

# Stormwater System Structure Maintenance

Using Collector App



# 2003 MS4 Permit Requirements for Mapping and Maintenance

## ● Minimum Control Measures

- #3 - Illicit Discharge Detection and Elimination
  - Inspect all Catch Basins
  - Map Outfalls/Receiving Waters
- #6 - Pollution Prevention and Good Housekeeping
  - **Stormwater system maintenance**



Collector App!

# Paper Records

## STORMWATER STRUCTURE MAINTENANCE LOG

DATE: \_\_\_\_\_

VEHICLE NO: \_\_\_\_\_

DRIVER: \_\_\_\_\_

CIRCLE APPROPRIATE RESPONSE BELOW

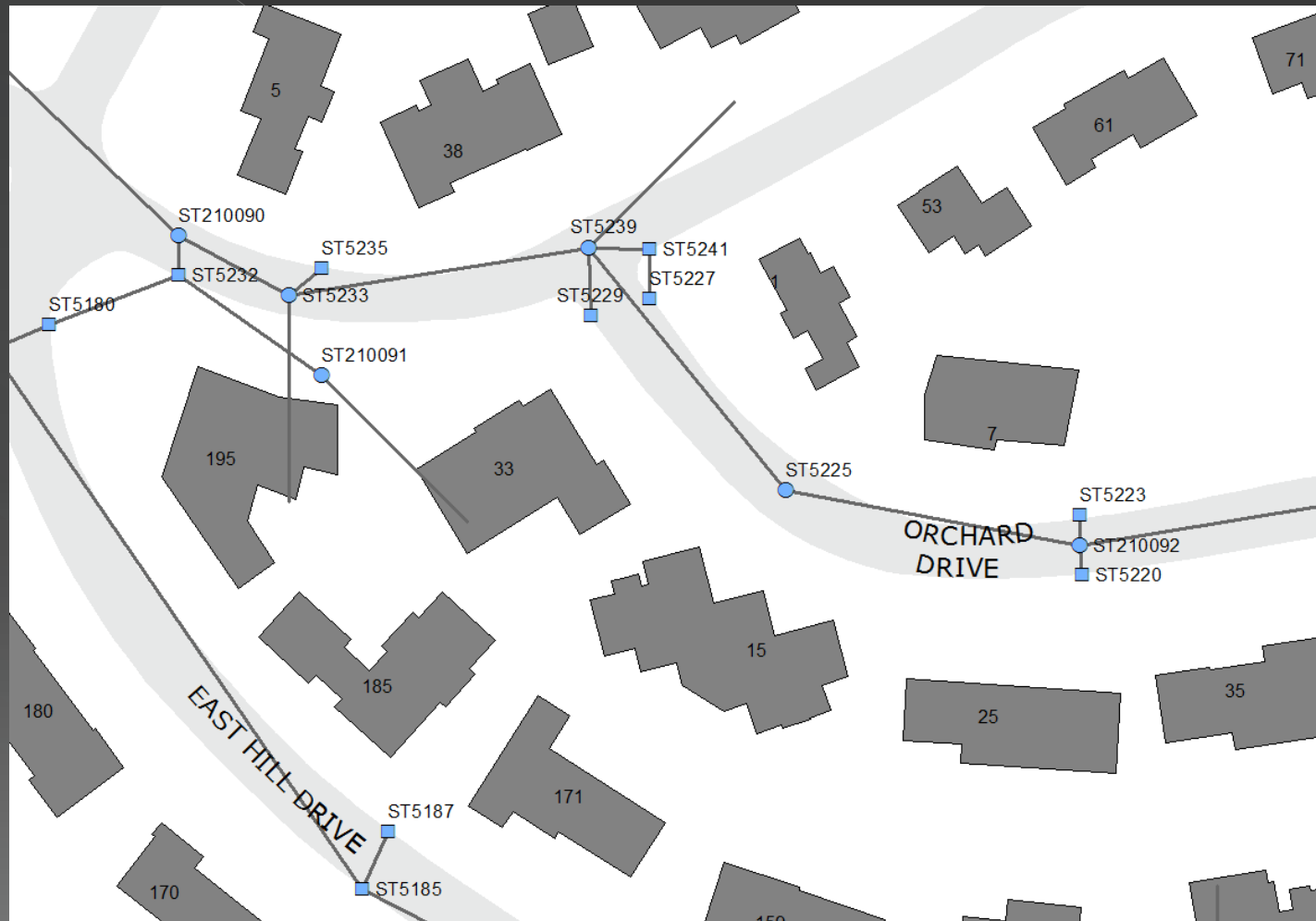
STRUCTURE ID	LOCATION	DEBRIS DEPTH (inches)	ODOR	COLOR	ACTIVE FLOW	STRUCTURE CONDITION	ILLCIT CONNECTIONS	COMMENTS
			None Slight Strong	Clear Not Clear	None Minimal Full	Satisfactory Poor	None Investigate	
			None Slight Strong	Clear Not Clear	None Minimal Full	Satisfactory Poor	None Investigate	
			None Slight Strong	Clear Not Clear	None Minimal Full	Satisfactory Poor	None Investigate	
			None Slight Strong	Clear Not Clear	None Minimal Full	Satisfactory Poor	None Investigate	
			None Slight Strong	Clear Not Clear	None Minimal Full	Satisfactory Poor	None Investigate	
			None Slight Strong	Clear Not Clear	None Minimal Full	Satisfactory Poor	None Investigate	
			None Slight Strong	Clear Not Clear	None Minimal Full	Satisfactory Poor	None Investigate	
			None Slight Strong	Clear Not Clear	None Minimal Full	Satisfactory Poor	None Investigate	

