



AMERICAN
STRUCTUREPOINT
INC.



OWEA ANNUAL CONFERENCE, JUNE 28TH, 2017, CINCINNATI, OHIO

**LARGE DIAMETER SEWER ASSESSMENT – WHEN TO
TAKE IT TO THE NEXT LEVEL?**

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Outline

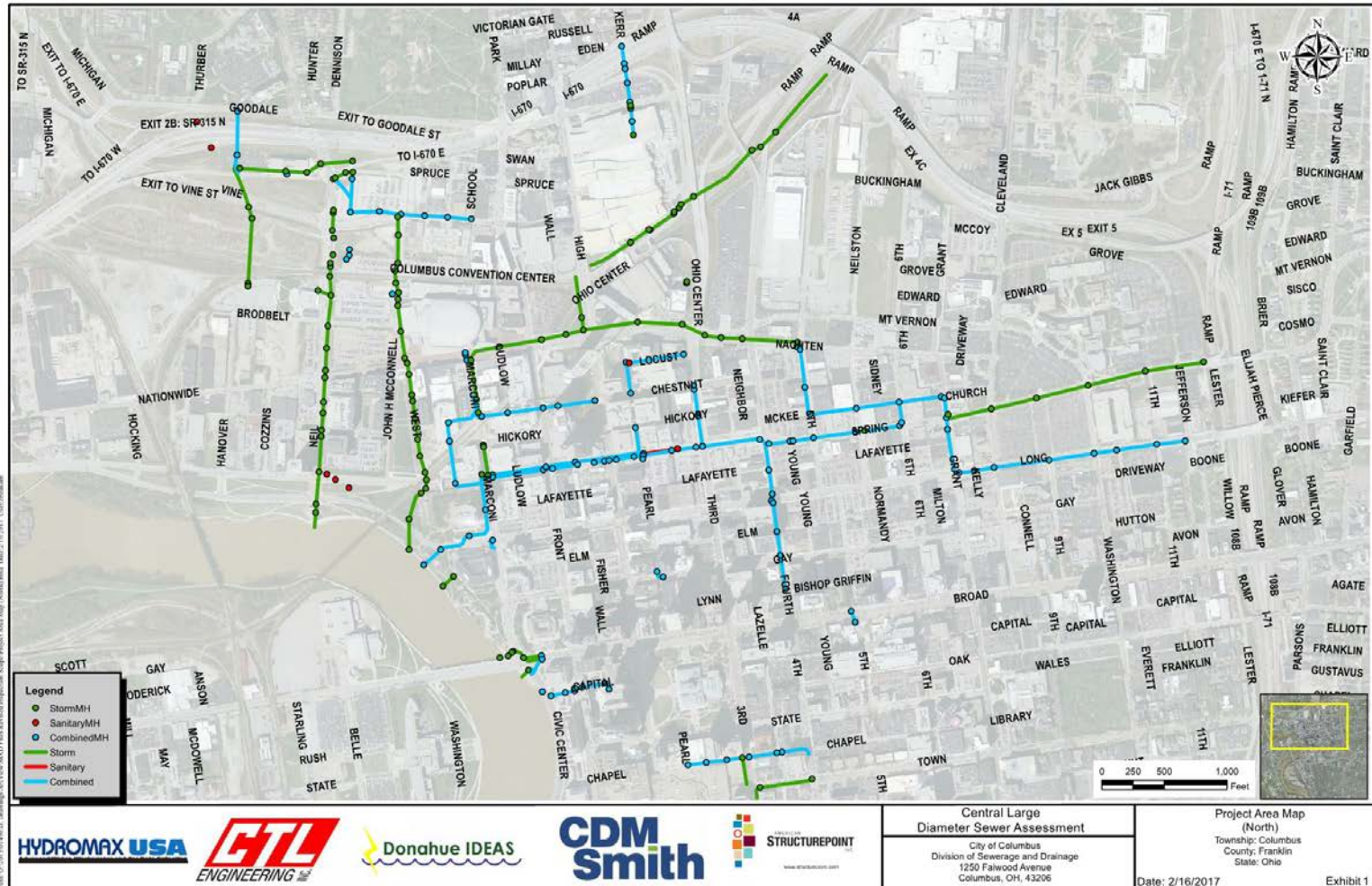
- Introduction
- Columbus Large Diameter Assessment Program
- Project Scope
- Methods Used
- Data Review/Results
- Next Steps

