

Using GIS to Manage and Visualize Sewer System Inspections

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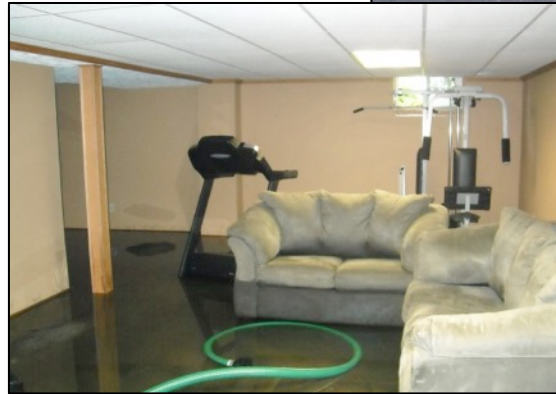
**CDM
Smith**

Presentation Outline

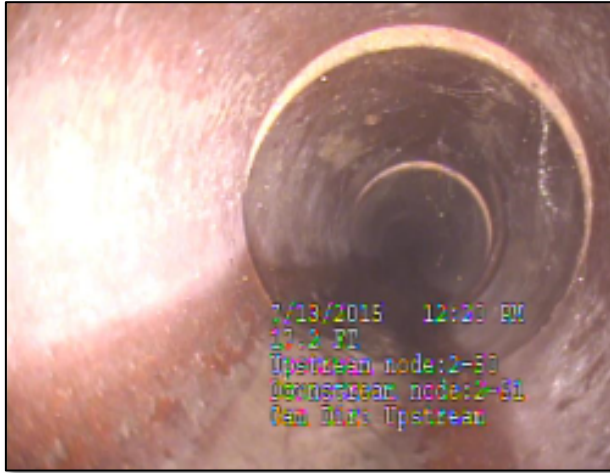
- Background
- Previous data management
- New electronic system
 - Collector app
 - Survey123 app
 - ArcGIS online web application
- Benefits

Background

- Sanitary (separated) sewer system
- 145 miles of gravity sewer pipe
- 13 pumping stations
- Dry weather overflows



Consent Decree (CD)

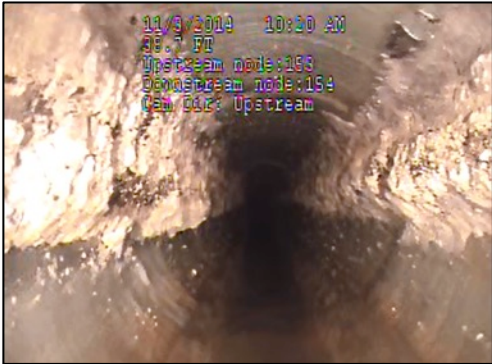


- Overflows dispersed throughout City
- EPA issued CD in 2014
- CD requirements include:
 - Mapping overflows
 - Clean 20% of system annually
 - CCTV inspect 10% of system annually
 - Manhole inspections for 10% of system annually
- A need to organize and map data

Types of Inspection Data

CCTV Insp.

- CCTV summary log and database
- Videos with observations
- Data reviewed - given recommendation and priority



Cleaning

- Routine and plug-up related cleaning
- Different crews complete two types
- All data on paper forms
- Tracked by street name and footage



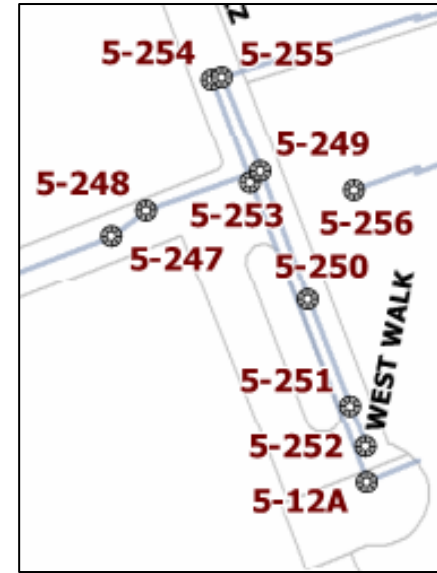
Manhole Insp.