TONS OF SAND: \_\_\_\_\_

TONS OF SAND: \_\_\_\_\_

TONS OF SAND: \_\_\_\_\_

# Paper Maps (Structure IDs)



# Issues

- Time-Consuming Map Production
  - 1,000 Pages of Letter Size Maps
- Cumbersome to Use Paper Maps & Logs
- Limited Access to Structure IDs
  - 7800+ City Structures
  - Not All Work was Recorded
  - Reprint After Data Updates
- Convert Years of Paper Field Logs to DB
  - As Time is Available

# Goals

# ● No More Paper!



# Solution

- Collector App

- › Field Access to Inventory
- › Create Work Records
- › Photos
- › Easy To Use

- Web App Builder

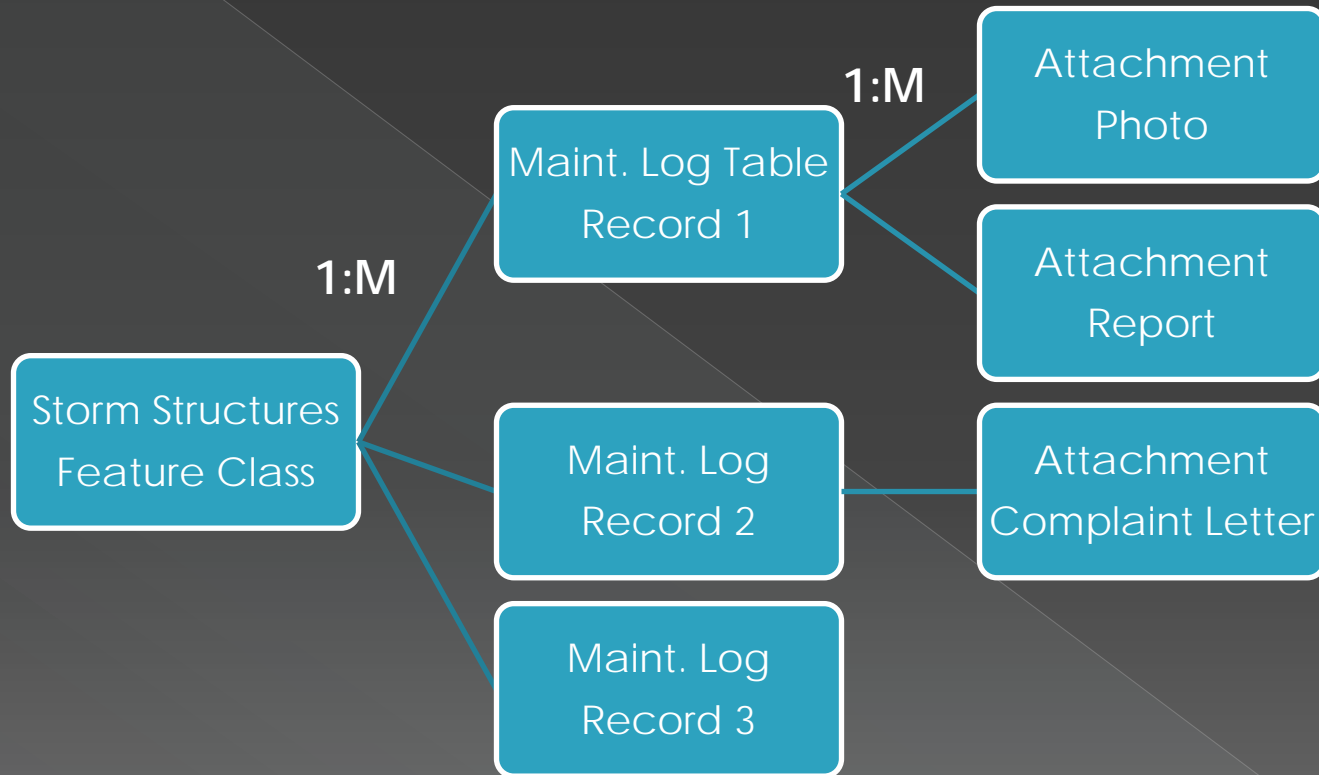
- › Convert Paper Logs from Desktop

# What Can Be Accomplished?

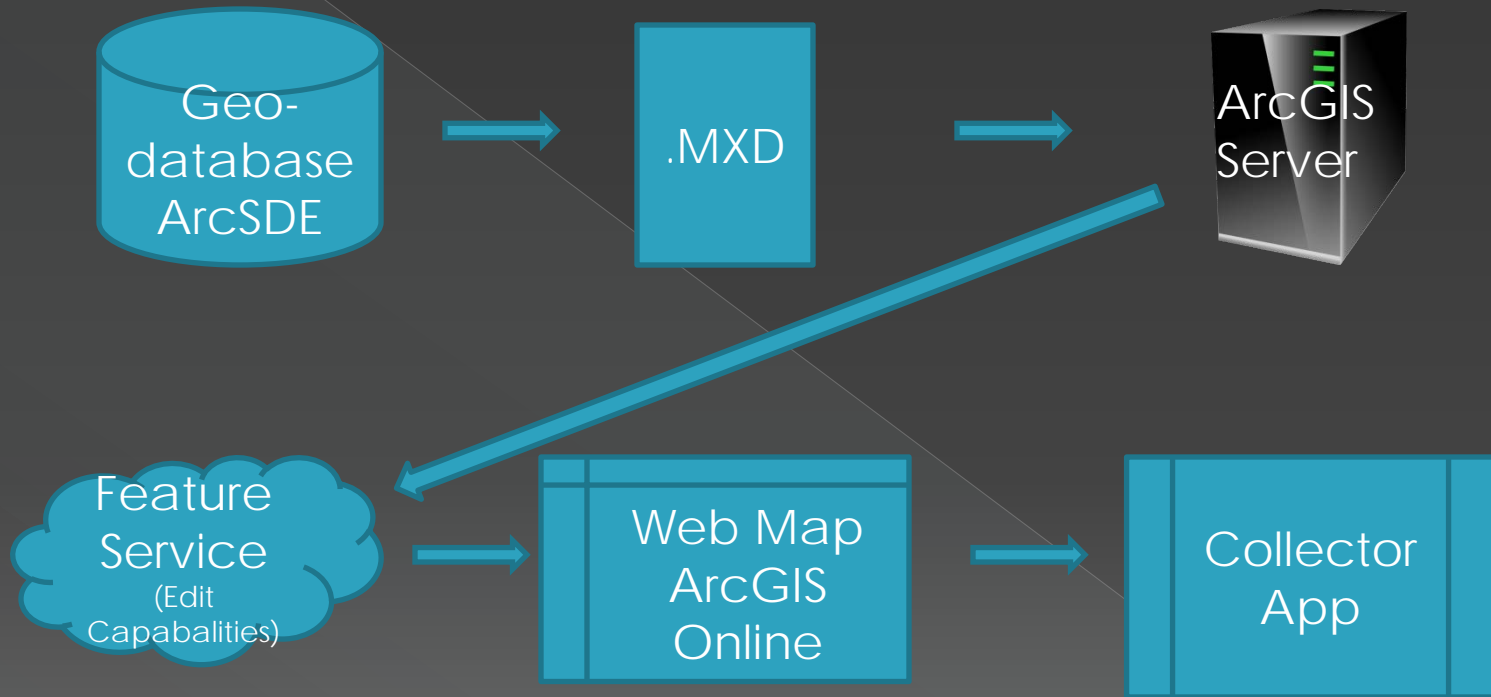
- ◉ Stormwater System Inventory Always Current
- ◉ Don't Have to Know Structure ID
- ◉ Work Performed is Recorded Immediately
- ◉ Can Take Updated Photos
- ◉ Generate Reports/Analysis