Columbus LDA Program

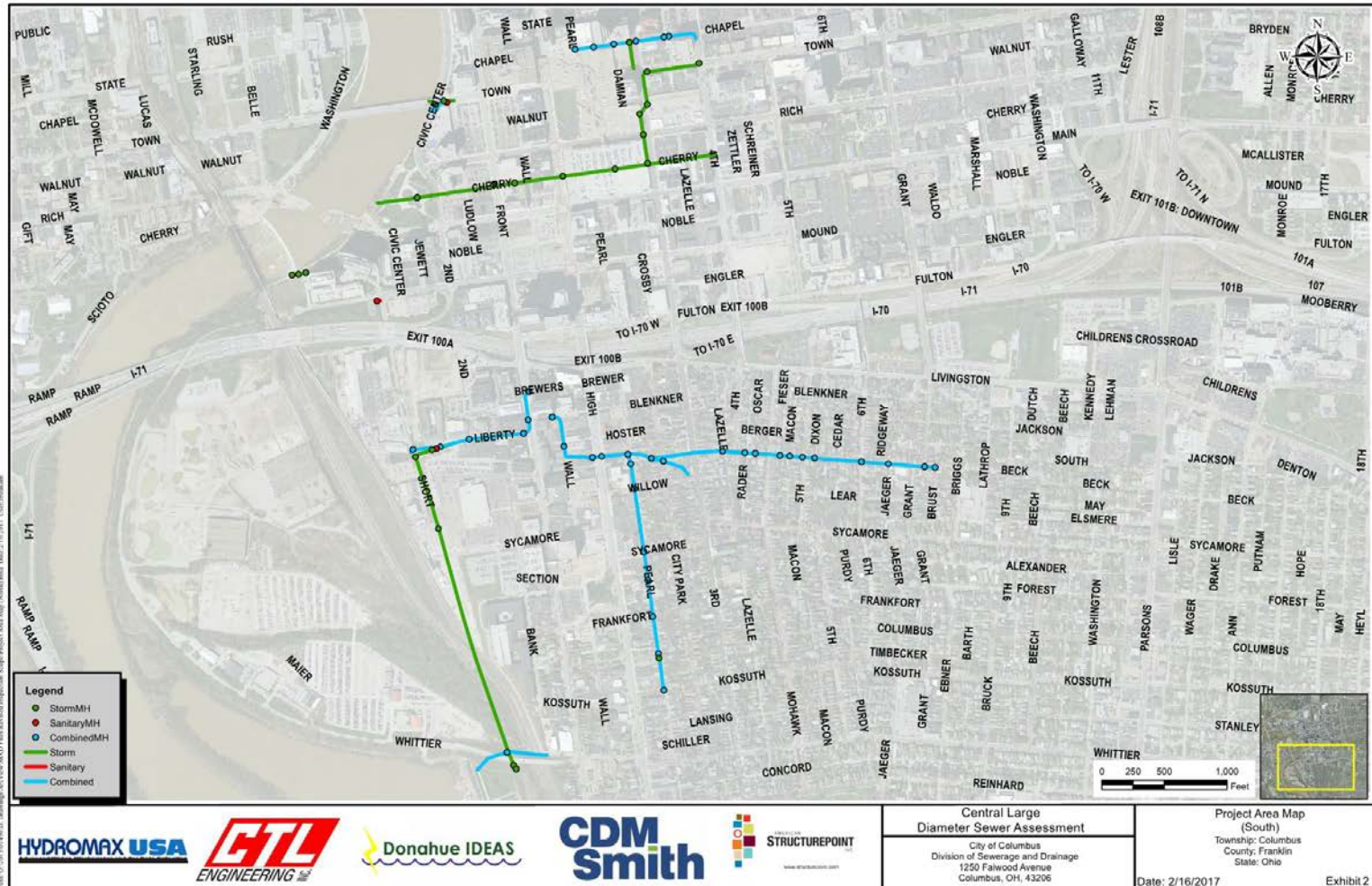


- Kicked off in 2005
- 36-inch and larger
- Address short/long-term cleaning and rehab needs

