



Integration of CMOM and Modeling

Identification and Elimination of a Large Diameter Siphon Restriction



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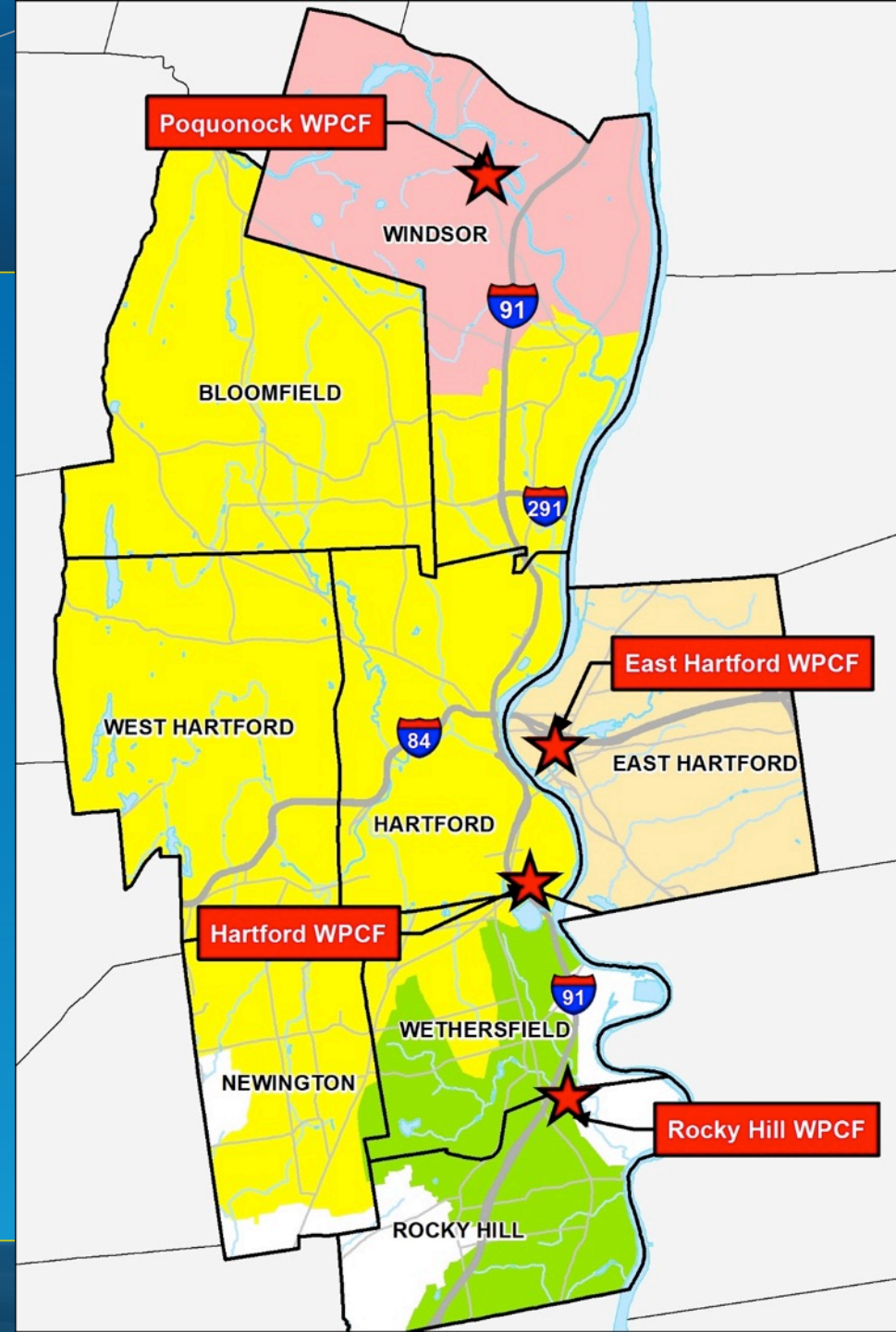
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555 Main Street
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NEWEA Annual Conference 2015
January 26, 2015



