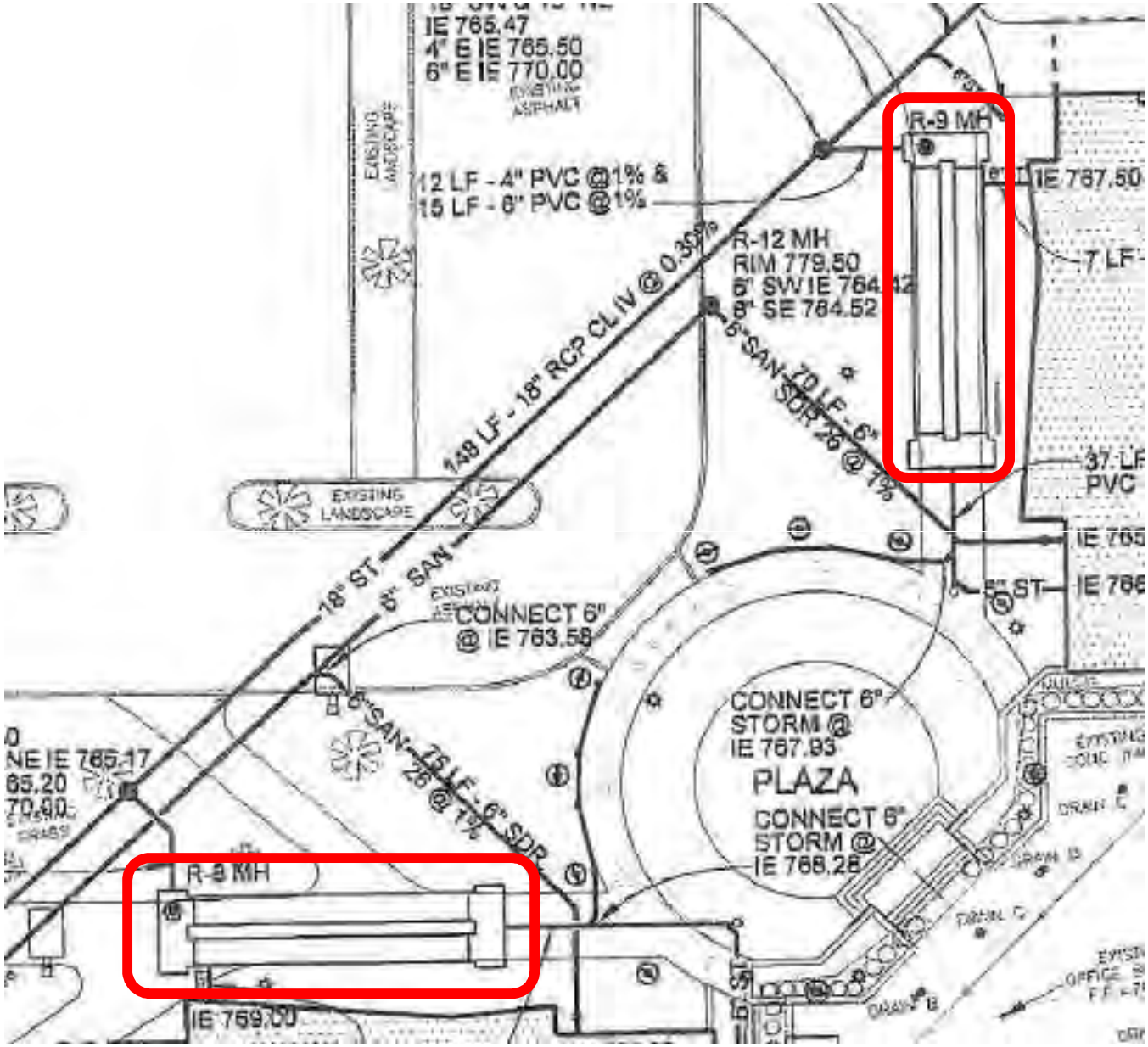

0
1
1200
1000
800
600
400
Rainfall (mm)
Voltage return (400-2000)
Rainfall
Site 82
Site 90
Site 3A
10/23 00:00
10/25 00:00
10/27 00:00
10/29 00:00
Date / Time (MM/dd HH:mm)

AWBERC Site Characterization


wall
flow_monitoring_sites
pave_sidewalklines
pavementparkinglines
streetlines
NewBuildings
W Nixon St
Vine St
8
1
2
3
130
260 Meters