Center LDA Scope - North of I-70



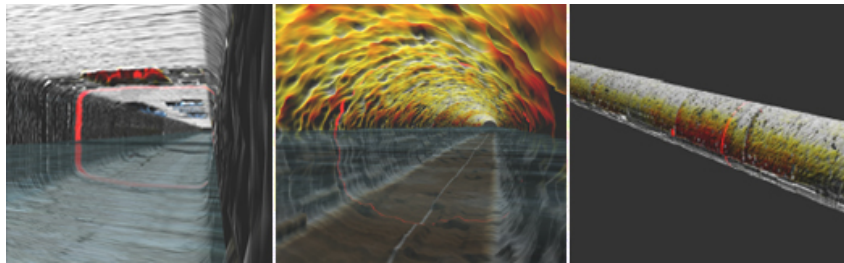
Center LDA Scope - South of I-70



Inspection Methods Used



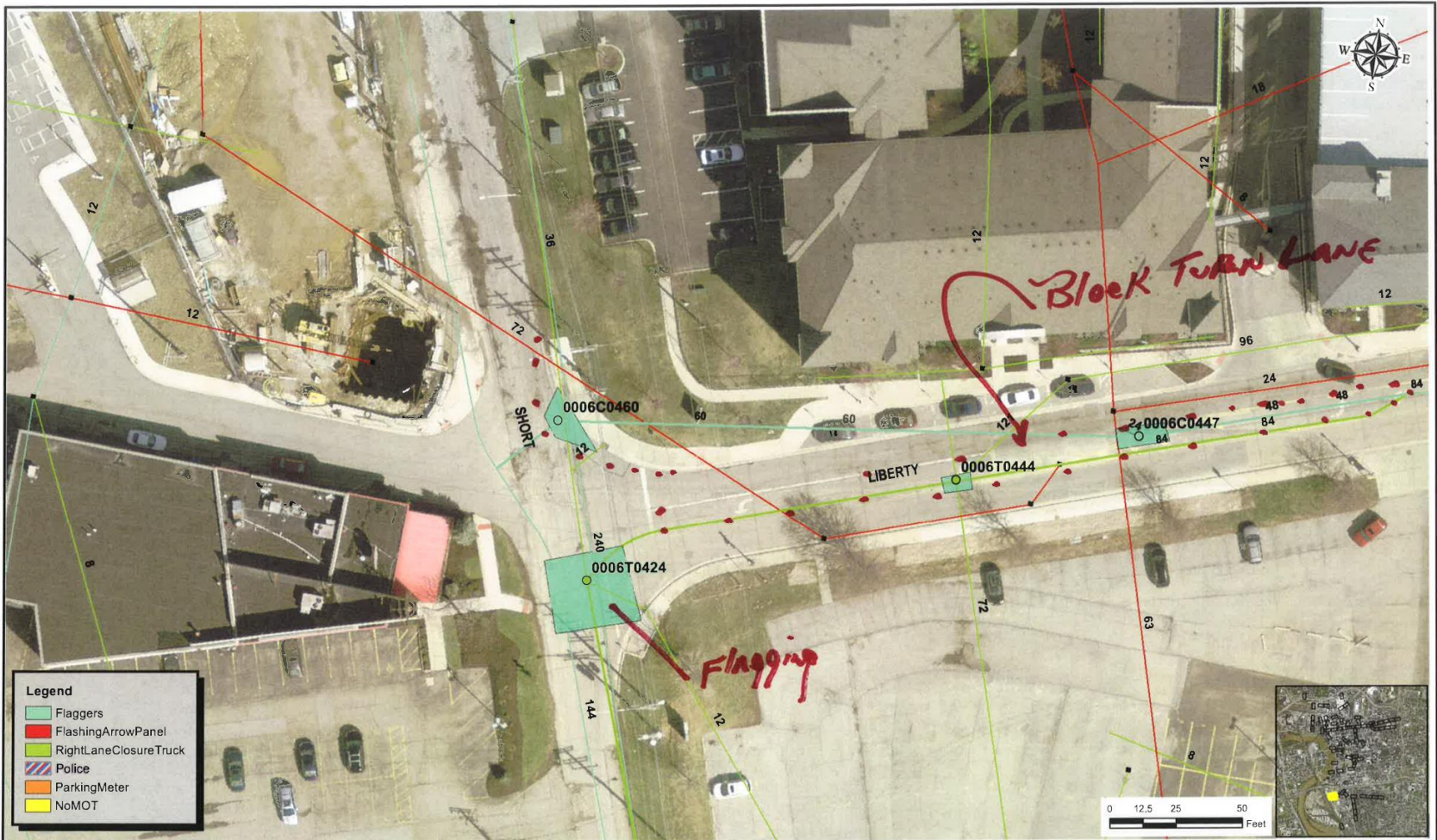
- CCTV
- Sonar
- Man-entry



Man-Entry



MoT



Path: G:\2015\08\08\13_Divisions\ActView_MDD\Final\Revised Inspection Scope_MOT final Doc 8/15/2016_13.rvt.mxd

HYDROMAX USA

GTL
ENGINEERING INC.

Donahue IDEAS

CDM Smith

STRUCTUREPOINT
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Central Large
Diameter Sewer Assessment

City of Columbus
Division of Sewerage and Drainage
1250 Fairwood Avenue
Columbus, OH, 43206

Revised Project Scope
Remaining MOT
Township: Columbus
County: Franklin
State: Ohio

Date: 8/15/2016

Exhibit 60

Manhole Inspection w/ Pipetech™



Browser: https://pipetechcloud.com/inspections/22013
Page Title: PipeTech Cloud
Breadcrumbs: Columbus LDA > #22013
Status: Lv 1 Manhole - **Final**

Manhole

Manhole # 000272381	System Owner COC	PO Number	
Location Details	Rim to Invert 9.0 ft	Grade to Invert 9.0 ft	
Rim to Grade 0 ft	MH Use SW - Stormwater	Year Built	Year Renewed
Media Label	Purpose of Survey F - Routine assessment	Sewer Category	Pre-Cleaning N - No pre-cleaning
Date Cleaned	Deposition	Deposition Depth 0 in	Location Code A - Main Highway - Urban
Potential for Runoff S - Sheeting	Access Point Type AMH - Manhole	Inspection Status SI - Surface Inspection	
Evidence of Surchage No - No	Northing	Easting	
Elevation	Coordinate System	GPS Accuracy	

PACP

- Pipeline Assessment and Certification Program
- 13 structural defect groups. More than 100 defect codes



Hole Void Visible (HVV)



Ovalization/Deformation



Bulging Crown w/ Fracture



Buckling



Cracks/Fractures



Debris Build-up



Cross-Bores



Manhole Inspection w/ Pipetech™



Browser: https://pipetechcloud.com/inspections/22013
Page Title: PipeTech
Page URL: https://pipetechcloud.com/inspections/22013