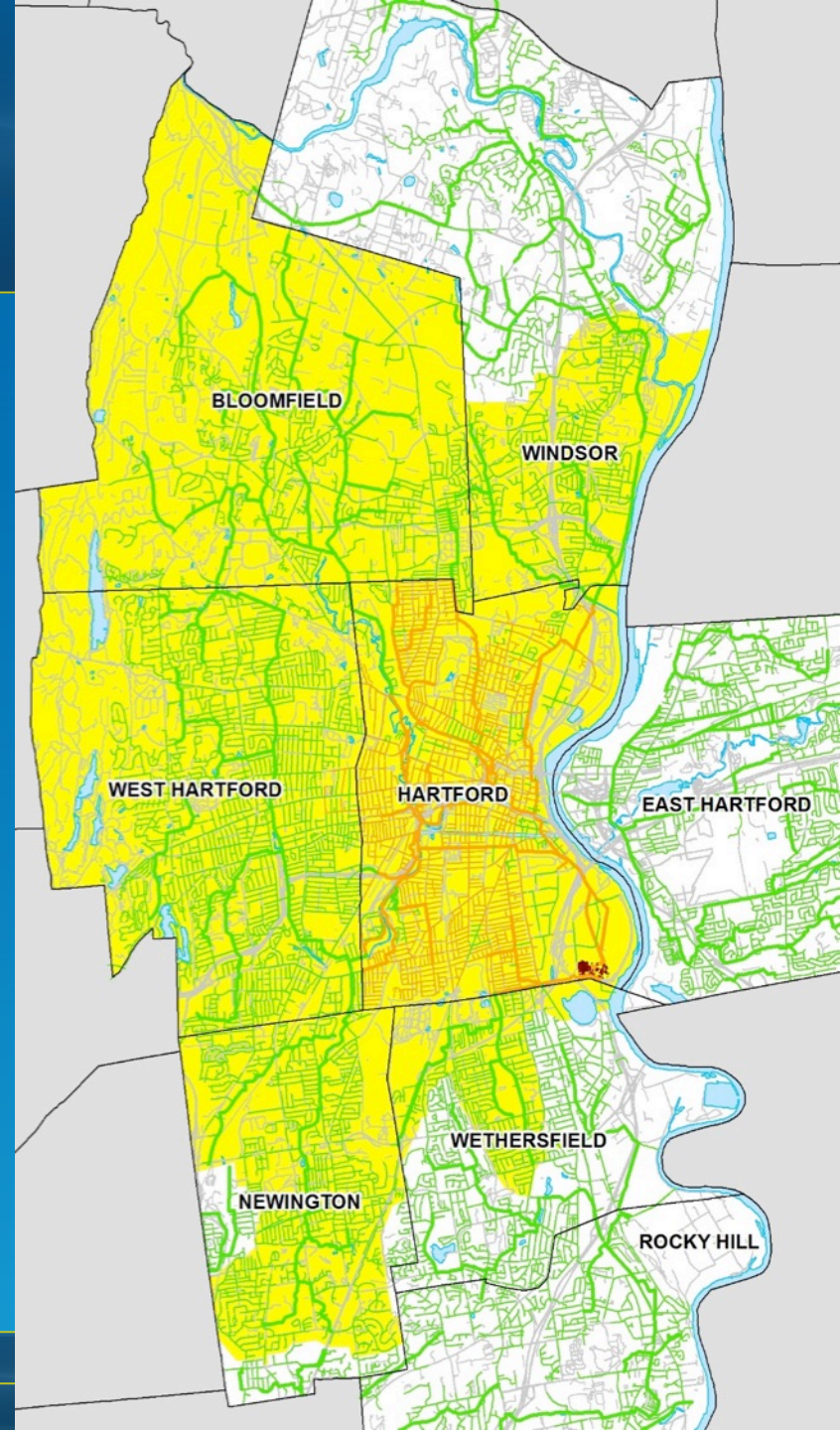
District Background

- The Metropolitan District (MDC or District) established in 1929
- Manages Hartford region's water and sewer systems
- Provides service to 8 member towns with ~400,000 people
- ~1,200 miles of sewers
- ~1,500 miles of water mains
- Systems date back to 1850s



HWPCF Sewershed

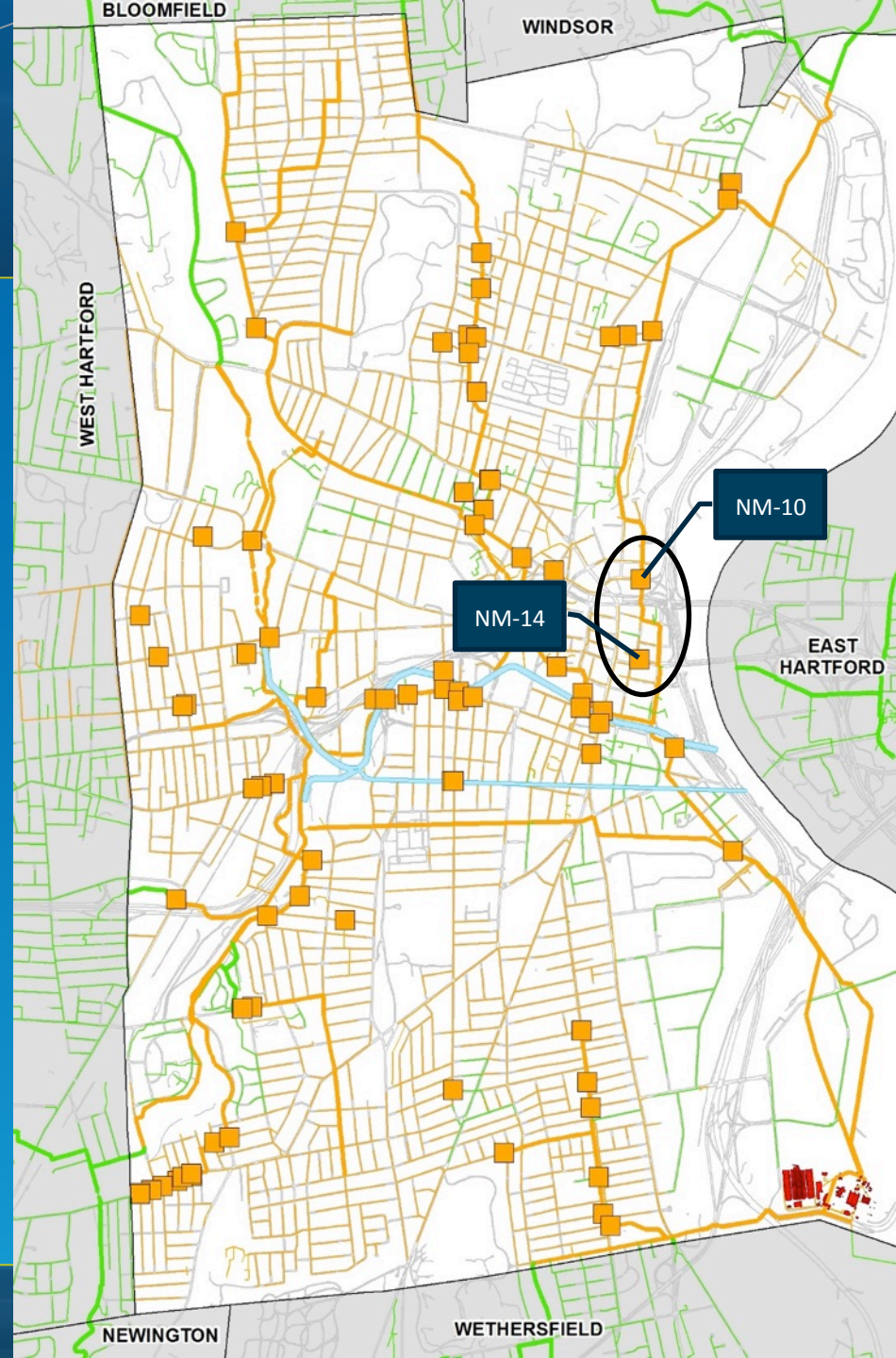
- 187 miles of combined sewers
- 590 miles of sanitary sewers
- Sanitary flows from Bloomfield, Newington, West Hartford, and portions of Wethersfield and Windsor
- Average flow = 56 MGD
- Treated wastewater is discharged to CT River