Stormwater Detention Tanks

IE 765.47
4" E IE 765.50
6" E IE 770.00
EXISTING ASPHALT
EXISTING LANDSCAPE
12 LF - 4" PVC @1% &
15 LF - 6" PVC @1%
R-9 MH
IE 767.50
R-12 MH
RIM 779.50
6" SW IE 764.42
8" SE 764.52
148 LF - 18" RCP CL IV @ 0.39%
6" SAN 70 LF - 6" SDR 26 @ 1%
7 LF
37 LF
PVC
EXISTING LANDSCAPE
18" ST
6" SAN
CONNECT 6"
@ IE 763.58
6" SAN 75 LF - 6" SDR 26 @ 1%
CONNECT 6"
STORM @
IE 767.93
PLAZA
CONNECT 6"
STORM @
IE 768.28
NE IE 765.17
65.20
70.00
R-9 MH
IE 769.00
DRAIN C
DRAIN B


IE 765.47
4" E IE 765.50
6" E IE 770.00
EXISTING ASPHALT
EXISTING LANDSCAPE
12 LF - 4" PVC @1% &
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148 LF - 18" RCP CL IV @ 0.39%
6" SAN
70 LF - 6" SDR 26 @ 1%
7 LF
37 LF
PVC
EXISTING LANDSCAPE
18" ST
6" SAN
CONNECT 6"
@ IE 763.58
6" SAN
75 LF - 6" SDR 26 @ 1%
CONNECT 6"
STORM @
IE 767.93
PLAZA
CONNECT 6"
STORM @
IE 768.28
NE IE 765.17
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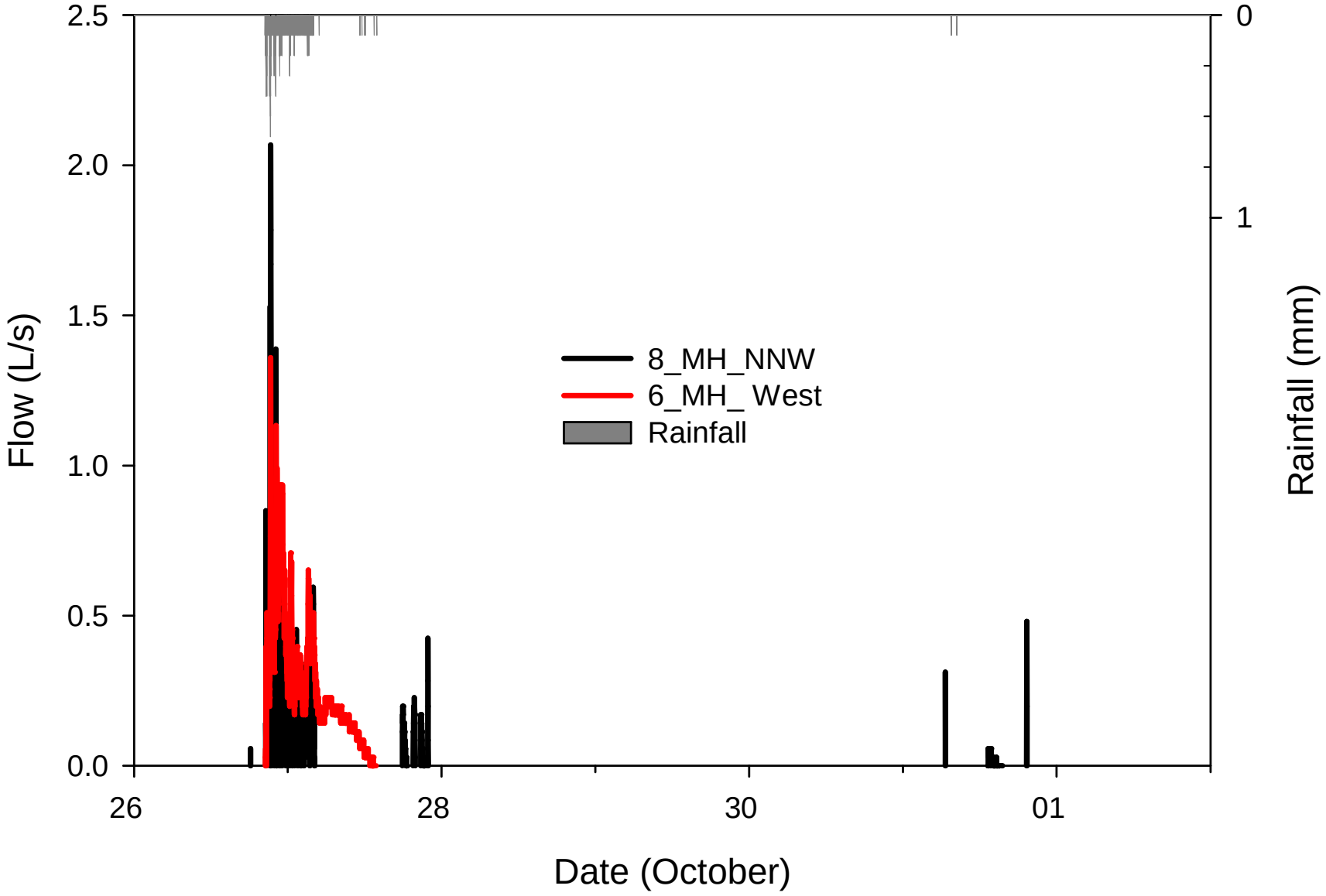
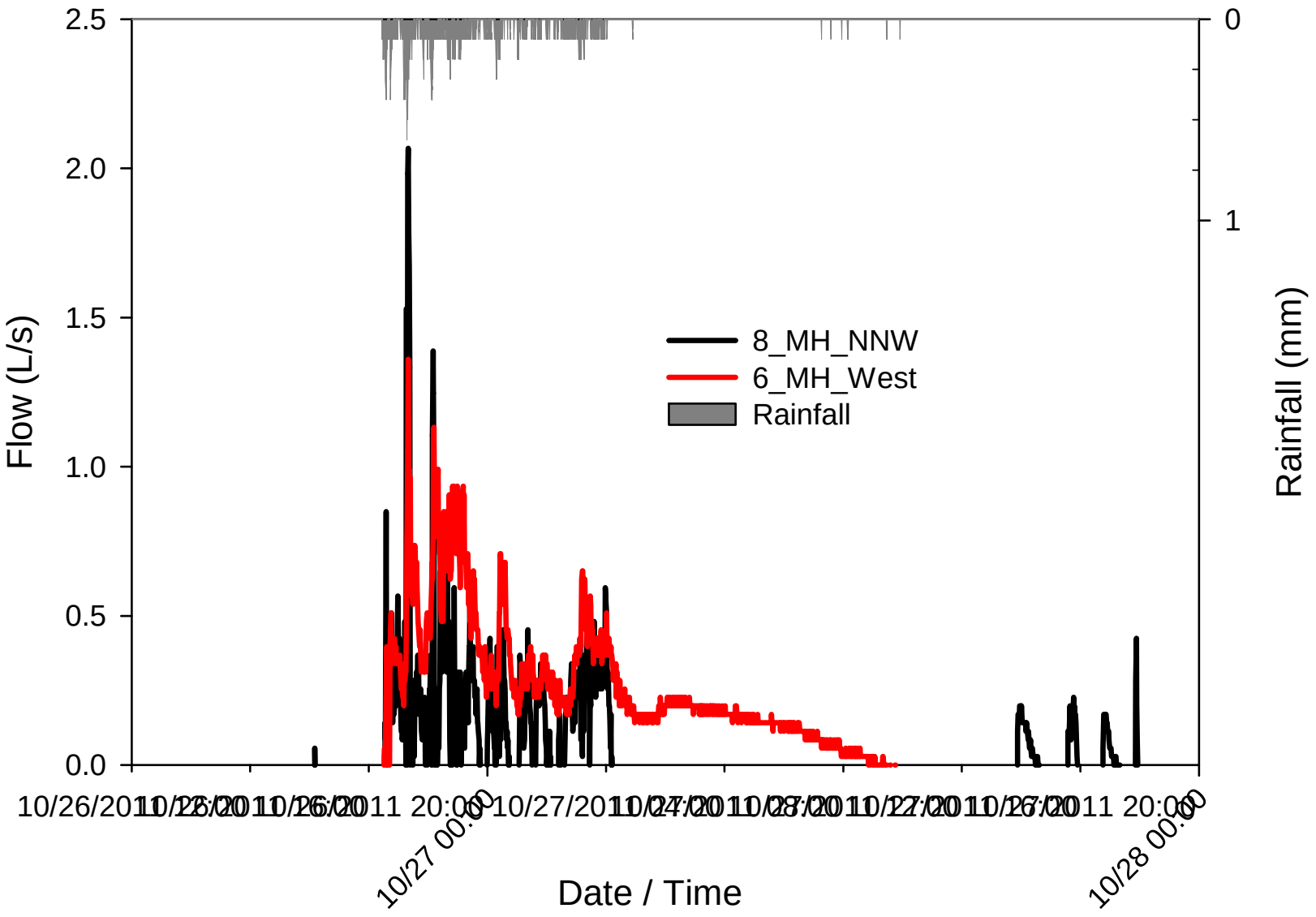