Projects Reports Final Sewer
Status Lv 1 Manhole Finish

Manhole

Manhole # 600272381	System Owner COC	PO Number	
Location Details	Rim to Invert 0.0	Grade to Invert 0.0	
Rim to Grade 0	MH Use SW - Stormwater	Year Built	Year Renewed
Media Label	Purpose of Survey F - Routine assessment	Sewer Category	Pre-Cleaning N - No pre-cleaning
Date Cleaned	Deposition	Deposition Depth 0 in	Location Code A - Main Highway - Urban
Potential for Runoff S - Sheeting	Access Point Type AMB4 - Manhole	Inspection Status SI - Surface Inspection	
Evidence of Surocharge No - No	Nothing	Easting	
Elevation	Coordinate System	GPS Accuracy	

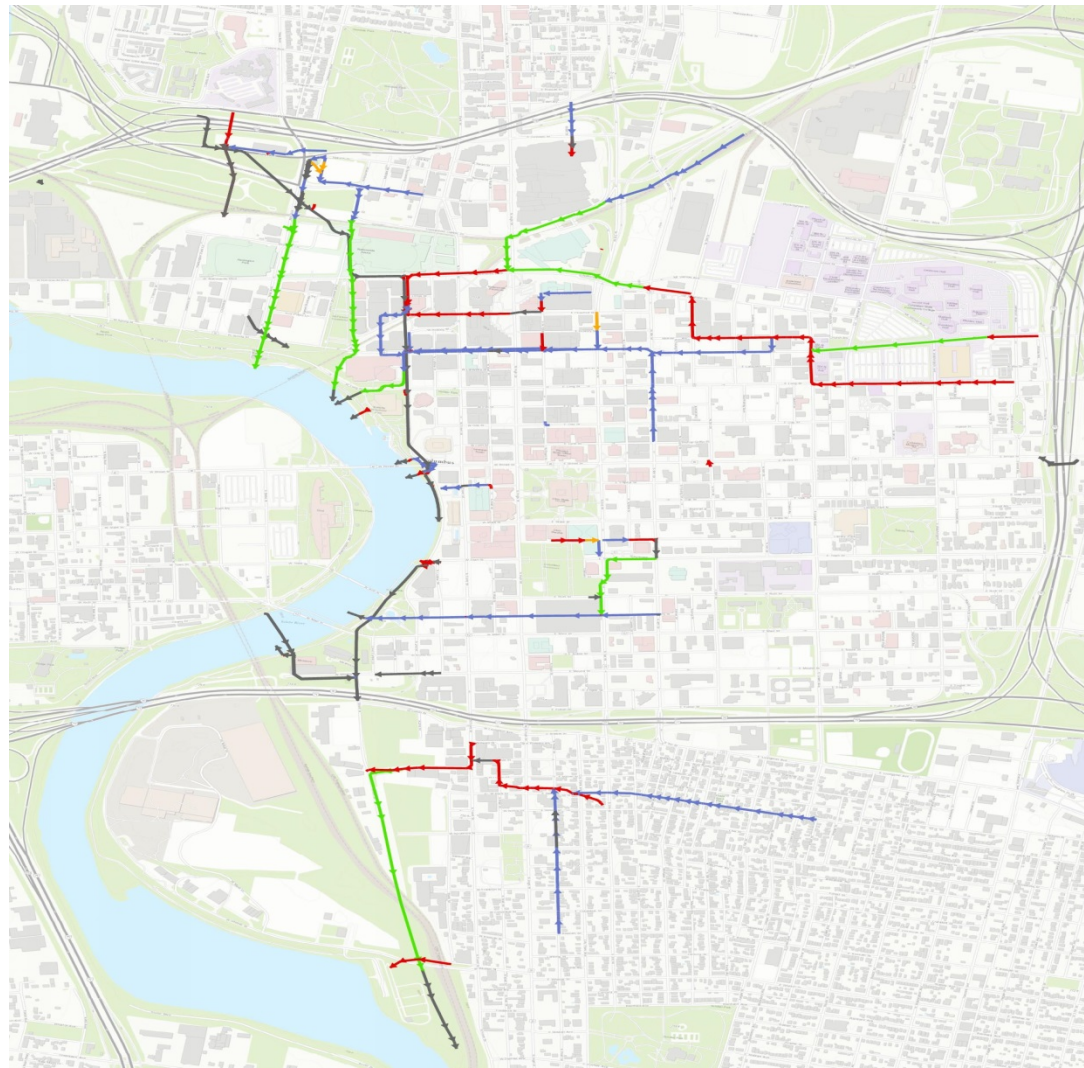
Manhole Inspection - Modified Level 2



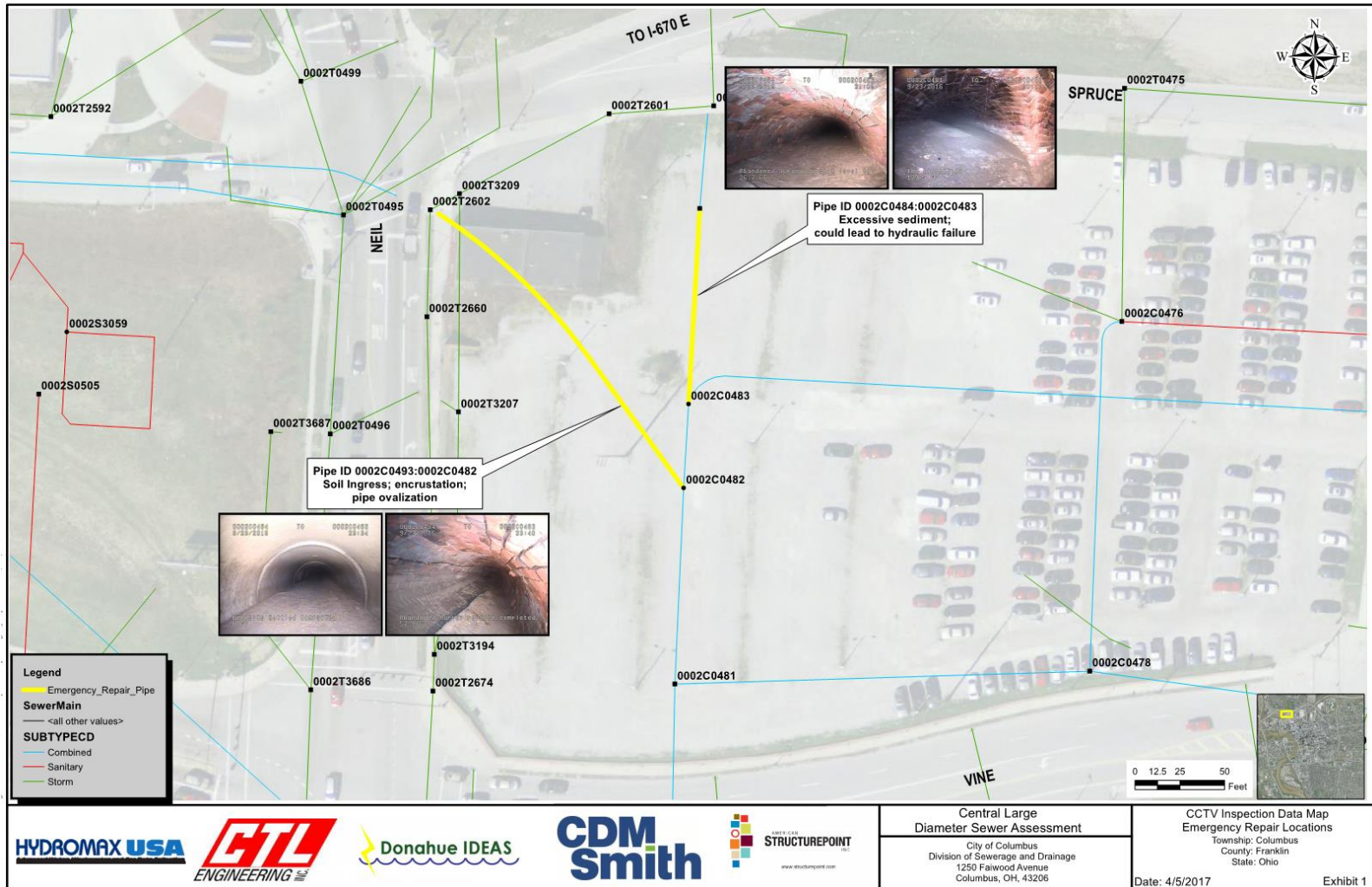
Manhole Inspection –Contd.



Inspection Progress Map



Mapping / GIS



Critical Pipes

Inspection ID	Ave. Depth (ft)	Pipe Material	Size (in.)	Load (lbs/ft.)	Risk of Failure	Main Defect Identified
0002C0737-0002C0303	14	Brick	48	11,792	Medium	One beam and two pipe penetrations. Deformation and debris build-up along the pipe
0002C0725-0002C0213	15	Brick	36	10,890	Medium	Dropped invert, deformation along pipe.
0003C0397-0003C0894	11	Brick	48	8,272	Medium	Conduit penetration. Deformation along pipe. Root intrusion.