District's Combined Sewer System in Hartford

- 85 CSO regulators
- Consent Order with CT DEEP
- CSO LTCP (2014)
 - 73 regulators controlled to 1-year storm
 - 12 regulators eliminated (sensitive waterbodies)

Target Area: CT River Interceptor



Target Area

- ~3,000 LF of 48-inch pipe
- ~900 LF of 72-inch pipe
- 36-inch/72-inch siphon
- Hydraulic modeling indicates existing system should control NM-10 and NM-14

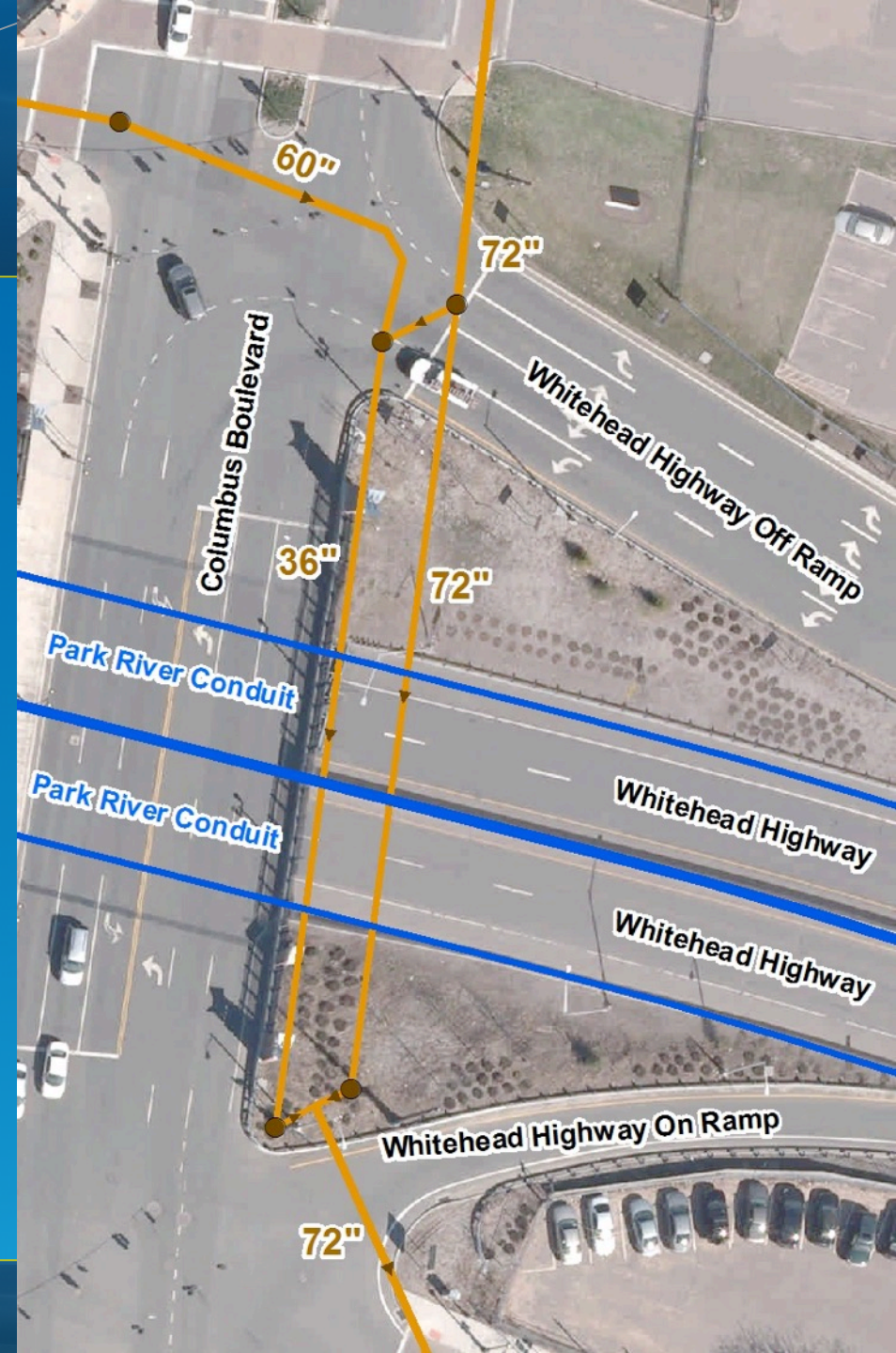
IF OPERATING WITHOUT SEDIMENT

- *Saves cost of new infrastructure for storage and/or conveyance*

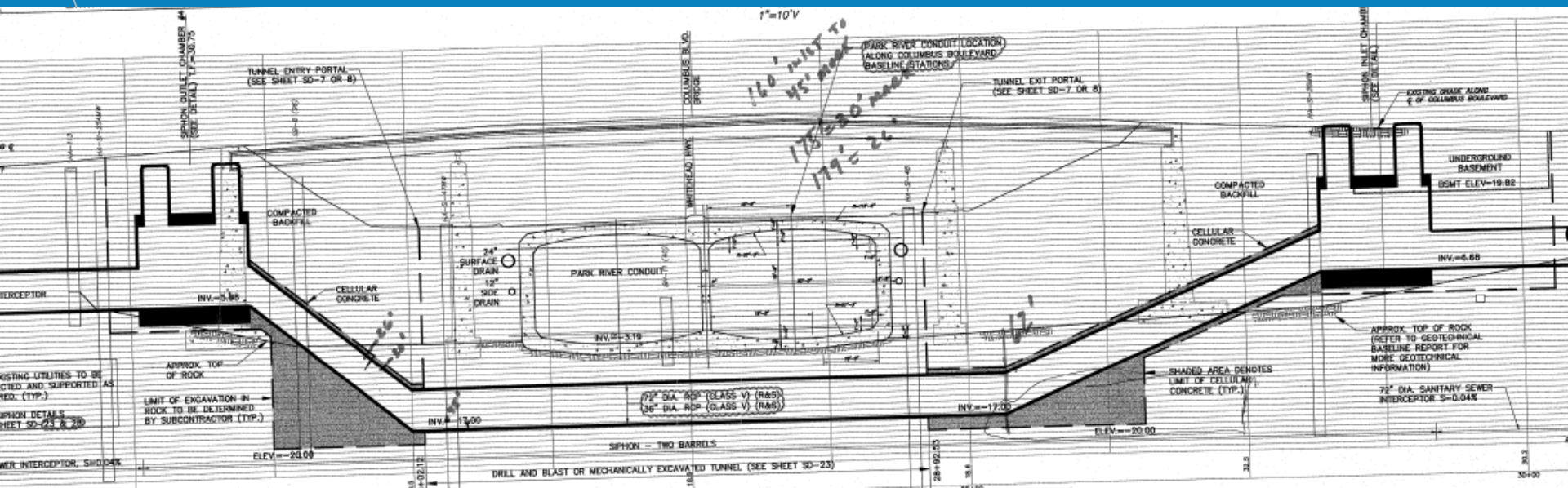


Columbus Boulevard Siphon

- Conveys flow from majority of HWPCF's sewershed
- 36-inch and 72-inch barrels constructed in 2003
- Approx. 50 feet deep