# Data



# Collector Implementation



# Workflow

Collector for ArcGIS

StormStructureMaintenanceLog - Web Map - Win 10

Storm Structures: ST14995 - CRANSTON STREET  
Location 41.76667459N, 71.4741403W

ID  
ST14995

Notes

Structure Depth  
5

Structure Type  
Curbed Catch Basin

As-Built Hyperlink

Maintenance Log  
+ Add

1. Click Structure

2. Add Maint. Record

The screenshot displays the 'Collector for ArcGIS' application window. The title bar indicates the current project is 'StormStructureMaintenanceLog - Web Map - Win 10'. On the left, a data entry form for 'Storm Structures: ST14995 - CRANSTON STREET' is open. The form includes fields for ID (ST14995), Notes, Structure Depth (5), Structure Type (Curbed Catch Basin), and As-Built Hyperlink. Below these fields is a 'Maintenance Log' section with a '+ Add' button. A red arrow points from the text '2. Add Maint. Record' to this button. The main area of the application is a map showing several storm structure locations marked with blue squares and labeled with IDs: ST14995, ST14996, ST14994, ST15734, ST15738, ST15723, and ST15741. A red arrow points from the text '1. Click Structure' to the ST15738 marker on the map. The Windows taskbar is visible at the bottom of the screen.

# Workflow

Collector for ArcGIS

Submit

Maintenance Log:

Date

Vehicle

Driver

DebrisDepth\_inches

Odor

Color

ActiveFlow

StructureCondition

IllicitConnections

Comments

3. Complete Record

4. Submit

Comments

Cycle

Attachments

Attach Photo or File

ST11929, ST11928, ST20188, ST11930, ST20201, ST20189, ST20194, ST11896, ST11893, ST11936, ST11935, ST11862, ST210408, ST11894, ST11937, ST11938, ST11946, ST11948, ST13105, ST20191, ST20192, ST20196, ST13124, ST13121, ST13119, ST13126, ST13117, ST13113, ST13107, ST20198, ST13108, ST210411, ST12341, ST12338, ST12343, ST12335, ST12347, ST12325, ST210392

**SUPERAntiSpyware**

A Product Update is Available!

A new version of SUPERAntiSpyware is ready to install.

Update Now

10:31 AM

# Displaying Maintenance Records

## ● In Collector

The screenshot displays the Collector for ArcGIS application interface. The main map area shows several storm structure points labeled ST5738, ST5734, ST5723, ST14995, ST14996, and ST14994. A blue arrow points to the ST5738 point, labeled "1. Click Structure".