0001T0212-0001T0184	21	RCP	136	39,561	High	Longitudinal cracks along the pipe.
0001T0290-0001T0291	24	Brick	48	19,360	High	Deformation, infiltration/encrustation, missing mortar along the pipe. A couple of dropped inverts.
0001T1739-0001T0290	22	Brick	48	19,360	High	Two large holes (HSV). Deformation, missing mortar along the pipe. Metal pipe penetration at 15 ft. from 0001T0290
0002C0291-0002C0291A	20	Brick	83	24,733	High	Deformation along the pipe. Cracking along the crown. Missing bricks and mortar.
0004C0092-0004T0892	13	Brick	36	10,890	Medium	Pipe collapse.
0004C0130-0004C0185	9	Brick	36	4,653	Medium	Missing mortar, dislodged bricks along pipe. Heavy sediment build-up and soil ingress.
0004C0185-0004C0905	10	Brick	36	6,633	Medium	Missing mortar, deformation, steel beam penetration, soil ingress/encrustation
0004T0067-0004T0069	45	RCP	90	68,063	High	Extensive cracking along the pipe.
0005C0080-0005C0077	13	Brick	48	11,792	High	Fractures, soil ingress, dislodged bricks, and deformation along pipe.
0011C0031-0002C0524	16	Brick	96	19,712	High	Infiltration (IS) encrustation along pipe indicative of continous cracks, gaps through the brick layers.
0003C0114-0003C0110	17	Brick	36	10,890	High	Pipe collapse, HSV, deformation, missing mortar, root intrusion (RF)