2.5
2.0
1.5
1.0
0.5
0.0
Flow (L/s)
0
1
Rainfall (mm)
8_MH_NNW
6_MH_ West
Rainfall
26
28
30
01
Date (October)

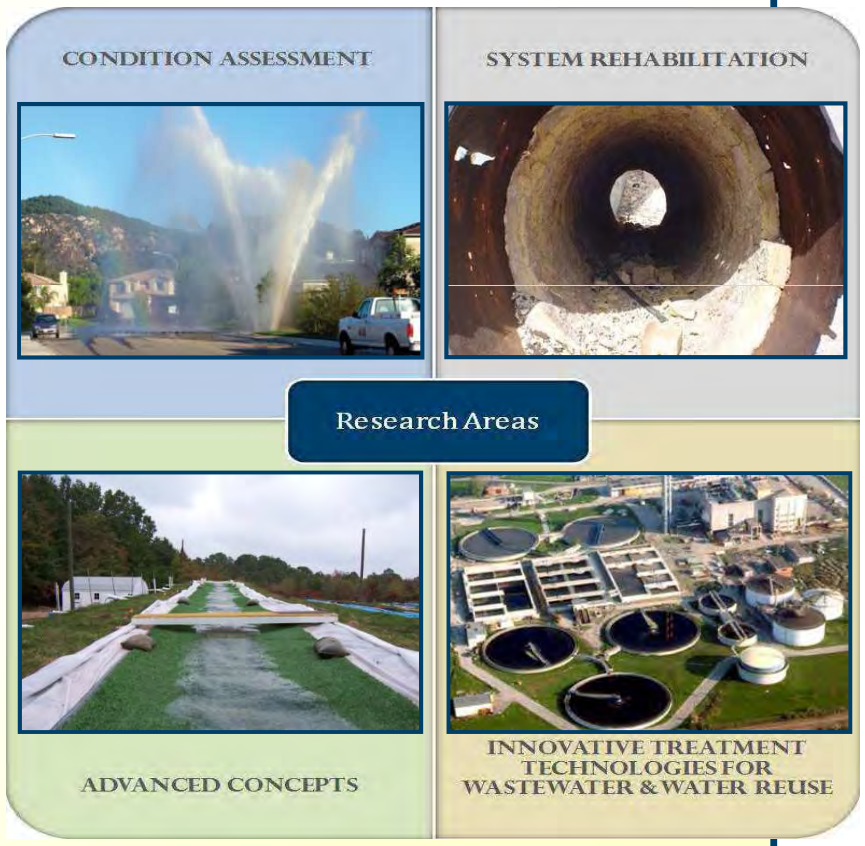

2.5
2.0
1.5
1.0
0.5
0.0
Flow (L/s)
0
1
Rainfall (mm)
8_MH_NNW
6_MH_West
Rainfall
10/26/2011 20:00
10/27/2011 20:00
10/27 00:00
10/28 00:00
Date / Time

Aging Water Infrastructure Research Program

Goal: To evaluate and demonstrate innovative technologies and improve the cost effectiveness of operation, maintenance, and replacement of aging and failing drinking water and wastewater infrastructure

Strategies

- Provide critical research and technology demonstrations:
  - that support the EPA's Sustainable Water Infrastructure Initiative.
  - that can be provided to drinking water and wastewater utilities.
- Determine the innovative technologies that can cost-effectively improve performance and extend the life of existing infrastructure.
- Conduct national assessments to identify the effects of major influencing factors on future system threats and demands.
- Develop new designs and approaches that will maintain the long-term performance of water infrastructure.
- Determine the factors that affect infrastructure deterioration to predict and prevent system failure.



