# INNOVATIVE ODOR AND CORROSION CONTROL STRATEGIES FOR THE WOODBRIDGE INTERCEPTOR SEWER

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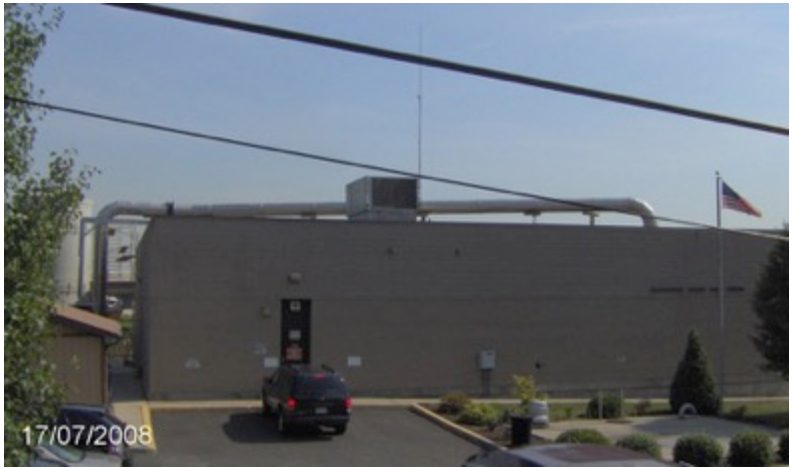