Business Risk Exposure/Criticality

Consequences of Failure

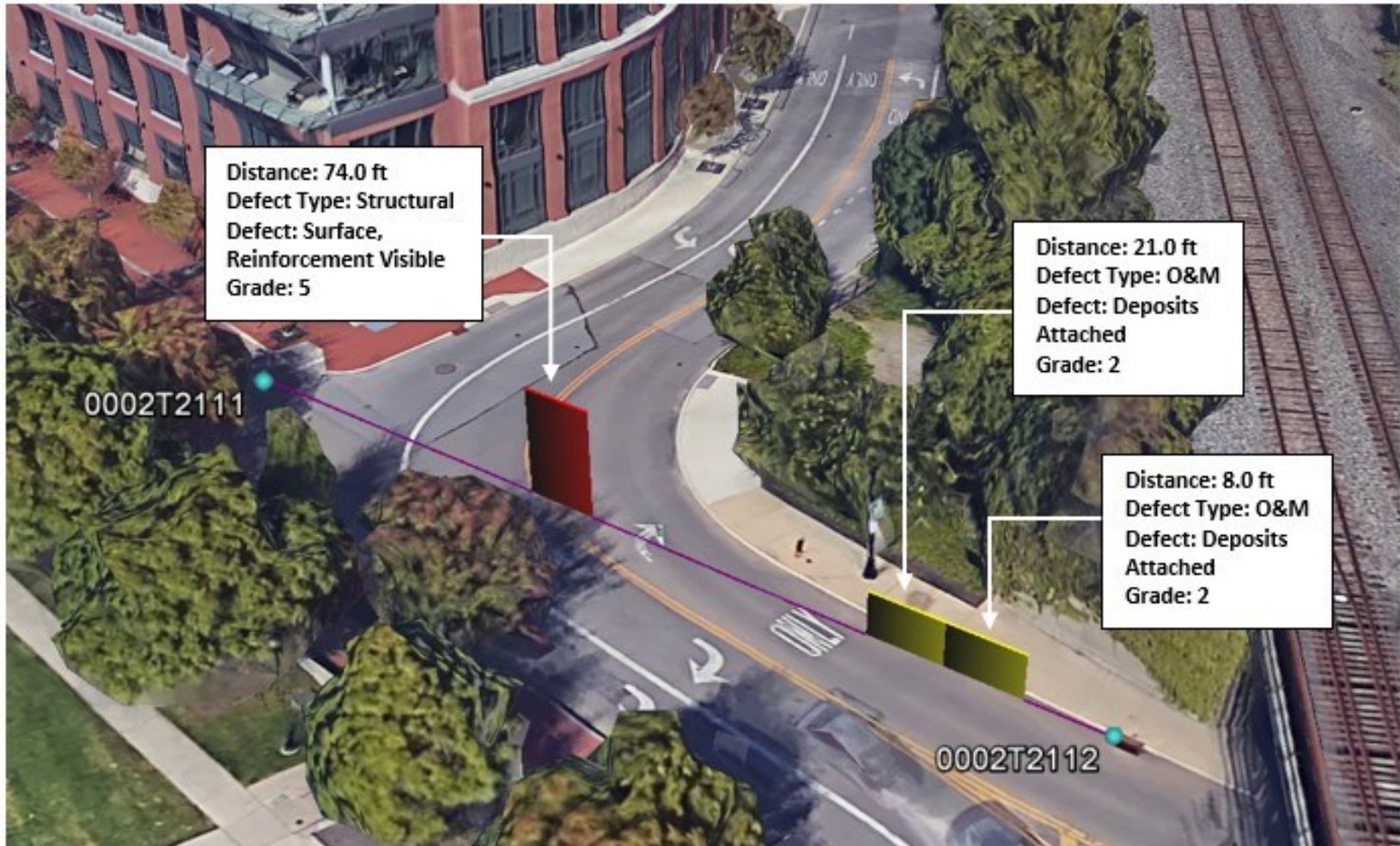
Probability of Failure

		Criticality					
		High	Med/High	Medium	Med/Low	Low	
		5	4	3	2	1	
Condition	High	5	10	11	9	7	13
	Med/High	4	17	11	22	17	23
	Medium	3	40	23	33	12	17
	Med/Low	2	28	13	21	26	34
	Low	1	101	68	90	90	164