- Inspections on paper form
- Photos taken on camera and attached to forms



Challenges from Previous System

- Difficulty keeping paper maps up-to-date
- Hard to distinguish nearby manholes and labeling
- Receiving incomplete forms from City
- City wanted system that was accessible to everyone
- ★ Historical data not linked to location (pipe, manhole)





Previous Paper-based System Not Connected

Cleaning records

CENTER STREET		
Center Street	CENTER STREET	150 FEET
CENTER STREET - 1 Total:		150

CCTV inspections




STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WATER MANAGEMENT BUREAU


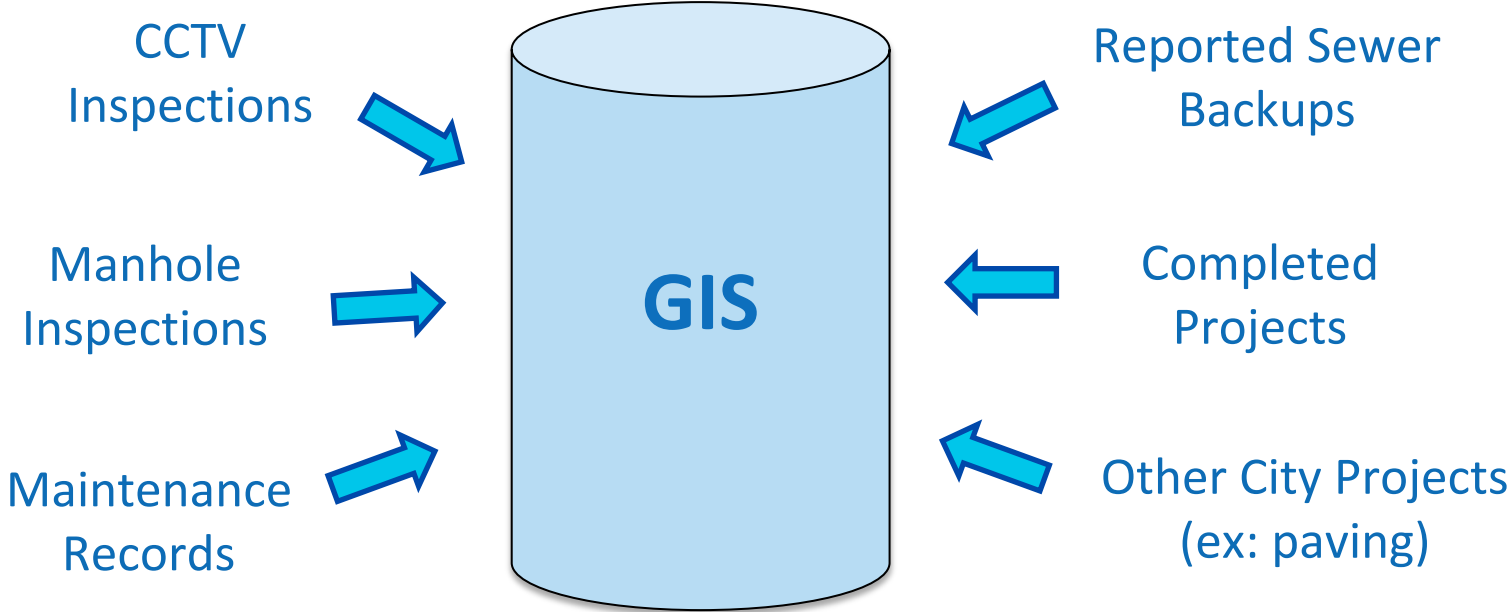
BY-PASS REPORT FORM

City or Town: _____ Date: 1/12/2014

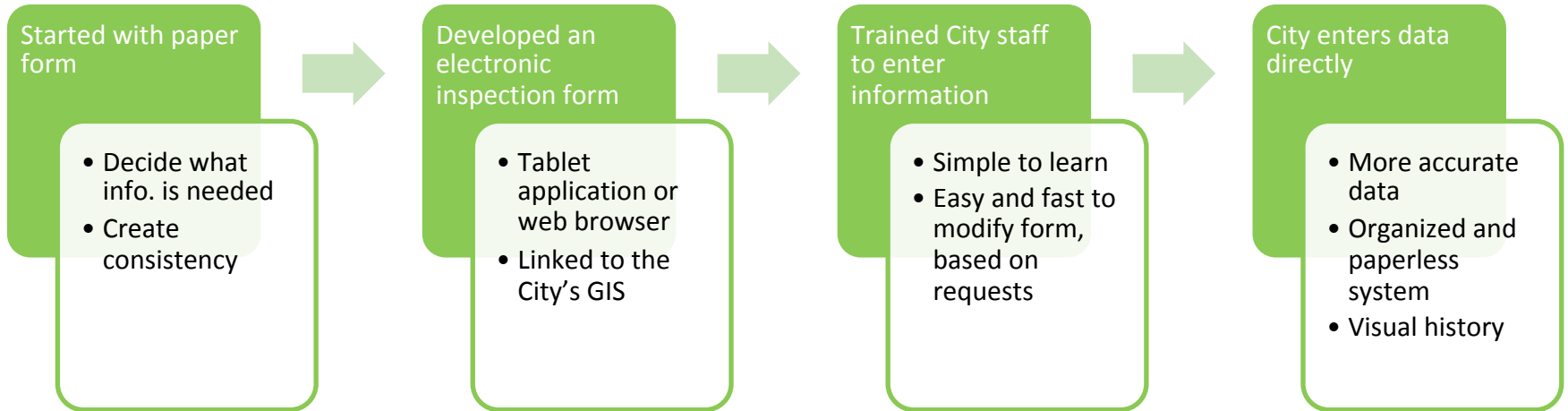
<p><u>Type of By-pass</u></p> <p><input checked="" type="checkbox"/> Raw Sewage</p> <p><input type="checkbox"/> Disinfected Raw Sewage</p> <p><input type="checkbox"/> Partially Treated Sewage</p> <p><input type="checkbox"/> Disinfected Partially Treated Sewage</p> <p><input type="checkbox"/> Sludge Spill</p> <p><input type="checkbox"/> Other _____</p> <p><u>Location of Bypass</u></p> <p><input type="checkbox"/> Treatment Plant</p> <p><input type="checkbox"/> Pump Station</p> <p><input checked="" type="checkbox"/> Manhole, <input type="checkbox"/> Lateral, <input type="checkbox"/> Basement</p> <p><input type="checkbox"/> Main, <input type="checkbox"/> Private _____</p>	<p><u>Cause of By-Pass</u></p> <p><input type="checkbox"/> Weather Condition _____</p> <p><input type="checkbox"/> Mechanical Equipment Failure</p> <p><input type="checkbox"/> Electric Utility Failure</p> <p><input type="checkbox"/> Electrical Equipment Failure</p> <p><input type="checkbox"/> Approved Shutdown</p> <p><input type="checkbox"/> Limited Capacity: <input type="checkbox"/> Dry Weather <input type="checkbox"/> Wet Weather</p> <p><u>Blockage of Sewer Line due to:</u></p> <p><input checked="" type="checkbox"/> Grease <input type="checkbox"/> Roots</p> <p><input type="checkbox"/> Other _____</p>
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Sewer overflow reporting