- Flows under the Whitehead Highway and Park River Conduit
 - Park River Conduit is double 19-ft X 30-ft drainage conduits

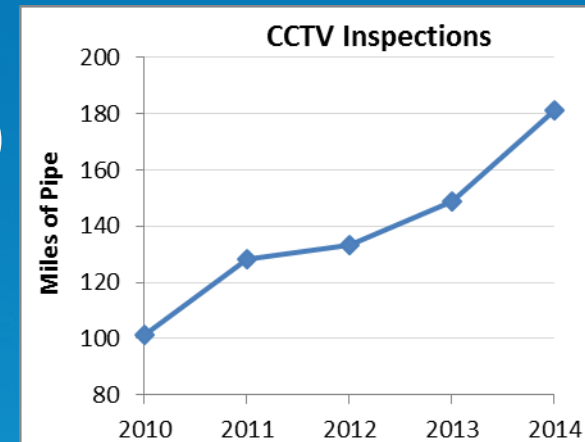


Columbus Boulevard Siphon



District's CMOM Program

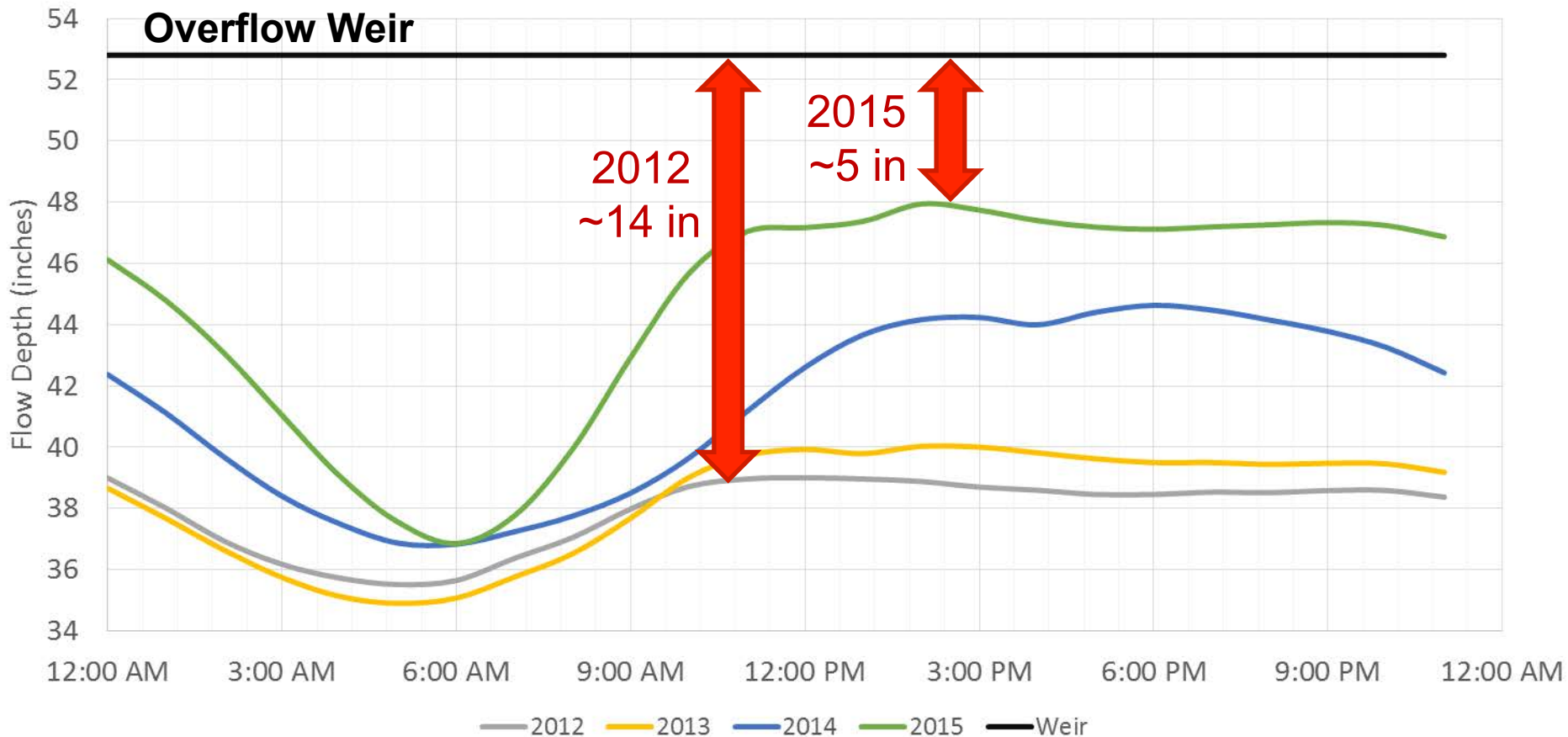
- Capacity, Management, Operations, and Maintenance (CMOM)
- District has made significant improvements to their CMOM program in the last 2 years
- Tremendous amount of data collected over past several years:
 - CCTV (inspect 150 miles per year)
 - Manhole inspections (Inspect 6,000 per year)
 - Periodic flow metering at 100+ sites
 - Permanent flow monitoring at 12 sites
 - Continuous depth data at 90 sites
- CMOM program ensures frequent review of the data and makes it readily available for making intelligent planning decisions