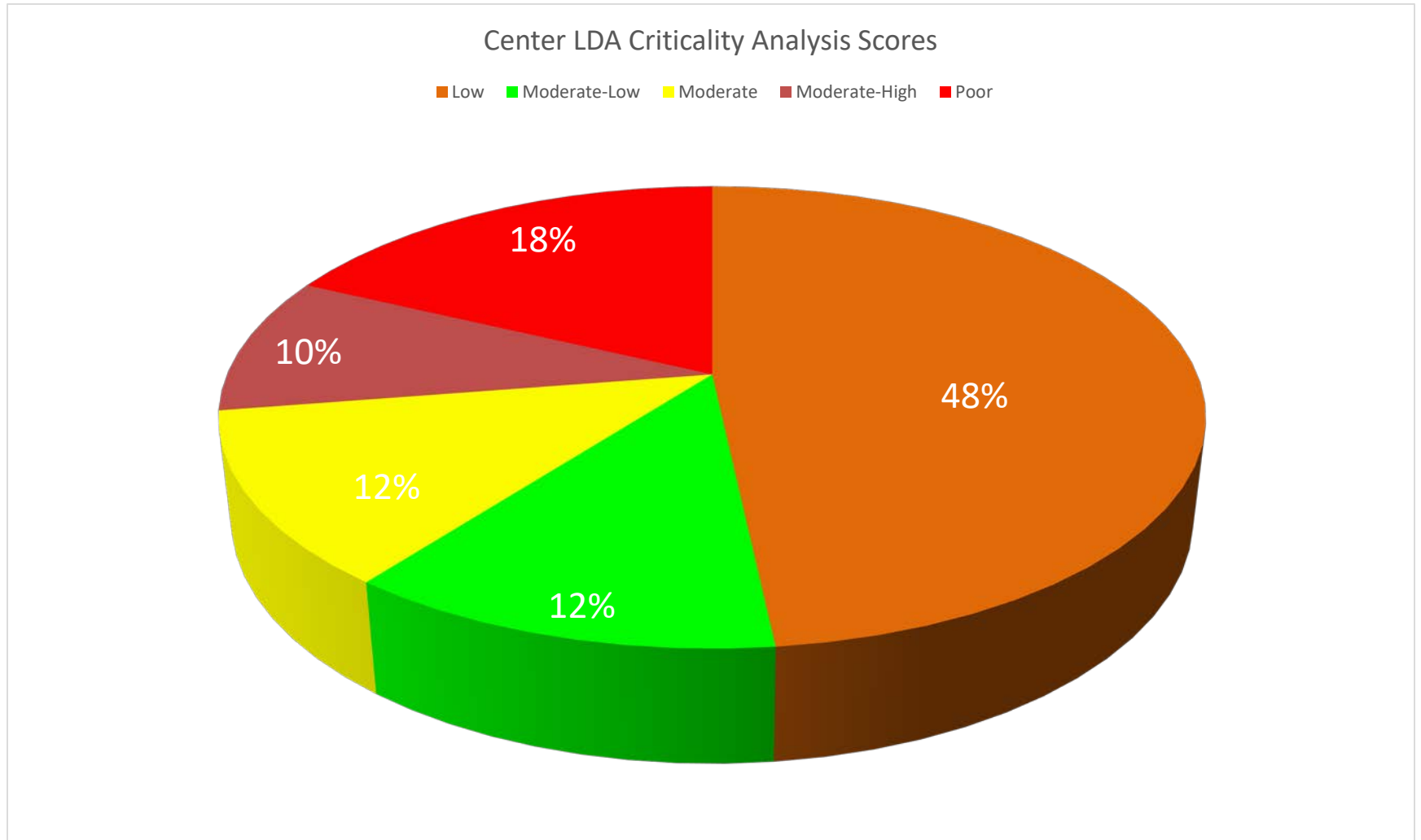
/ Redundancy?

Number in box = pipe sections in system

Criticality (contd.)



Criticality Score Distribution



Condition Assessment Summary

- Concrete storm sewers are in good condition with one exception (deep and non-reinforced)
- A number of brick pipes sustained ovalization and deformation
- Most manholes are structurally sound
- A couple of spots hydraulically stressed
- Man-entry is useful for select pipes
- Pipe thickness and surrounding soil condition are important – can't see this with CCTV

Next Steps

- Pipe Penetrating Radar (PPR)
- Rehabilitation Design
- Construction Phase Services