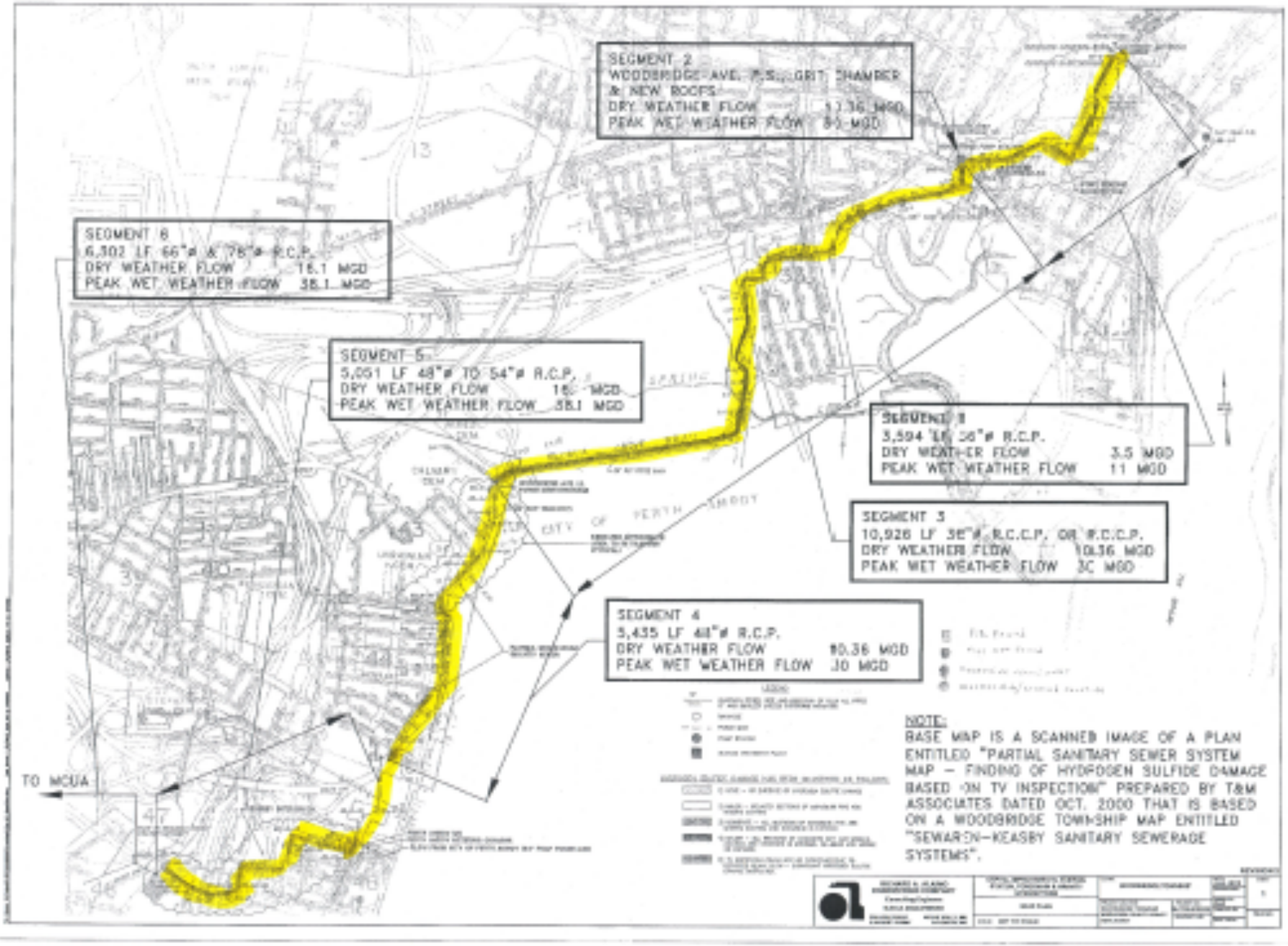
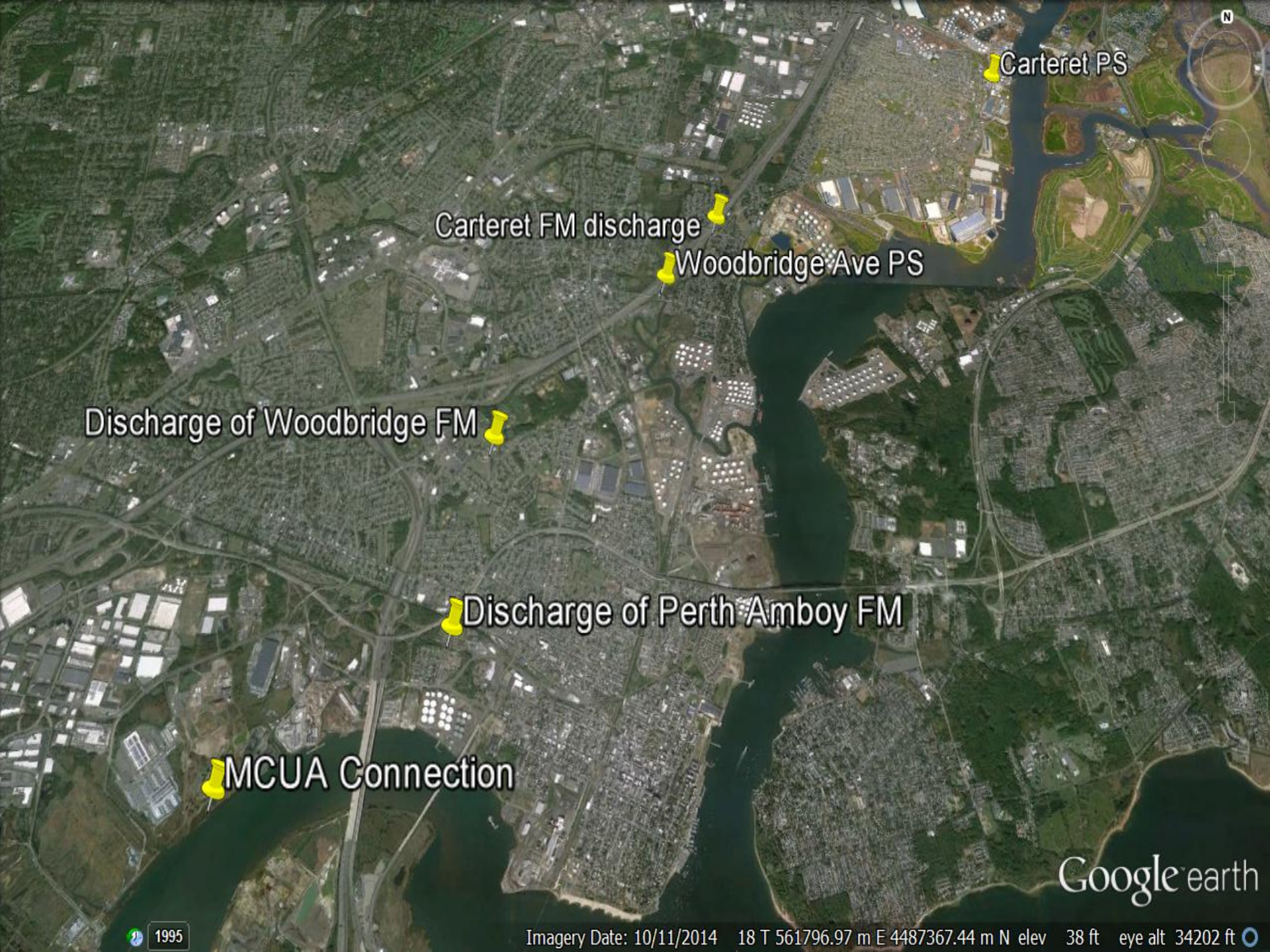
New England Water Environmental Association
Annual Conference
Boston, MA
January 27, 2016