Flow Depth at NM-10

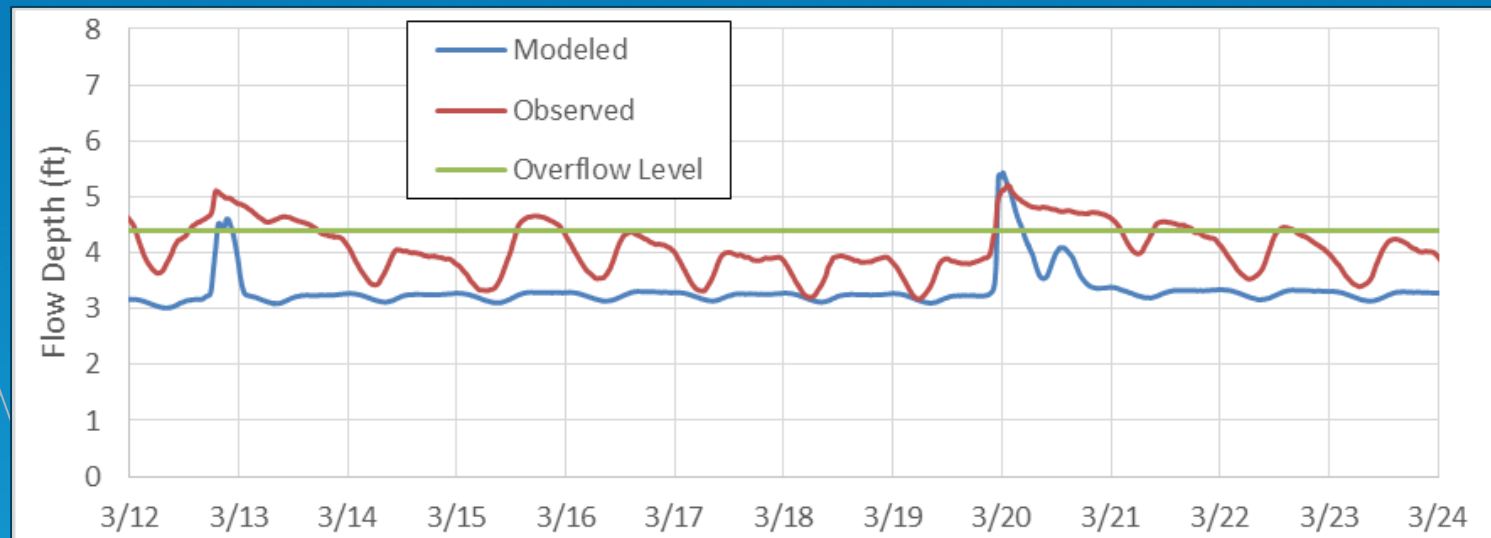
Average Daily Dry Weather Flow Depth in January

Overflow Weir



Hydraulic Model Results

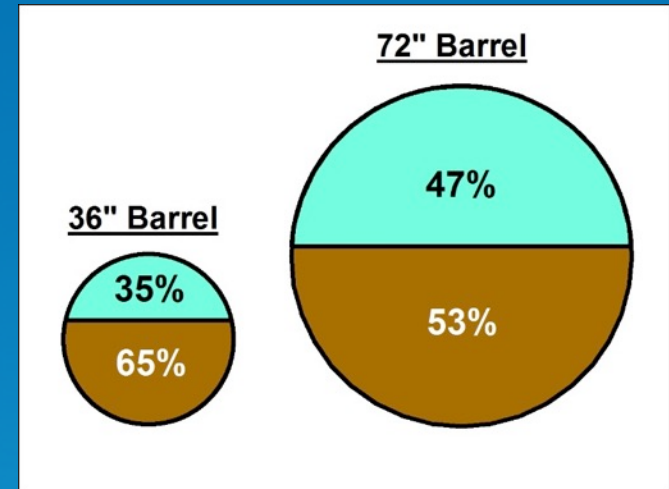
- Hydraulic model is an ideal representation of the system
 - When the model doesn't match potential indicator that the system is not operating ideally
- Last system calibration in 2009
- Model only matches depth and overflow at NM-10 with debris