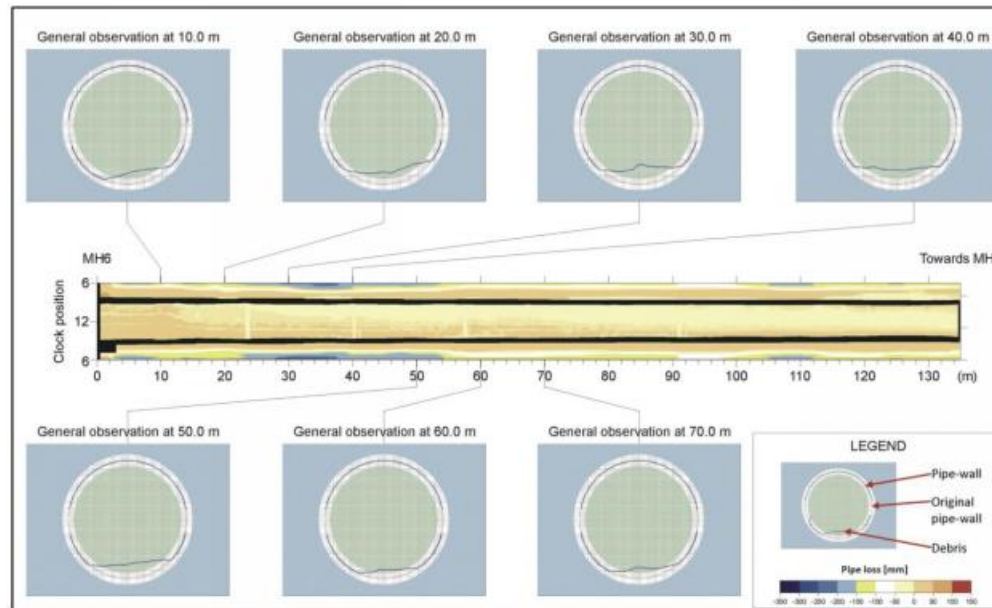


Image courtesy of Sewervue™

Goals of Sewer Rehab

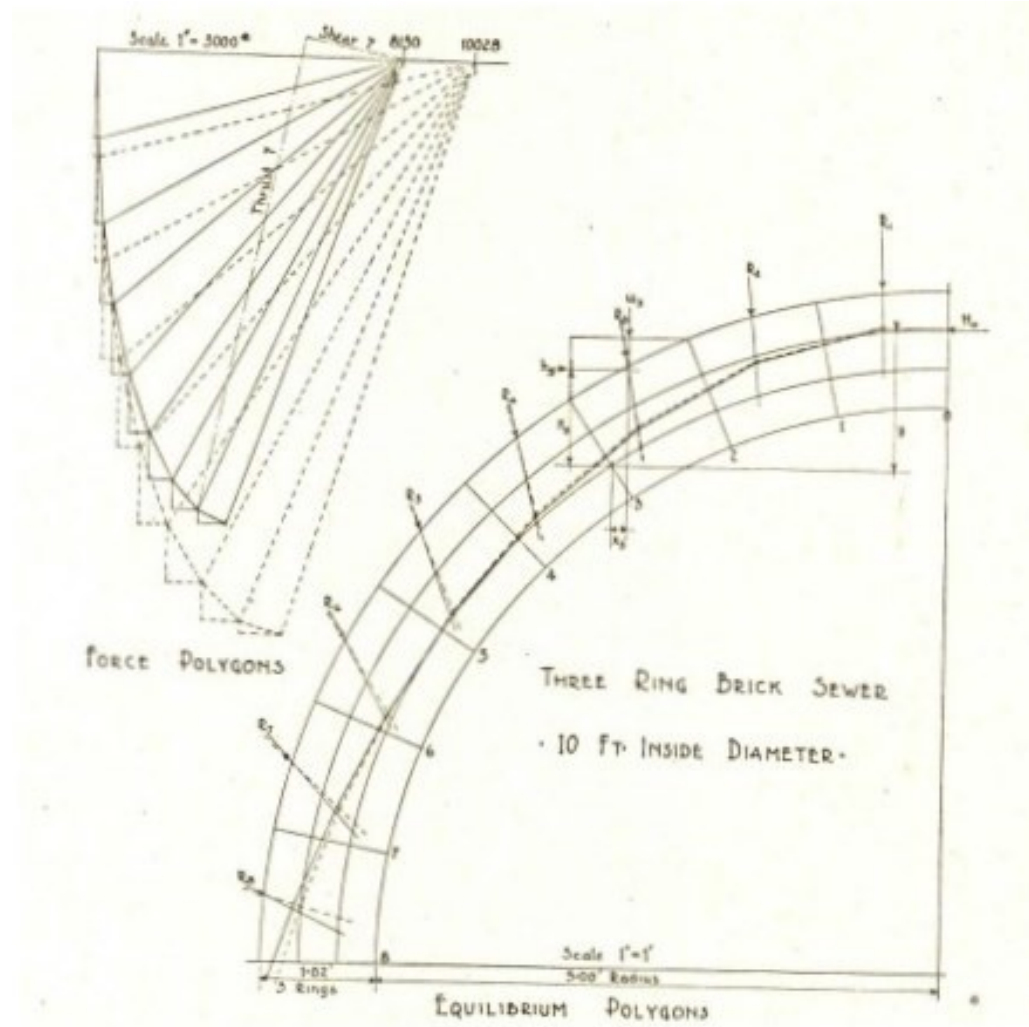
- Reduce/Eliminate Inflow and Infiltration
 - Prevent Sanitary Sewer Overflows (SSOs).
 - Reduce treatment plant flows and operation costs.
- Maintain structural integrity of sewer system
 - Avoid catastrophic failures.
 - Prevent sewage backups
- Achieve regulatory compliance
 - EPA's CMOM
 - Consent decrees
- Improve asset management



Rehabilitation Design

- Liner type and thickness matter
- Loads (soil, groundwater, traffic, other surcharge)
- Environmental effects
- ASTM F1216 for CIPP
 - Empirical, partially / fully deteriorated design

Brick Conduits



Acknowledgment

- John Schroeder (CDM Smith)
- Marc Lehmann (CDM Smith)
- Drew Richards (CDM Smith)
- Scott McBrayer (Donahue IDEAS)
- Jordan McCormack (American Structurepoint)
- Barry Waites (City of Columbus)
- Mark Dipiero (City of Columbus)
- Paul Peterson Company
- Joe Grani (CTL)
- Hydromax

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