Centralized Data Management System

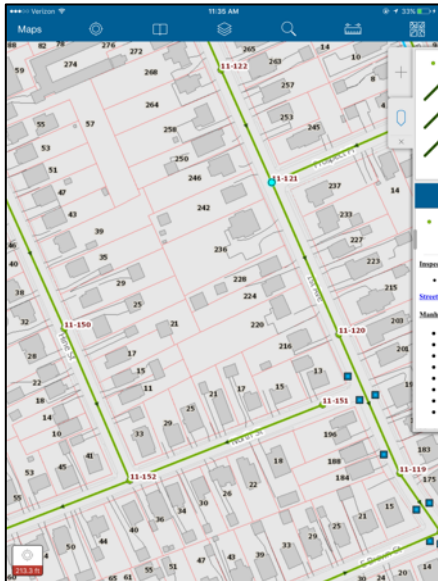


Transition from Paper to New Electronic Forms

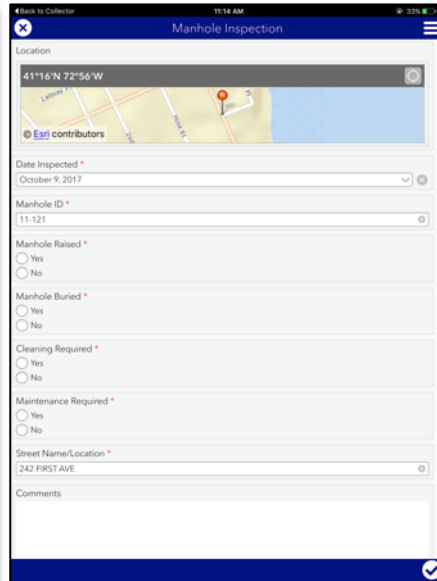


Creating an Electronic Inspection System

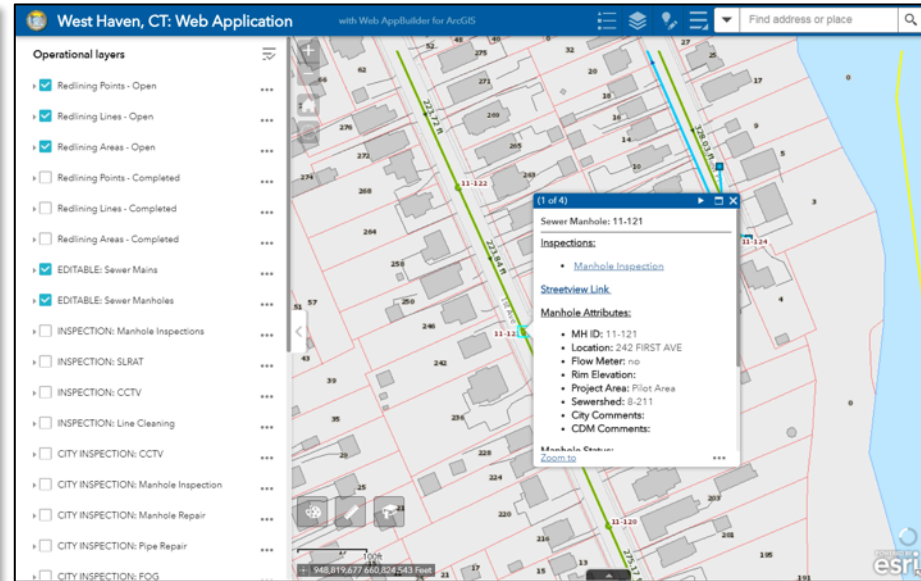
- Sewer inspections have multiple components:



View and update data
from the field



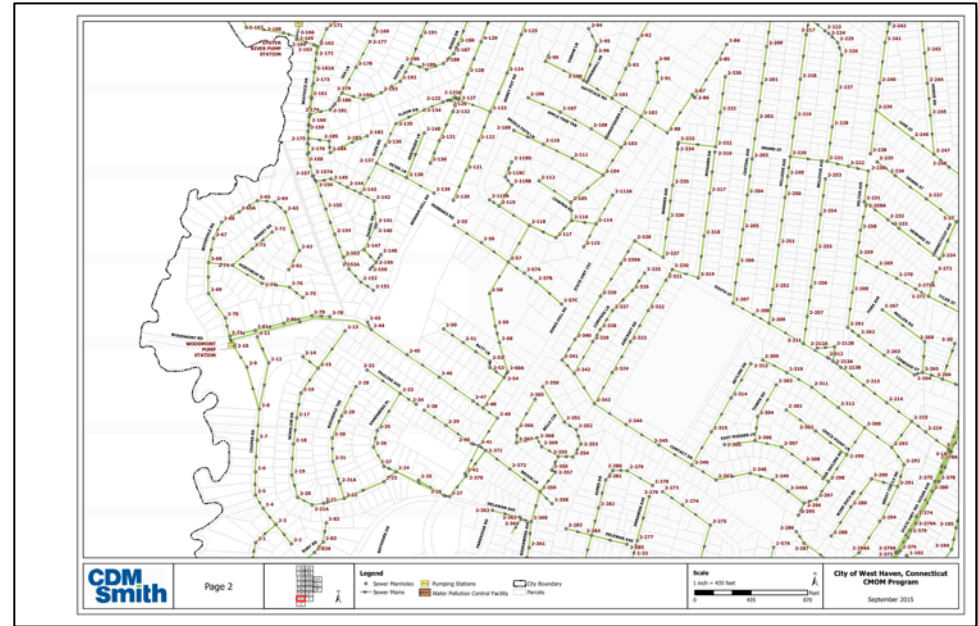
Perform inspections
on assets



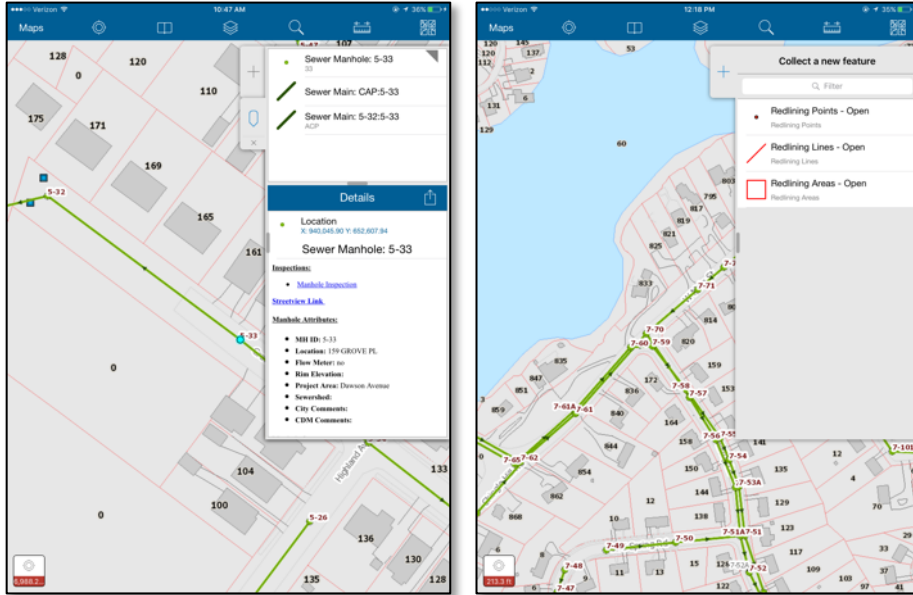
Track inspection progress and
manage inspection data from the office

Bringing Data into the Field with Collector App

- Old System:
 - Paper field map books
- Difficulties:
 - Map readability
 - Limited information
 - Data in map out of date
 - Collaboration with office staff



Bringing Data into the Field with Collector App



- New System:
 - Digital maps in Collector
- Benefits:
 - Versatile and smart interface
 - Information accessible without cluttering the map
 - Data is up-to-date
 - Easier collaboration

Performing Inspections with Survey123 App

- Old System:
 - Paper inspection forms
 - Manually entered into spreadsheet or database
- Difficulties:
 - Incomplete or inaccurate forms
 - Inefficient
 - Data organization and management

DAILY CLEANING INSPECTION REPORT

Date: 2/6/17

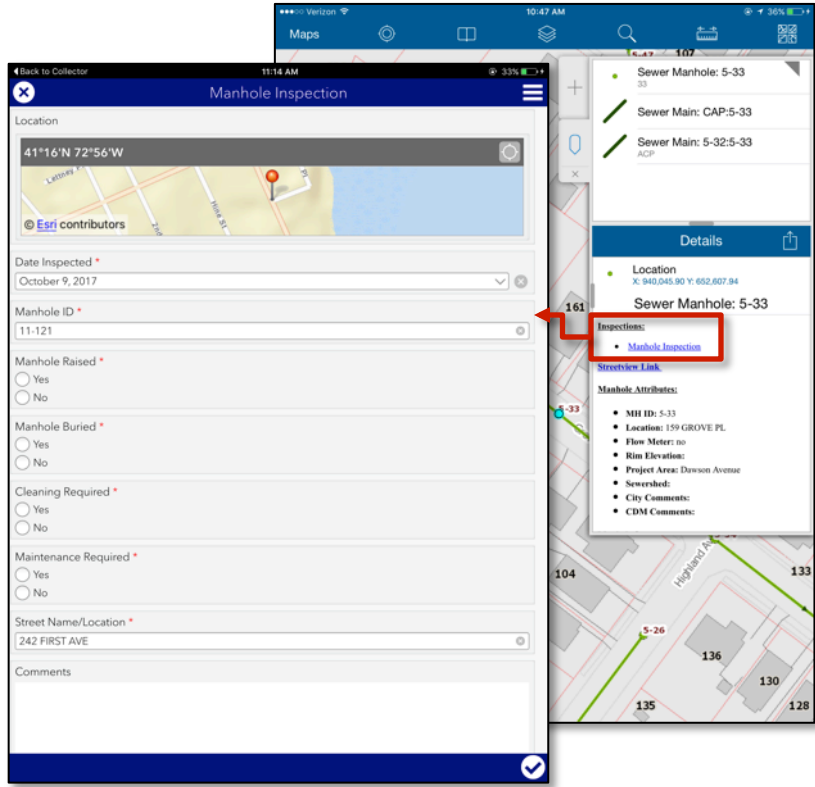
Time Started: _____ Time Ended: _____

Weather: Clear/Dry

Pat Marrierty (T.M.) Mike O'Brien (Mo.)

From MH #	To MH #	Diameter (in)	Direction US/DS	Footage Cleaned (feet)	Cleaning Completed? (Y/N)	Heavy Cleaning (Y/N)	Location / Street Names	Comment #
4-241, 4-241, 4-242	4-244	8	US	750	Y		Jones Hill Rd.	
4-244, 5-57	5-57A	8	US	450	Y		Jones Hill Rd	
11-73, 11-74, 11-76	11-45	8	US	870	Y		Brown St. / Martin St	
11-73, 11-74	11-23	10	US	380	Y		Brown St. / Union Ave	
				Total				
				2370				
				(1.6)				

Performing Inspections with Survey123 App



- **New System:**
 - Digital inspection forms in Survey123
- **Benefits:**
 - User friendly interface
 - Quick and simple data input
 - Improved accuracy and completeness
 - Data centralized and easy to access

Tracking and Managing Inspections in ArcGIS Online

- Data Management:
 - Applications in ArcGIS Online
- Benefits:
 - Manage and explore data
 - Data centralized
 - Improved collaboration

West Haven, CT: Web Application with Web AppBuilder for ArcGIS

Find address or place

Filter

- Manhole Inspections

Date is between January 1, 2017 and today

Inspection Status is Surface Inspection: Level 1 (no manhole entry)

- SLRAT Inspections

Date is between November 5, 2017 and November 5, 2017

Assessment is between 0 to 10

Pipe Status is

Good, Fair, Poor

- CCTV Inspections

Date CCTVed is between 11/5/2017, 12:00 and 11/5/2017, 12:00

Additional CCTV Required is

(1 of 4)

Manhole Inspection: 1-68A

General Information:

- Surveyed By: DT
- Date: March 17, 2017
- Weather: Dry (no precipitation during survey)
- Inspection Status: Surface Inspection: Level 1 (no manhole entry)

Location Details:

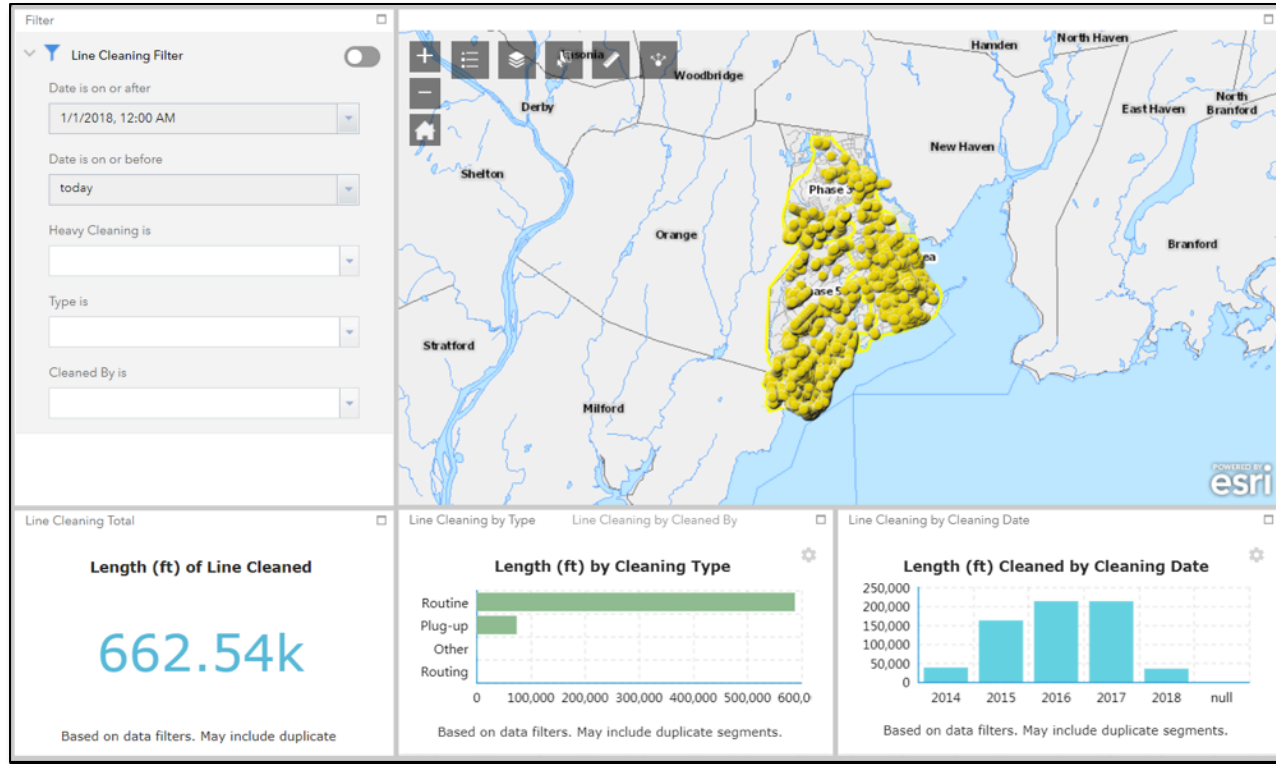
- Manhole/Access Point ID: 1-68A
- Street Name and Number: 262 OCEAN AVE
- City: WEST HAVEN
- Location: Secondary Roads

Zoom to ***

200ft

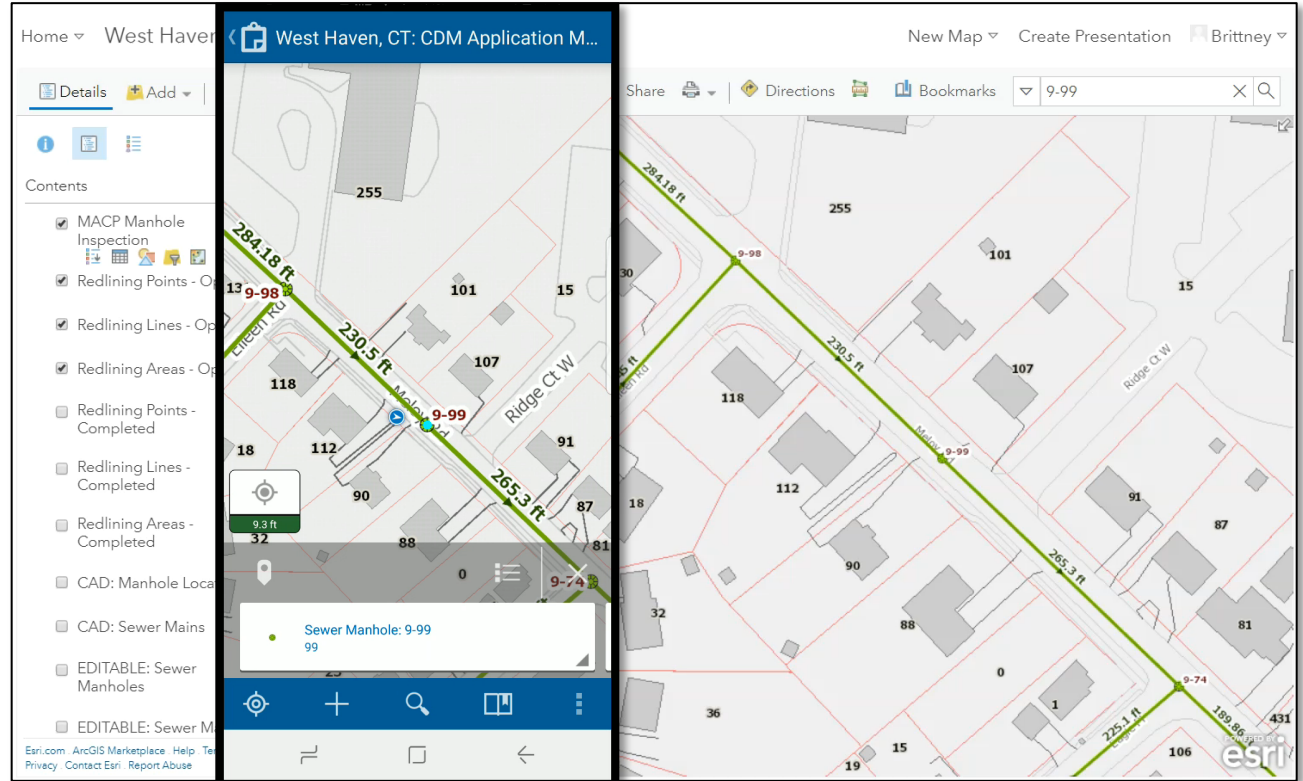
938,044,208 646,584,898 Feet

Tracking and Managing Inspections in ArcGIS Online



- Data Management:
 - Dashboards in ArcGIS Online
- Benefits:
 - Easy to create and intuitive to use
 - Easily track key performance metrics

Inspection System Demonstration



Consent Decree Reporting Benefits

- Data easily **accessible** to City and CDM Smith
 - Simple to filter and total completed inspections
 - Can check ongoing progress of requirements
- Quickly create **maps** for reporting
- Data is **live and up-to-date**, doesn't need to be entered/
compiled for report
- **Historical data** for location (pipe, manhole) is available to
make past comparisons

Additional Benefits

- Confirm **required data** is collected
- Reduce the **amount of equipment** needed to perform inspections
- Improve **accuracy** by providing field staff with current data on mobile devices (phone, tablet)
- Ability to use maps and apps **offline**
- Improve **efficiency** by creating maps and applications for specific purposes (ex: cleaning and CCTV)
- Increase **collaboration** by having data accessible to multiple users immediately



Questions and Answers