Sonar

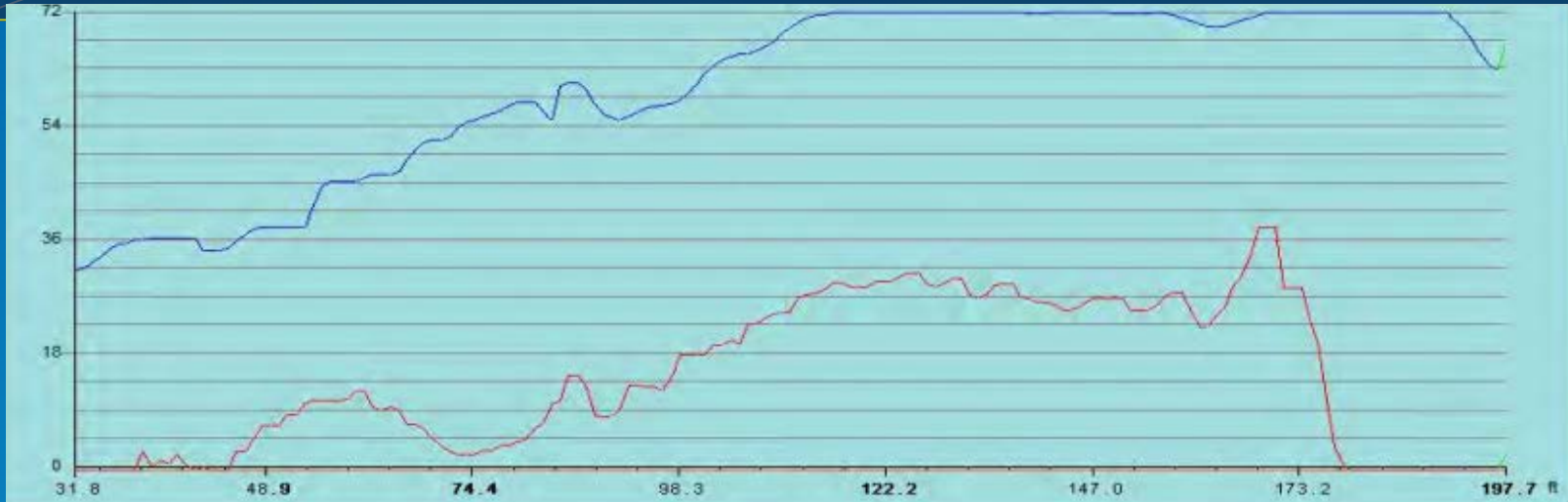
- Sonar inspected by RedZone in June 2014
- Estimated debris
 - 36-inch = 310 ft³ (11 yd³)
 - 72-inch = 850 ft³ (32 yd³)
 - **TOTAL = 1,160 ft³ (43 yd³)**
- Peak Debris Levels
 - 36-inch = 21.5" maximum debris level
 - 72-inch = 38.2" maximum debris level

Maximum Debris Levels

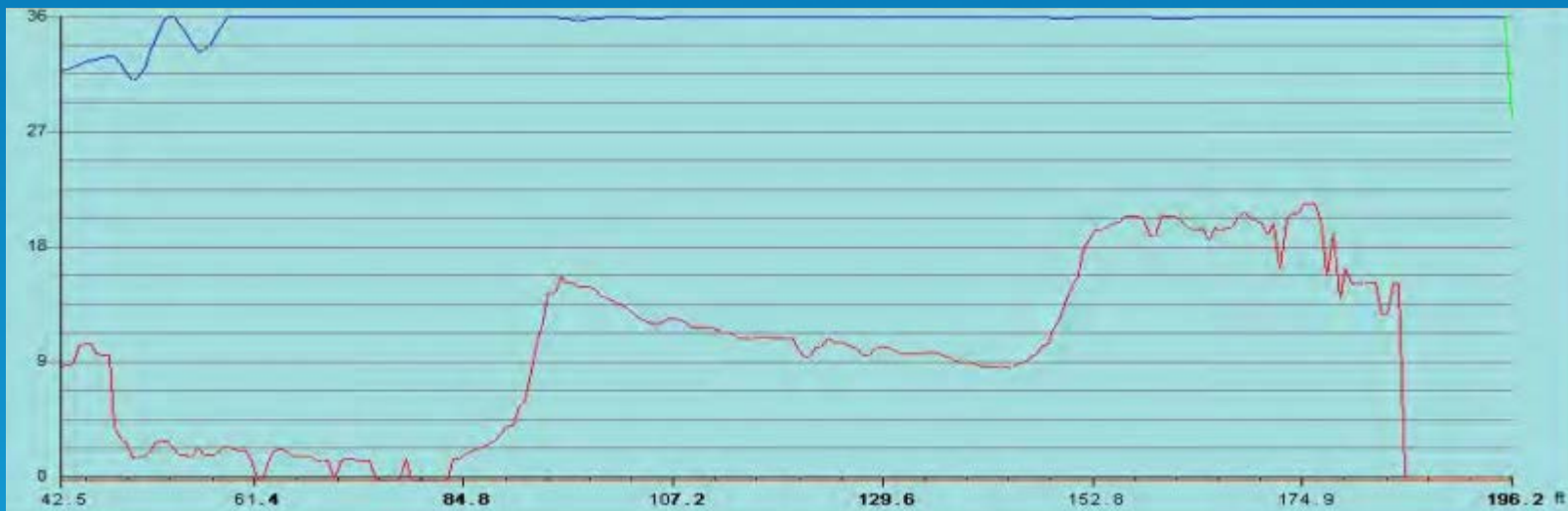


Sonar Debris Profiles

72"

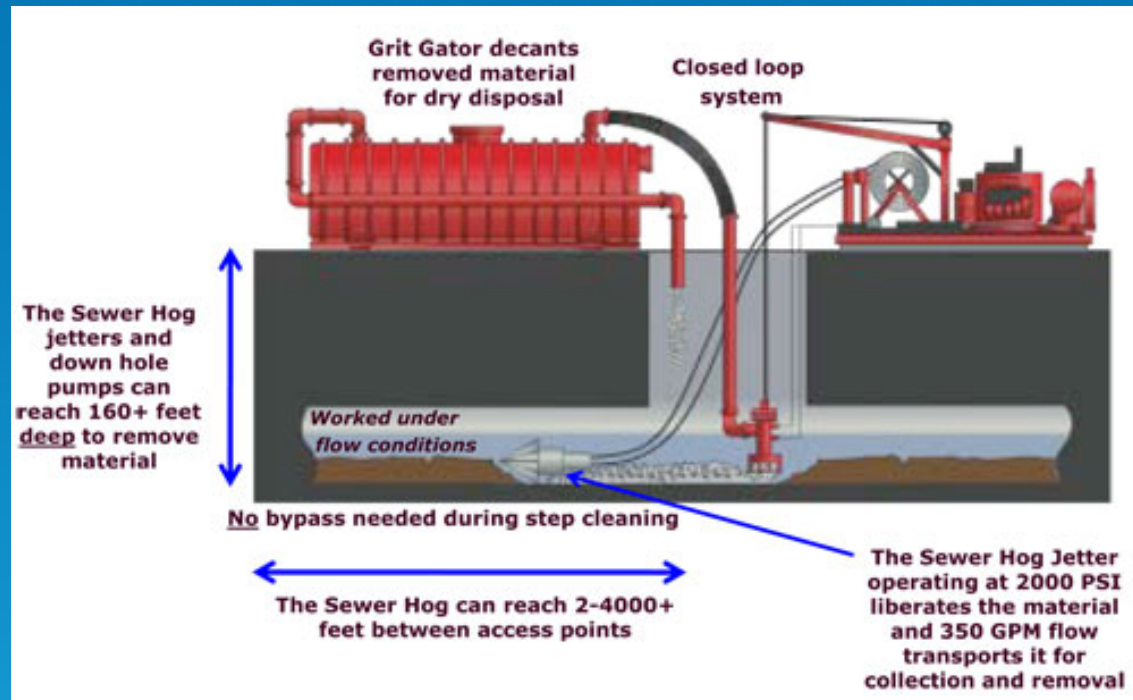


36"



How do we clean it?

- Considered two options:
 1. Isolating each barrel, dewatering, and cleaning
 2. Cleaning while online
- Chose cleaning while online for cost and operational benefits
- Brenford Environmental Services began the cleaning operation on 1/6/2015



Sewer Hog Arriving at the Work Site



Grit Gator Arriving at the Work Site



The Work Site



Pump Being Lowered in the 72-Inch Siphon



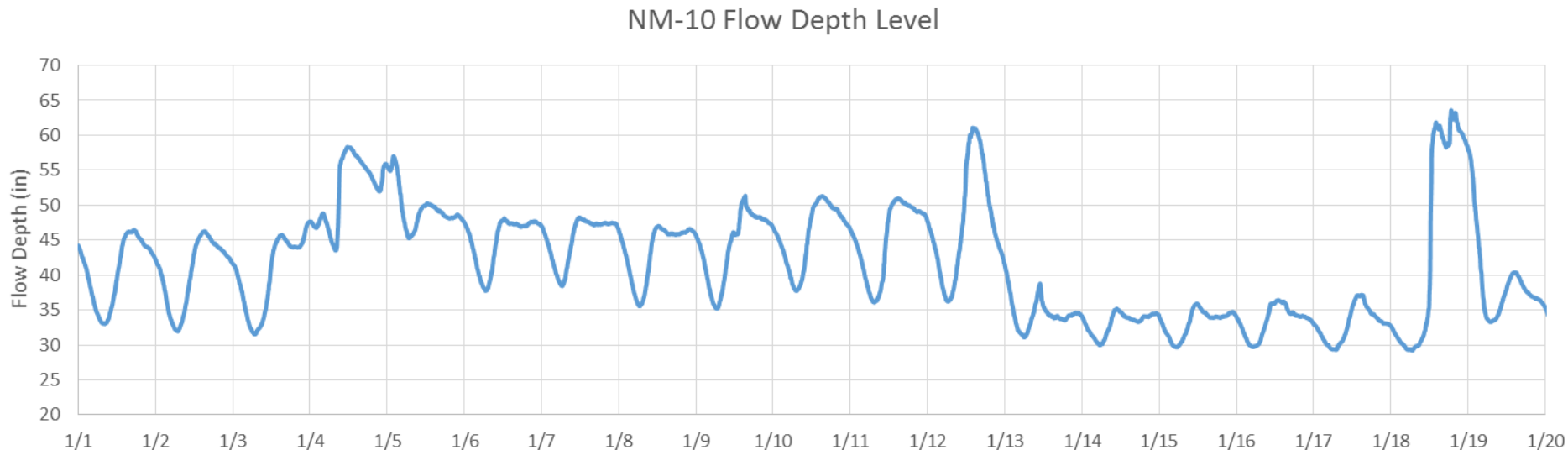
Challenges

- CT State Highway On Ramp Closure
 - Overnight work hours
 - Detailed traffic pattern
 - Constant communication with CT DOT
- Working in January in New England
 - Average temperature of working hours: 12°F
- Large debris foreign to collection system