On the left, a panel titled "Storm Structures: ST5738 - CRANSTON STREET" displays the following details:

- Location: 41.76713962N, 71.47386451W
- ID: ST5738
- Notes:
- Structure Depth: 5
- Structure Type: Curbed Catch Basin
- As-Built Hyperlink:
- Maintenance Log: View (indicated by a blue arrow and labeled "2. View Record")
- + Add

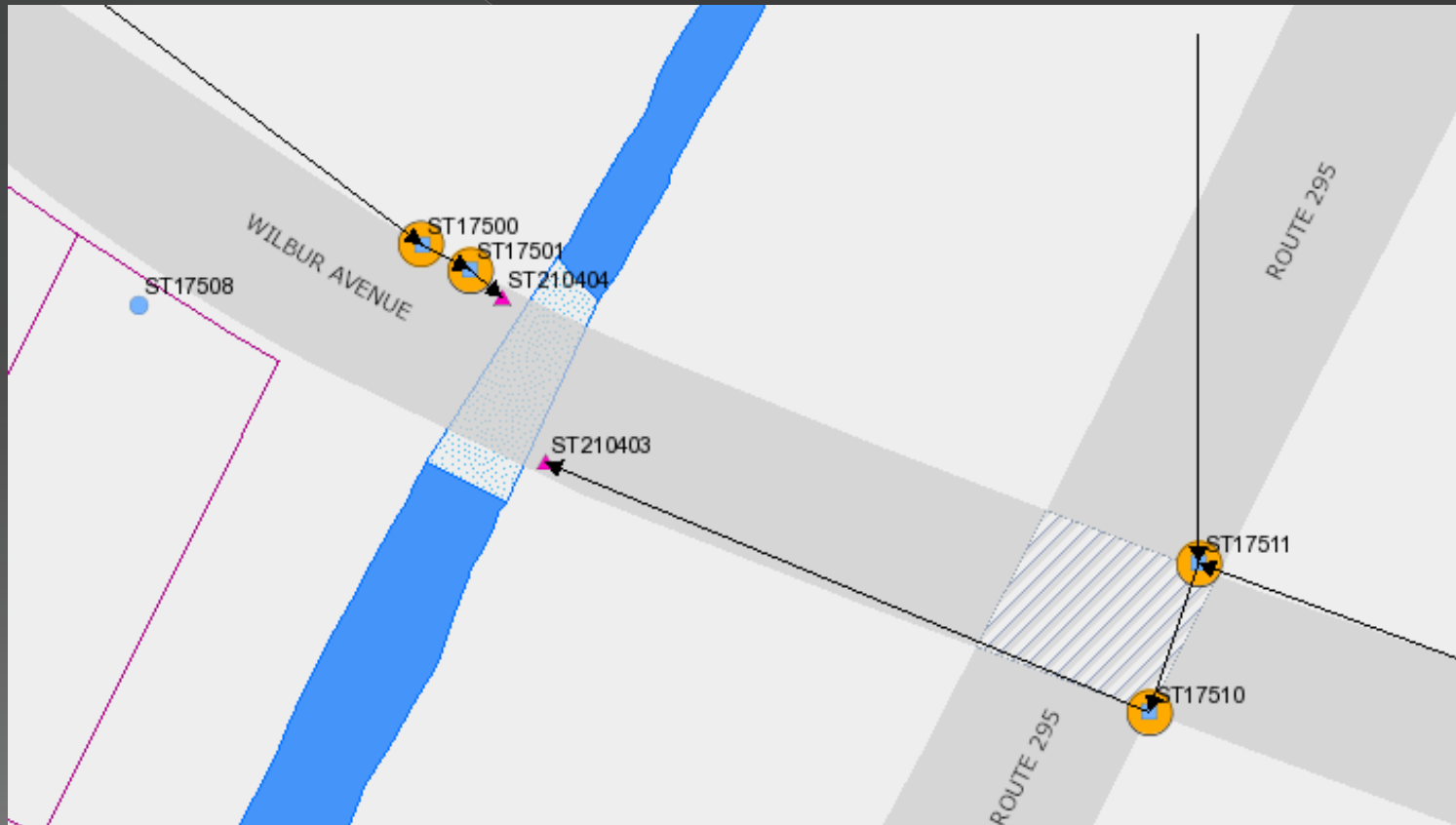
On the right, a panel titled "Maintenance Log: June 4, 2012" displays the following details:

- Edited on November 7, 2016
- Attributes:
- Date: June 4, 2012
- Vehicle: Clam Truck
- Driver: Joe Macera
- DebrisDepth\_inches:
- Odor: None
- Color: Not Clear
- ActiveFlow: None
- StructureCondition: Satisfactory
- IllicitConnections:

At the bottom right, there are buttons for "Edit Or Delete" (indicated by a blue arrow) and a trash icon.