# WOODBRIDGE INTERCEPTOR SEWER

- Serves Woodbridge, Carteret, and Perth Amboy
- Average flow ≈15 mgd
- Constructed in late 1970's
- 36" to 66" RCP gravity sewer
- 36" PCCP force main
- Wastewater from Carteret and Perth Amboy delivered to interceptor via force main




SEGMENT 2
WOODBRIDGE AVE. P.S., GRIT CHAMBER & NEW ROOFS
DRY WEATHER FLOW 11.36 MGD
PEAK WET WEATHER FLOW 51 MGD
SEGMENT 6
6,302 LF 66"ø & 78"ø R.C.P.
DRY WEATHER FLOW 16.1 MGD
PEAK WET WEATHER FLOW 38.1 MGD
SEGMENT 5
5,051 LF 48"ø TO 54"ø R.C.P.
DRY WEATHER FLOW 16 MGD
PEAK WET WEATHER FLOW 38.1 MGD
SEGMENT 1
5,594 LF 36"ø R.C.P.
DRY WEATHER FLOW 3.5 MGD
PEAK WET WEATHER FLOW 11 MGD
SEGMENT 3
10,926 LF 36"ø R.C.P., OR R.C.C.P.
DRY WEATHER FLOW 10.36 MGD
PEAK WET WEATHER FLOW 30 MGD
SEGMENT 4
5,435 LF 48"ø R.C.P.
DRY WEATHER FLOW 10.36 MGD
PEAK WET WEATHER FLOW 30 MGD
TO MCUA
CITY OF PERTH AMBOY
NOTE:
BASE MAP IS A SCANNED IMAGE OF A PLAN ENTITLED "PARTIAL SANITARY SEWER SYSTEM MAP – FINDING OF HYDROGEN SULFIDE DAMAGE BASED ON TV INSPECTION" PREPARED BY T&M ASSOCIATES DATED OCT. 2000 THAT IS BASED ON A WOODBRIDGE TOWNSHIP MAP ENTITLED "SEWAREN–KEASBY SANITARY SEWERAGE SYSTEMS".


Carteret PS
Carteret FM discharge
Woodbridge Ave PS
Discharge of Woodbridge FM
Discharge of Perth Amboy FM
MCUA Connection
Google earth
1995
Imagery Date: 10/11/2014 18 T 561796.97 m E 4487367.44 m N elev 38 ft eye alt 34202 ft

# PROBLEMS

- Odor complaints at discharge of Carteret force main
- Odor complaints near Woodbridge Avenue PS
- Hazardous $H_2S$ concentrations at PS wet well
- Severe corrosion at multiple locations
- Major sewer collapse at discharge of Perth Amboy force main

# WOODBRIDGE INTERCEPTOR PIPE COLLAPSE


- Eleven 5-MGD bypass pumps
- 3 months to complete
- Cost of $3.2 million

# PREVIOUS ATTEMPTS AT ODOR/ CORROSION CONTROL

- Injection of ferrous sulfate upstream of Woodbridge Ave. PS – marginal effectiveness
- Small chemical scrubber at metering chamber – abandoned
- Injection of compressed air into force main at Woodbridge Ave P.S. to control sulfide generation – effective
- Activated carbon adsorber at PS – carbon overwhelmed by high $H_2S$ and abandoned
- Manhole sealing – odors released elsewhere

# ALAIMO/BOWKER APPROACH

1. Conduct $H_2S$ and sulfide monitoring for each segment

2. Conduct robotic inspection to identify corrosion locations, measure corrosion penetration, and measure sediment deposits

3. Evaluate pipe and manhole rehabilitation/ replacement options

4. Evaluate need and locations for odor control systems

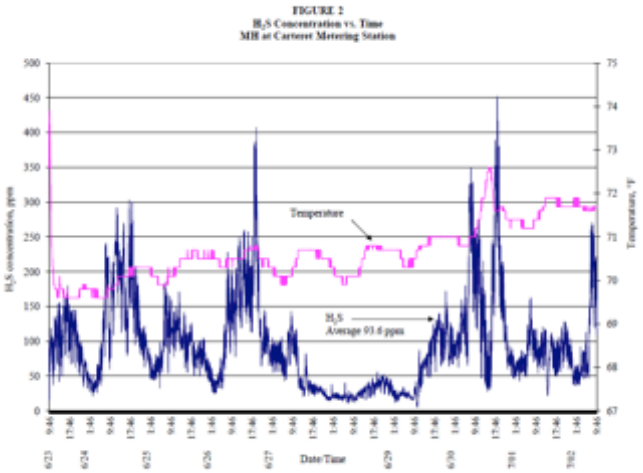
# HIGHLIGHTS OF TESTING AND INSPECTION

1. Discharge of Carteret FM causing high levels of H2S (>300 ppm) in gravity sewer headspace

2. Severe corrosion throughout Segment 1

3. Air injection into Woodbridge FM effective in preventing further sulfide generation

4. Concern for localized corrosion of force main at high points (air pockets)



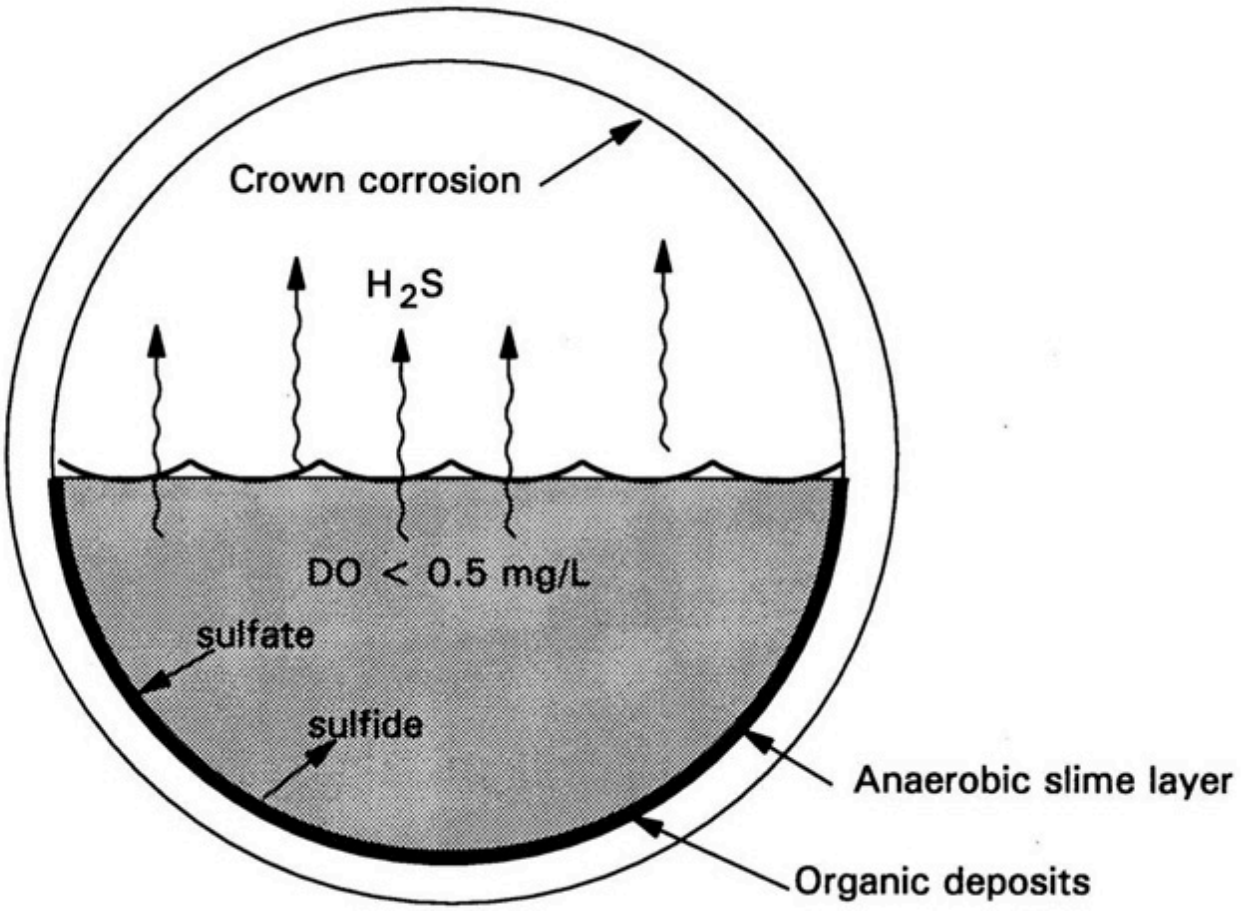

# HIGHLIGHTS OF TESTING AND INSPECTION (cont.)

5. Severe corrosion detected in Segment 5, downstream of Perth Amboy FM discharge

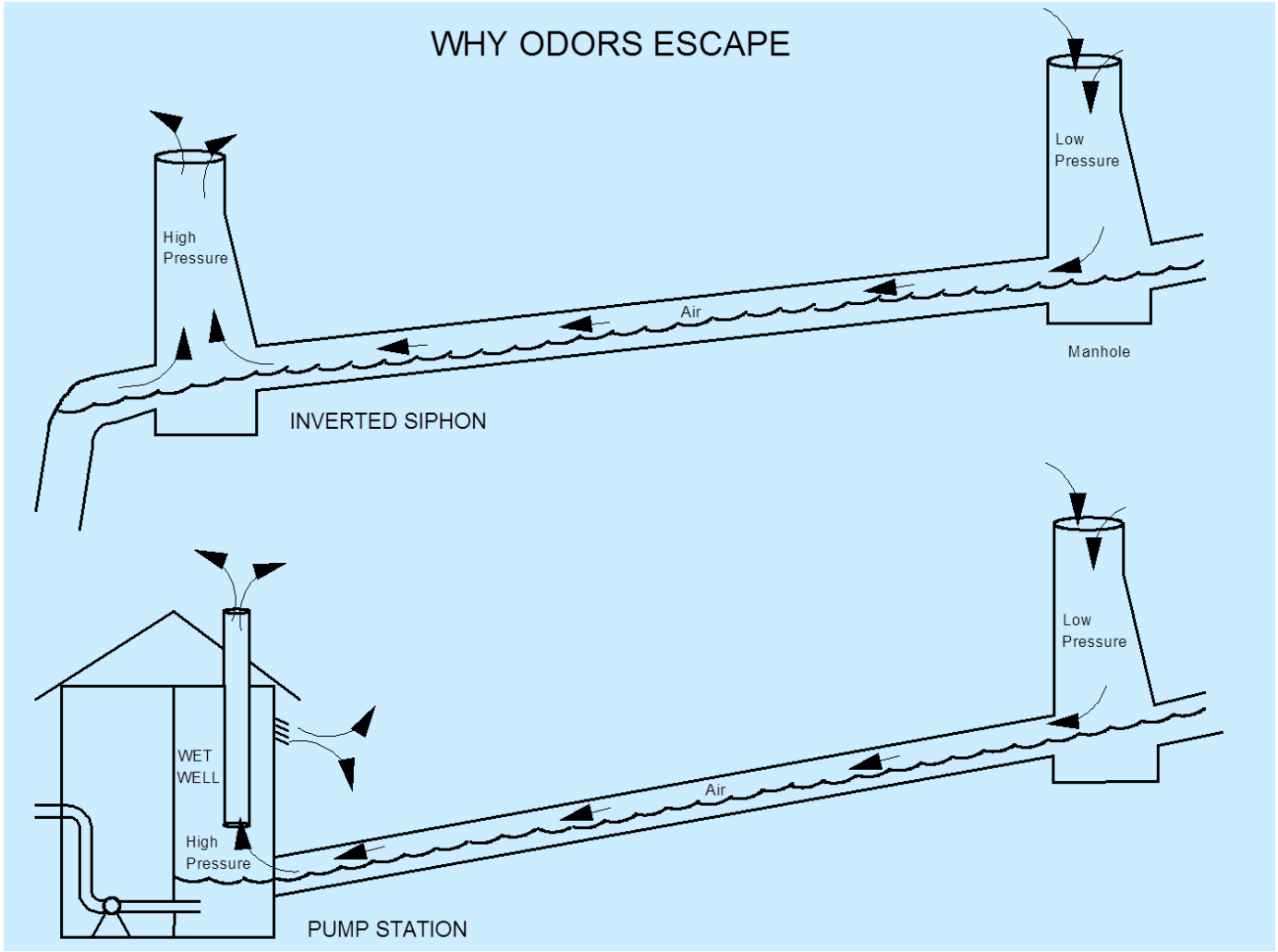
6. Drop manholes causing turbulence that releases $H_2S$ from solution

7. Sewer headspace pressurized upstream of two inverted siphons, causing odor complaints

# SULFIDE GENERATION IN SEWERS



# CAUSES OF SEWER ODOR RELEASE



# SEGMENT 1 RECOMMENDATIONS

1. Oxygen injection at Carteret FM

2. Replacement or sliplining Segment 1 RCP with CCFRM pipe

3. Installation of biotrickling filter for Woodbridge PS odor control (completed 2012)

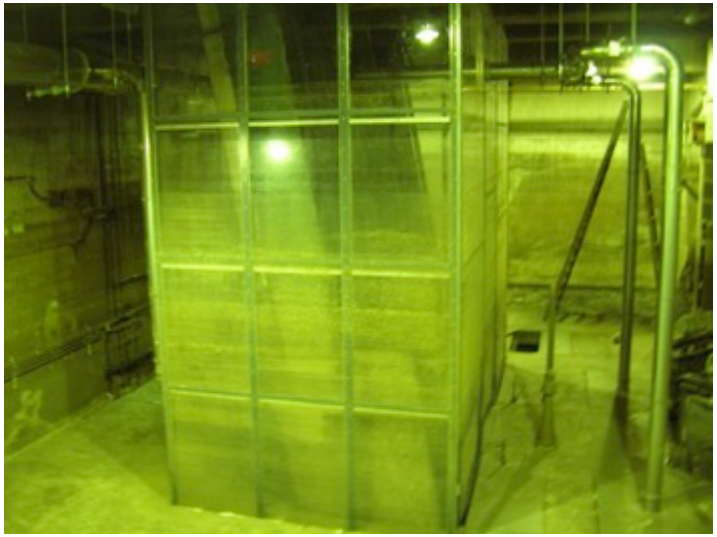
# WOODBRIDGE AVENUE PUMP STATION

1. Innovative odor containment system for bar screens

2. Odorous air drawn from aerated grit chamber, screens, and covered wet well channels

3. Working conditions in PS improved

4. Biotrickling filter achieved 99% removal of $H_2S$



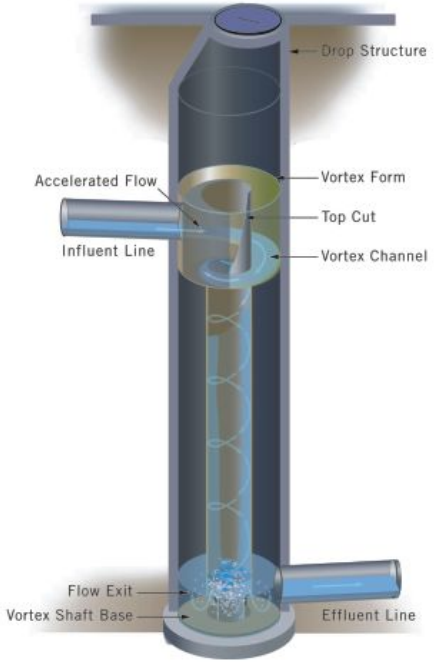
# SEGMENTS 4 AND 5 RECOMMENDATIONS

1. Replace severely damaged manholes; install PVC liner where structurally sound

2. Replace deep-drop manholes with vortex flow inserts

3. Rehab interceptor using sliplining technology

4. Install biotrickling odor control system at headbox of inverted siphons




# CONCLUSIONS

1. Force mains are often responsible for significant sulfide generation

2. Corrosion damage can occur rapidly, and if left unchecked, can result in pipe collapse and costly repairs

3. Oxygen injection is a cost-effective alternative for preventing sulfide formation in force mains

4. High levels of $H_2S$ are hazardous to pump station operators and sewer workers

# CONCLUSIONS (cont.)

5. Properly-designed biotrickling filters perform well on hydrogen sulfide odors

6. Drop manholes create turbulence that strips the hydrogen gas from the wastewater into the sewer headspace where it can cause corrosion and odors

7. The use of vortex inserts can help prevent the release of odorous air while adding dissolved oxygen to the wastewater

8. Where hydrogen sulfide is anticipated, only corrosion-resistant materials should be exposed to $H_2S$ gas

# QUESTIONS?


CAUTION:
Vehicle may be Transporting
Political Promises!
CALIFORNIA
POO PMPR