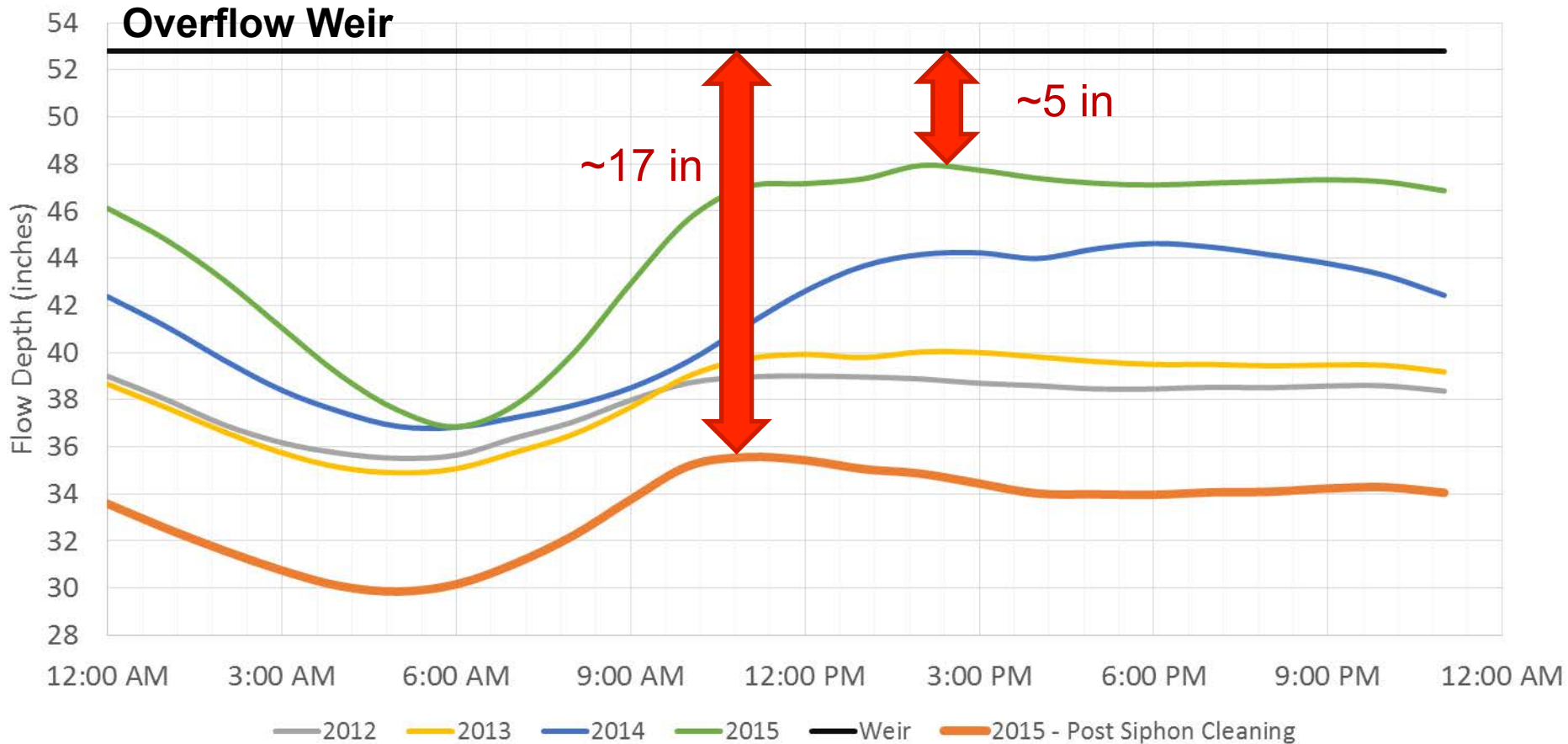
Cleaning Results

- 12 cleaning shifts (~8 hours of cleaning per shift)
- Removed 42 tons of debris (estimated ~ 45 yd³)
- Noticeable change in dry weather flow elevation
- Pending results of post-cleaning sonar inspection



We've Dropped the Flow ~1 Ft

Average Daily Dry Weather Flow Depth in January



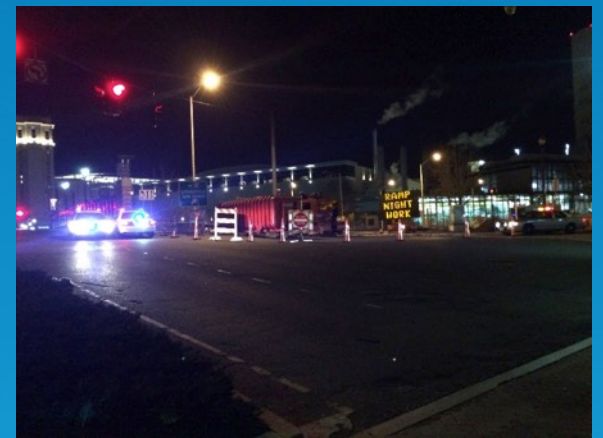
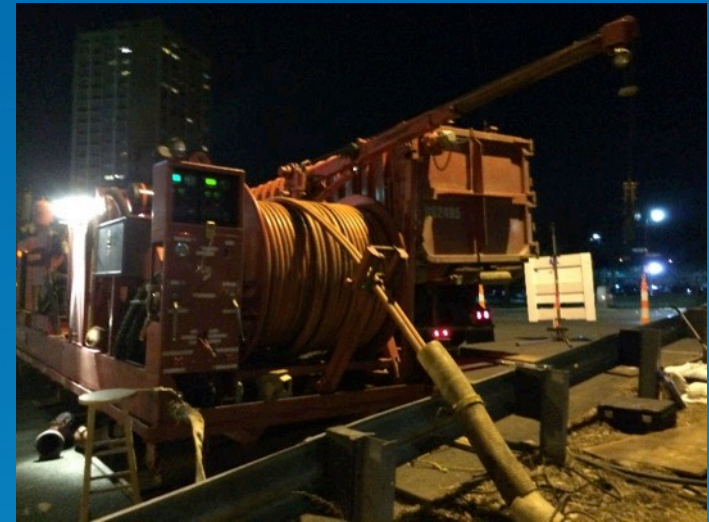
Long Term Alternatives

1. Routine monitoring and cleaning
2. Grit chambers on 2 major interceptors:
 - Park River Interceptor
 - CT River Interceptor
 - Capture debris upstream of the siphon so the District can maintain in-house
 - District initiated a study to size chambers and identify suitable sites
- Continued CMOM and large diameter pipe inspection program – **Identify potential problem areas BEFORE becoming problems**



Questions?

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Not planning to use slides...

Hydraulic Model

- All combined sewer pipes greater than or equal to 18" in diameter
- All sanitary pipes greater than or equal to 12" in diameter
 - 3,200 catchments
 - 230 miles of pipes
 - 4,200 manholes