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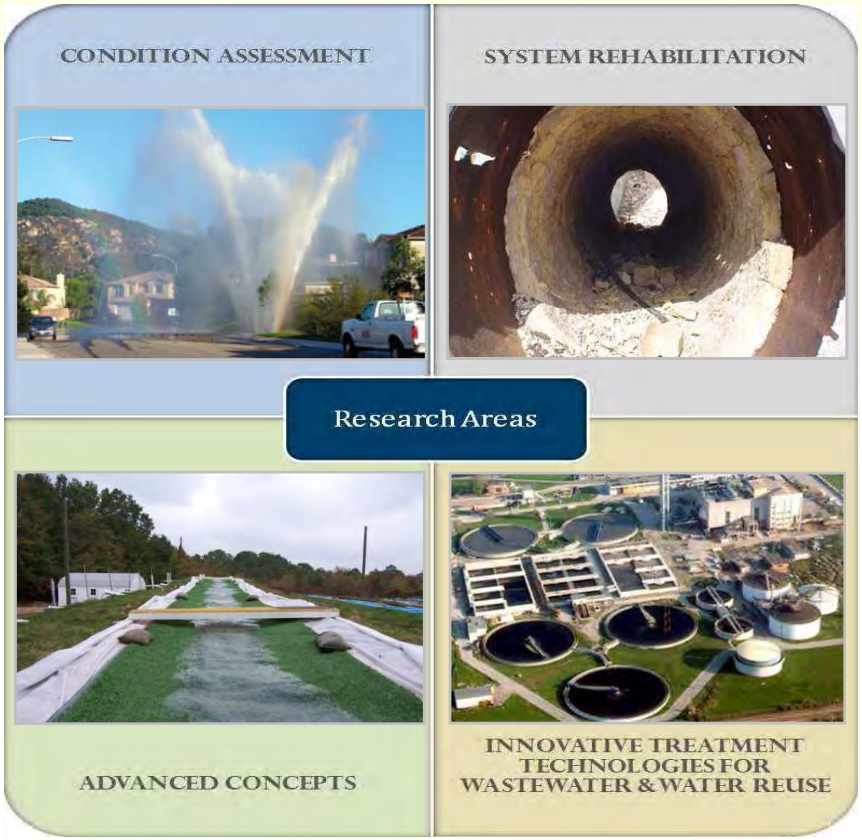
Aging Water Infrastructure Research Program

Goal: To evaluate and demonstrate innovative technologies, and improve the cost effectiveness of operation, maintenance, and replacement of aging and failing drinking water and wastewater infrastructure.

Encompasses the collection and analysis of data for determining the structural, operational, and performance status of capital infrastructure.

Application of infrastructure repair, renewal, & replacement technologies in an effort to return functionality to drinking water or wastewater systems or sub-systems.



Application or adoption of new and innovative infrastructure designs, management procedures, and operational approaches.

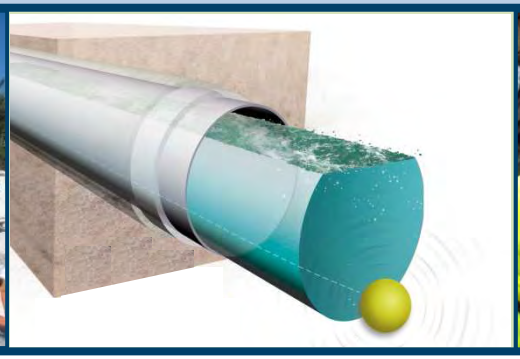
(Green Infrastructure)

Addresses the need for improved water quality and the growing demands for safe and reliable reclaimed wastewater and stormwater.

Technology Demonstration Project

Innovative Condition Assessment Technologies for Water Mains
Louisville, Kentucky

- Demonstrated 13 technologies at various stages of development and providing different levels of inspection, on a 76-yr old, 2,500-ft long, 24-in cast iron pipe
- Compared performance and cost of technologies looking for similar defects
- Confirmed measurements by non-destructive technologies with direct measurements
- Assessed applicability, limitations, practical difficulties, and cost
- Removed and archived pipe segments for future comparative testing using new developing technologies



Questions?