# Displaying Maintenance Records

- GIS Layer



# Displaying Maintenance Records

- Storm Structure Web Page
  - › Attributes
  - › Work Records & Photos
  - › Historical Photos
  - › As-Built Hyperlink

gis.cranstonri.org/CranstonGIS/StormStructure.aspx?StrID=ST11098


Storm Structure ST11098

Structure Type: CCB Structure Depth (ft): 6.56 Location: SPRING MEADOW COURT Ownership: Cranston Attribution Obstacles: As-Built: SDAB49

SubWatershed: Receiving Waterbody: Drains Urbanized Area? Drains To Impaired Waters? Outfall Comment: Inter Connection Owner: Flow:

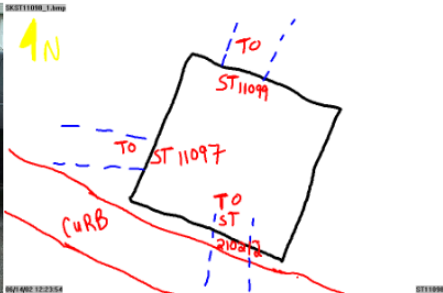



Maintenance Log

Date/Cycle	Vehicle/Driver	Debris Depth (in.)	Odor?	Color	Active Flow?	Structure Condition	Illicit Connections?	Comments
11/30/2016 1	Other Other	24.0	Slight	Not Clear	Minimal	Satisfactory	Investigate	Test Data



Date/Cycle	Vehicle/Driver	Debris Depth (in.)	Odor?	Color	Active Flow?	Structure Condition	Illicit Connections?	Comments
02/01/2016 0	Clam Truck JMacera		None	Not Clear	None	Satisfactory	None	

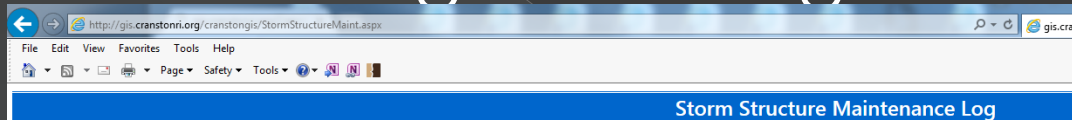
2003/2004 Field Photos





# Displaying Maintenance Records

## Maint Log Web Page



### Storm Structure Maintenance Log

All Structures

Year	Cycle	Total
2011	0	1
2011	0	352
2012	0	599
2013	0	500
2014	0	392
2015	0	445
2016	0	239

☒ All Records ☐ One Year  ☐ One Date

2528 Records

ID	Date	Vehicle	Driver	DebrisDepth	Odor	Color	ActiveFlow	Condition	IllicitConnections	Comments	Cycle	created_date	last_edited_date
ST15873	3/2/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 6:01:37 PM	11/9/2016 6:02:06 PM
ST15875	3/2/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 6:02:21 PM	11/9/2016 6:02:50 PM
ST15870	3/2/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 6:03:04 PM	11/9/2016 6:03:28 PM
ST15814	3/2/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 6:03:53 PM	11/9/2016 6:04:24 PM
ST15827	3/2/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 6:04:35 PM	11/9/2016 6:05:00 PM
ST15829	3/2/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 6:05:25 PM	11/9/2016 6:05:49 PM
ST15885	3/4/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 8:04:57 PM	11/9/2016 8:15:48 PM
ST15888	3/4/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 8:05:32 PM	11/9/2016 8:06:02 PM
ST16167	3/4/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 8:06:18 PM	11/9/2016 8:06:40 PM
ST16190	3/4/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 8:10:57 PM	11/9/2016 8:11:23 PM
ST16214	3/4/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 8:11:59 PM	11/9/2016 8:12:23 PM
ST16207	3/4/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 8:12:41 PM	11/9/2016 8:15:21 PM
ST16188	3/4/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 8:13:21 PM	11/9/2016 8:13:43 PM
ST16205	3/7/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 8:16:49 PM	11/9/2016 8:17:16 PM
ST16211	3/7/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 8:18:46 PM	11/9/2016 8:19:10 PM
ST16213	3/7/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 8:19:29 PM	11/9/2016 8:19:56 PM
ST16368	3/7/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 8:20:12 PM	11/9/2016 8:20:39 PM
ST16310	3/7/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 8:21:03 PM	11/9/2016 8:21:26 PM
ST16296	3/7/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 8:21:39 PM	11/9/2016 8:22:06 PM
ST16298	3/7/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 8:22:18 PM	11/9/2016 8:22:41 PM
ST16292	3/8/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 8:43:16 PM	11/9/2016 8:44:04 PM
ST16312	3/8/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 8:44:37 PM	11/9/2016 8:44:59 PM
ST15506	3/8/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/9/2016 8:45:16 PM	11/9/2016 8:45:43 PM
ST16620	3/8/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/10/2016 2:43:42 PM	11/10/2016 2:44:17 PM
ST16618	3/8/2011 5:00:00 AM	ClamTruck	JMacera		None	NotClear	None	Satisfactory	None		0	11/10/2016 2:44:36 PM	11/10/2016 2:45:03 PM

All Structures

Year Cycle Total

2011	0	1
2011	0	352
2012	0	599
2013	0	500
2014	0	392
2015	0	445
2016	0	239

☒ All Records ☐ One Year  ☐ One Date

2528 Records



# What's Next

- Field Notes
- Outfall Inspections
- Water Quality Sampling
- Repairs
- Implement Workforce?

# Questions

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- GIS Manger
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- Ed Tally
- Environmental Program Manager
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# Initial Data Collection Form

**Storm Structure ID and Location**

Structure ID:  Street:  Street Code:   
Structure Type:  GPS Solution:  Zip:   
System Type:  Map Index:  ☐ At Intersection ☐ New

Insp. Date:   
Crew Name:   
Str. Depth:

Internal Conditions:  
☒ Contains Silt  
☐ Wall Damage  
☐ Contains Water  
☐ Ladder Damage  
☐ Contains Debris  
☒ Mortar Damage  
☐ Seepage

Pipe Conditions:  
☐ Damaged Pipe  
☐ Buried Pipe  
☐ Clogged Pipe

Surface Conditions:  
☐ Clogged Inlet  
☐ Cracked Grate  
☐ Cracked Manhole Cover  
☐ Sewer Cover on Storm  
☐ Damaged Frame

Structure Material:  
☒ Brick  
☐ Block  
☒ Precast  
☐ Concrete  
☐ Other  
Structure Material Other:

Structure Accessibility:  
☐ Check here if structure is NOT accessible and denote reason below:  
No Access Reasons:

Non Removable Structures:  
☐ Check here if cover is NOT able to be removed and denote reason below:  
Non-Removable Reason:

Partial Attribution:  
☐ Check here if structure CANNOT be fully attributed and denote obstacles below:  
Structure Obstacles:

Photographs Record: 1 of 3

Sketches Record: 1 of 2

☒ Display Background

New Sketch

New Sketch with Back-ground

☐ Contains Pipe less Than 12 Inches in Diameter

	CMHW Inv Elev	Connecting Structure ID	Diameter	Flow Direction	Invert Elevation	Material	Measure Down	Measured From	Shape	Side of Chamber	Silted Invert
▶	344.97391	ST3402	12		346.49391	Concrete	4.61 ft SS		Round	North	<input type="checkbox"/>
	344.55391	ST210354	12		346.07391	Concrete	5.03 ft SS		Round	South	<input type="checkbox"/>
	345.03391	ST3404	12		346.55391	Concrete	4.55 ft SS		Round	East	<input type="checkbox"/>
*											<input type="checkbox"/>

Record  of 3

Notes:

Primary GPS Comment:

Secondary GPS Comment: