Interceptor Condition Assessment and Rehabilitation Program

Scott Dentz, Manager Interceptor Engineering and Design
Karen Keenan, Manager Interceptor Project Delivery

Environment Committee

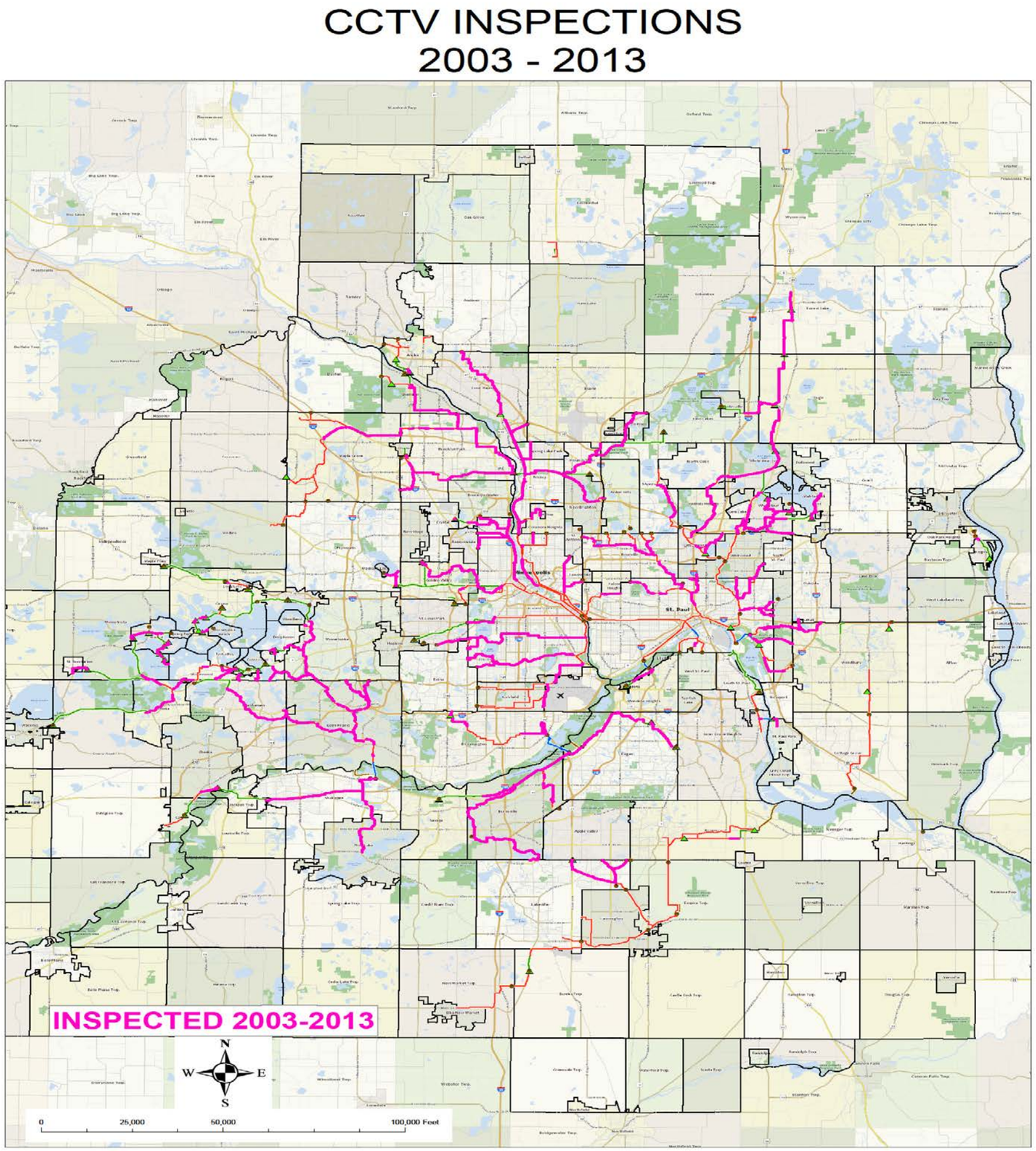
February 11, 2014

METROPOLITAN COUNCIL

Topics

- Current System
- Condition Assessment
- Rehabilitation Program

METROPOLITAN COUNCIL

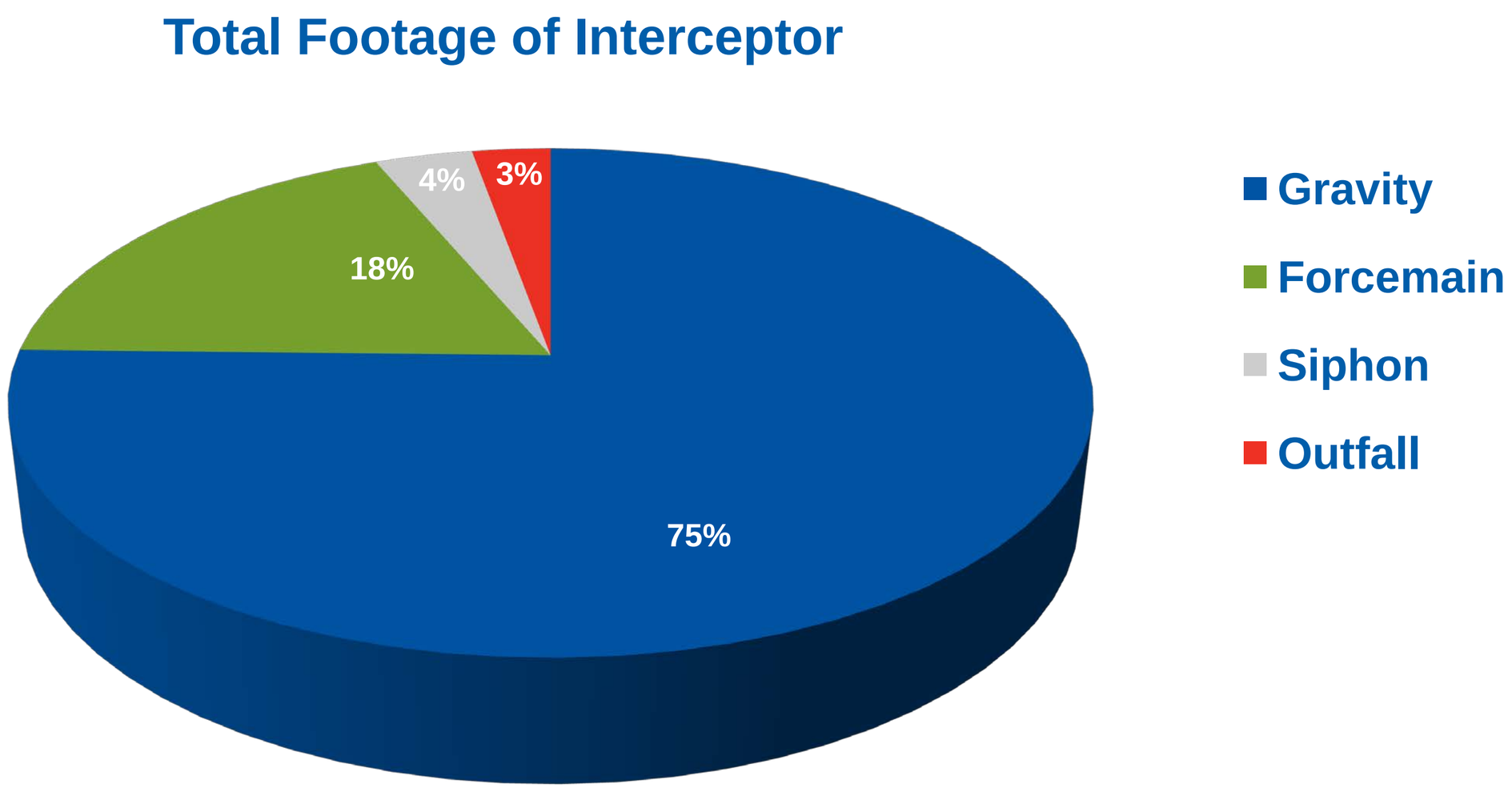


Inspection Status

- 481 miles of gravity sewer in MCES system
- 317 miles inspected (pink) 2003 through 2013
- 164 miles to be inspected in 2014-2015

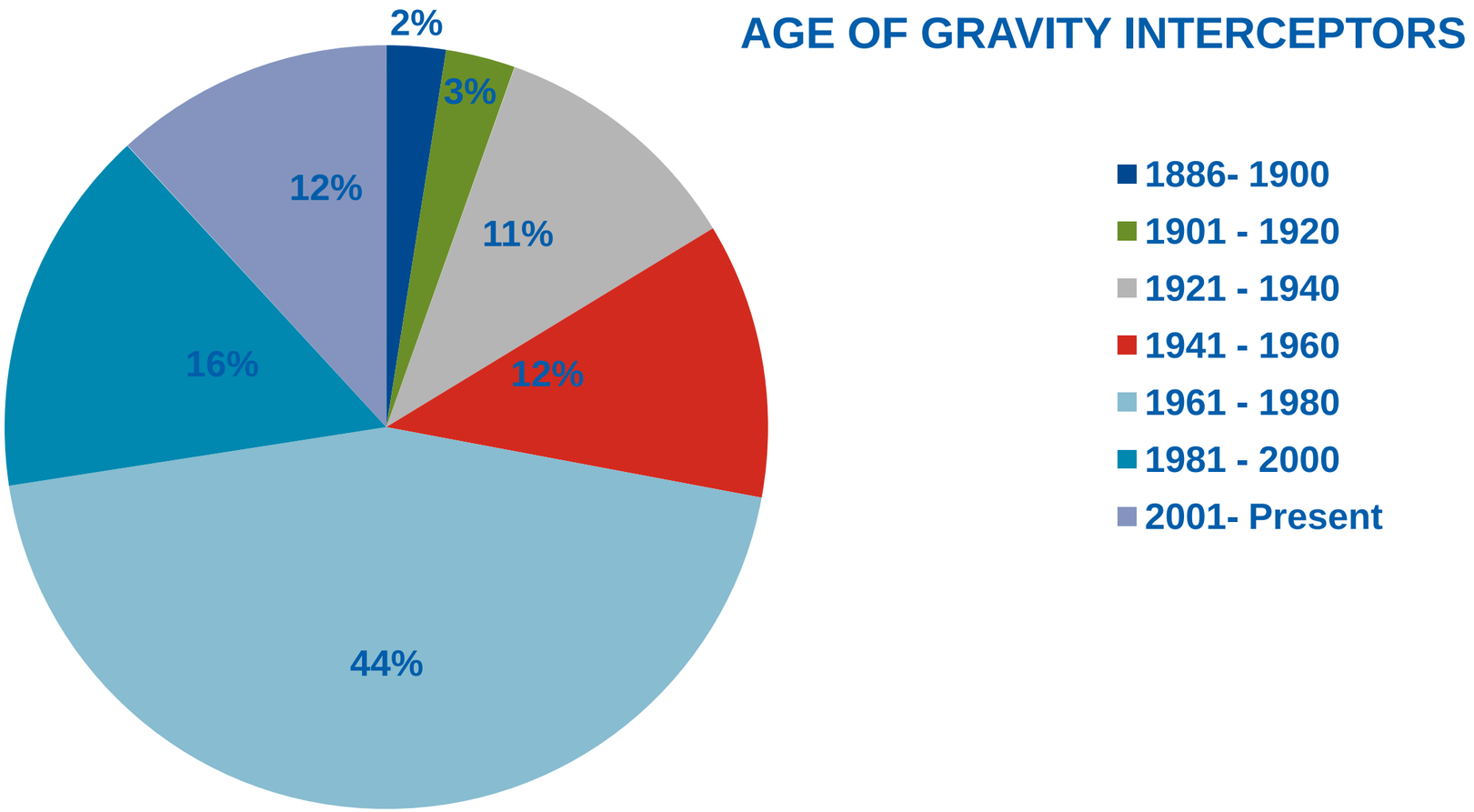
METROPOLITAN COUNCIL

Interceptor Type



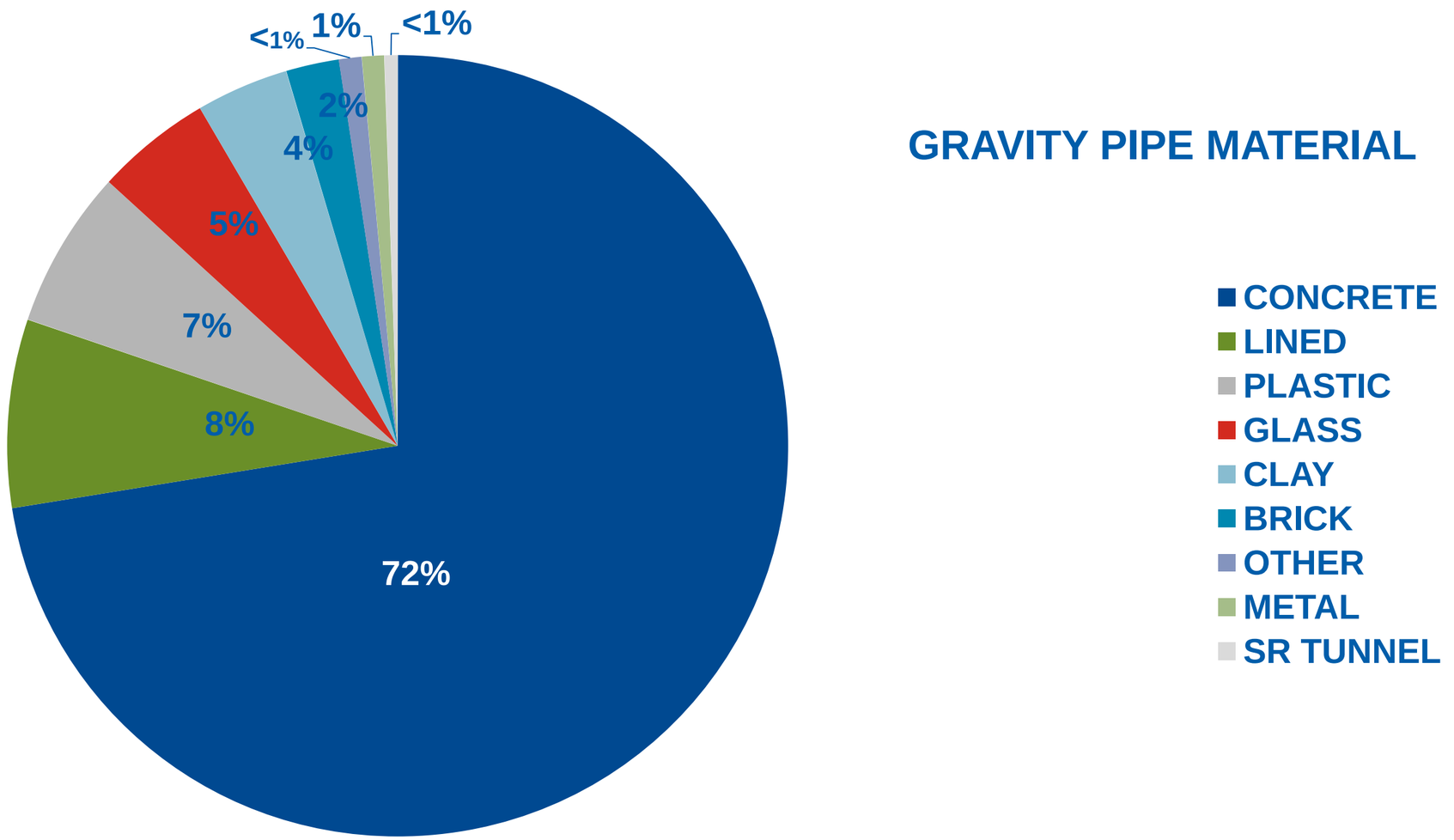
METROPOLITAN COUNCIL

Pipe Age



METROPOLITAN COUNCIL

Pipe Material



METROPOLITAN COUNCIL

Condition Assessment Program

- Inspect All Gravity Sewer Pipe within a 10-Year Cycle
- Evaluate Pipe Condition Using Standardized Rating System
- Re-inspect Deteriorated Pipe at More Frequent Intervals
- Devise and Implement Inspection Program for Force Main and River Crossing Facilities

Condition Grading System

Grade	Condition	Rehabilitation
5	Near failure	Immediate Attention
4	Poor	Repair within 10 years
3	Fair	Re-inspect in 5 years
2	Good	Re-inspect in 10 years
1	Excellent	Re-inspect in 10 years

METROPOLITAN COUNCIL

Reasons for Poor Pipe Condition

- Hydrogen Sulfide (H2S) Corrosion
  - Long travel time produces septic wastewater and high concentrations of dissolved sulfides that when released cause corrosion damage.
  - High pipe slope found in areas with steep terrain produces turbulence that releases H2S.
  - Force mains produce septic wastewater, H2S is released when discharged into the downstream gravity sewer.
  - Turbulence where flow drops Into a lower pipe.
  - Junctions where multiple pipes meet.
- Pipe Materials
  - Concrete and metal pipe do not hold up to H2S Corrosion.
  - Vitrified clay while resistant to H2S corrosion is brittle and cannot tolerate subsidence. Results in open joints and cracked pipe.
- Poor Soils
  - Pipe alignment traverse or follow areas or poor soil such as wetlands and natural drainage paths.

Rehabilitation Technologies

- Pipe
  - Cured-In-Place-Pipe
  - Slip-lining
  - Remove and Replace
- Maintenance Structures
  - Lining (cured-in-place)
  - Fiberglass Lining Inserts
  - Polymer Concrete Inserts
  - Coating Systems

Construction Materials

- Pipe
  - Reinforced Plastic Mortar Pipe
  - Polyvinyl Chloride Pipe
  - High Density Polyethylene Pipe
  - Epoxy Lined Ductile Iron Pipe
  - Cured-In-Place Lined Reinforced Concrete Pipe
- Maintenance Access Structures
  - Fiberglass
  - Polymer Concrete
  - Cured-In-Place Lined Reinforced Concrete

Lessons Learned

- Corrosion damage occurs in bare concrete and metal pipe (73 percent of existing system)
- Corrosion damage occurs downstream of force main discharges
- Corrosion damage occurs in areas of turbulence, such as pipe with high slopes and at drop locations

Current Approach for New Interceptors

- Use corrosion resistant materials
- Use chemicals, oxygen/ozone injection to reduce the sulfides in the wastewater
- Minimize force main length
- Minimize turbulence– minimize use of drops and highly sloped pipe

Interceptor System
Proposed 2014-2019 CIP

- Asset Preservation
  - 90 Miles of Pipe
  - 20 Lift Stations
- Growth/Capacity
  - 3 Miles of Pipe
  - 5 Lift Stations
- Proposed Investment
  - $604 Million

Category 5

METROPOLITAN
COUNCIL

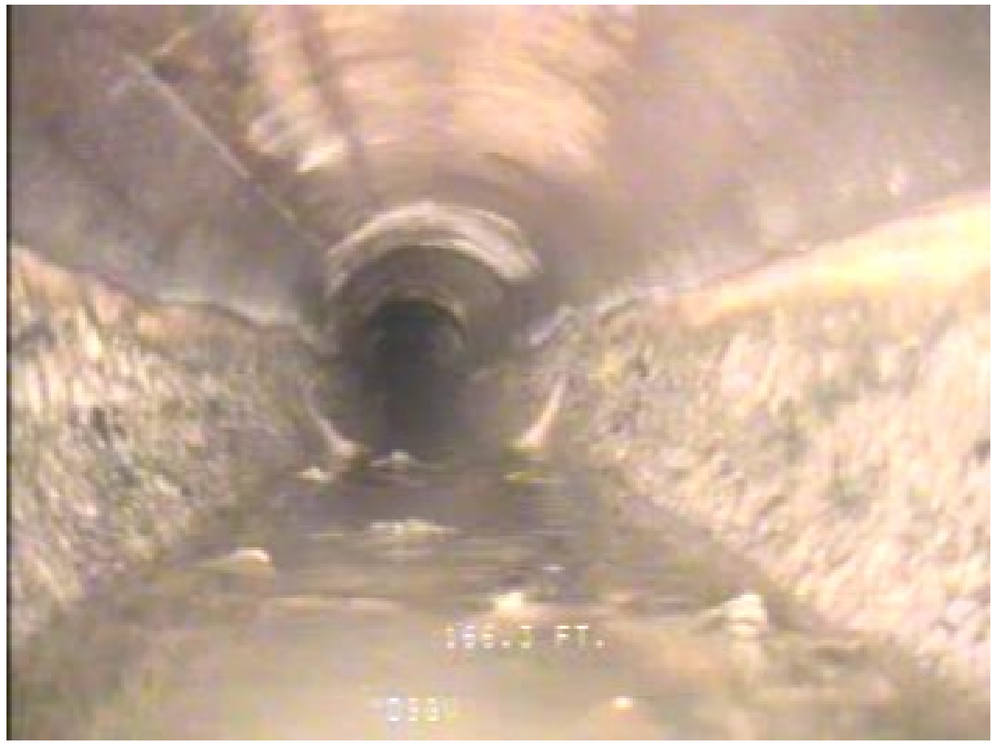
Category 4

METROPOLITAN
COUNCIL

Category 3

METROPOLITAN
COUNCIL

Category 2



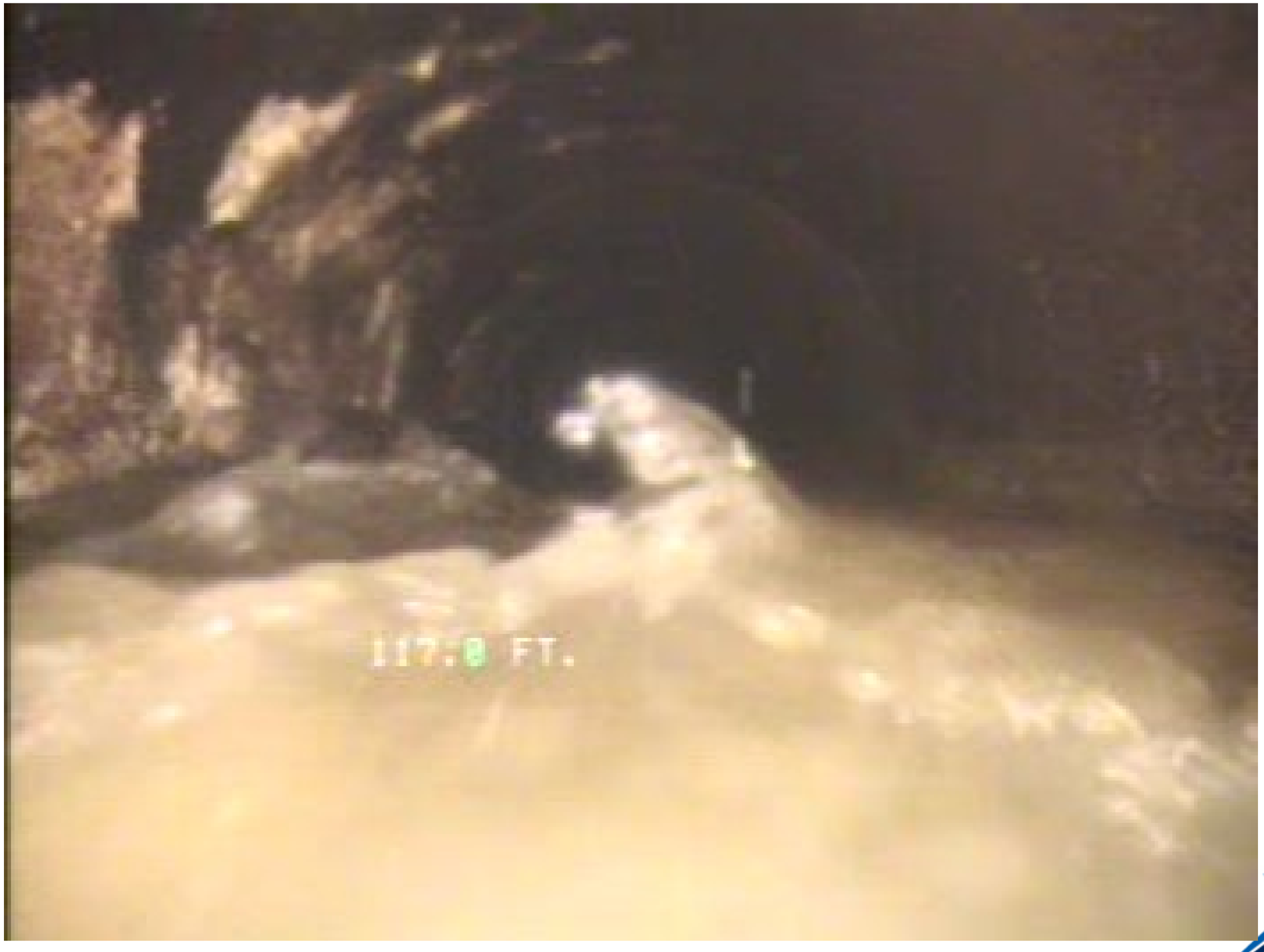
Category 1

METROPOLITAN
COUNCIL

Corrosion Damage Found at FM Discharge Structure

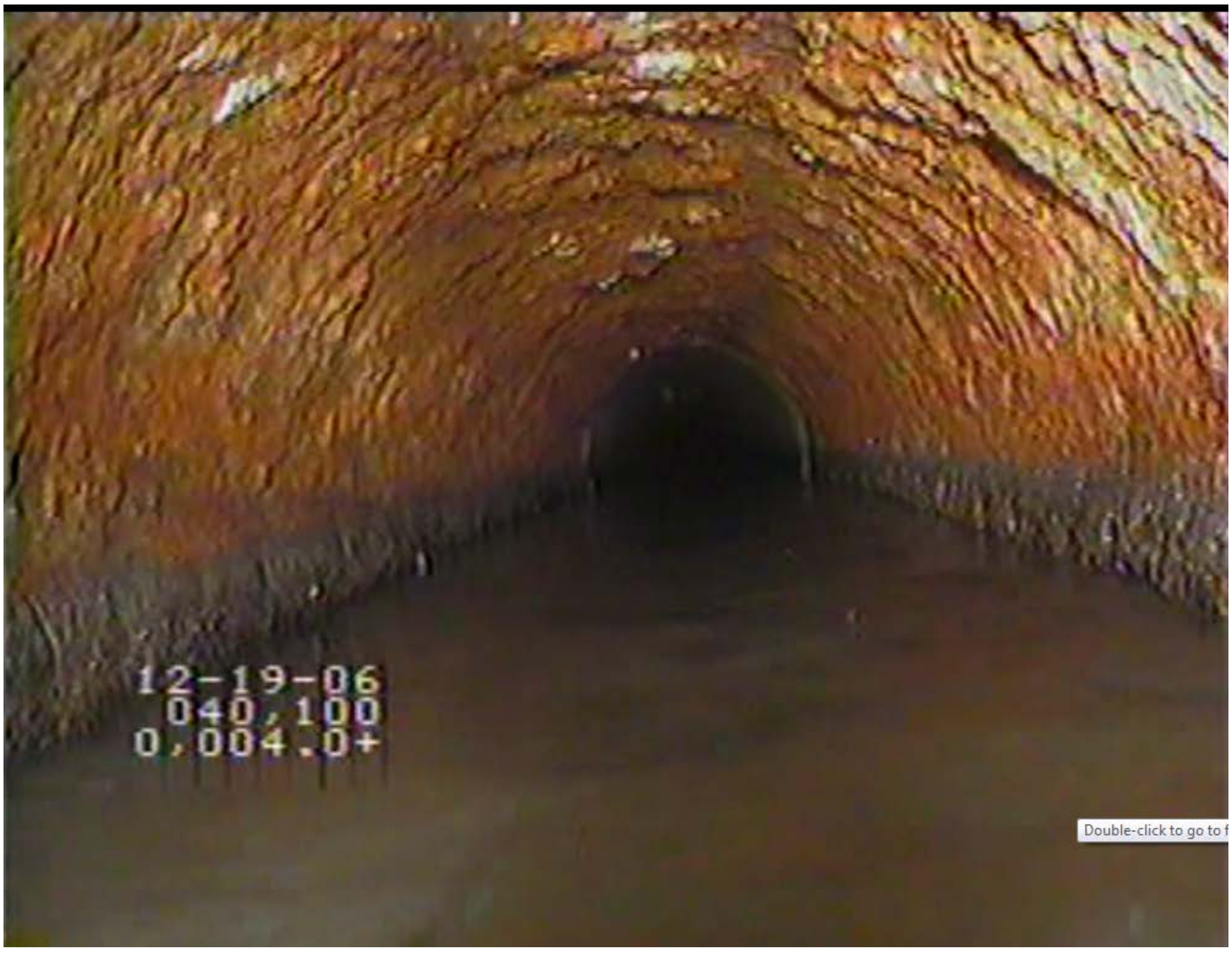
METROPOLITAN COUNCIL

Corrosion Damage Found at Highly Sloped Concrete Pipe



METROPOLITAN
COUNCIL

Corrosion Damage Metal Pipe

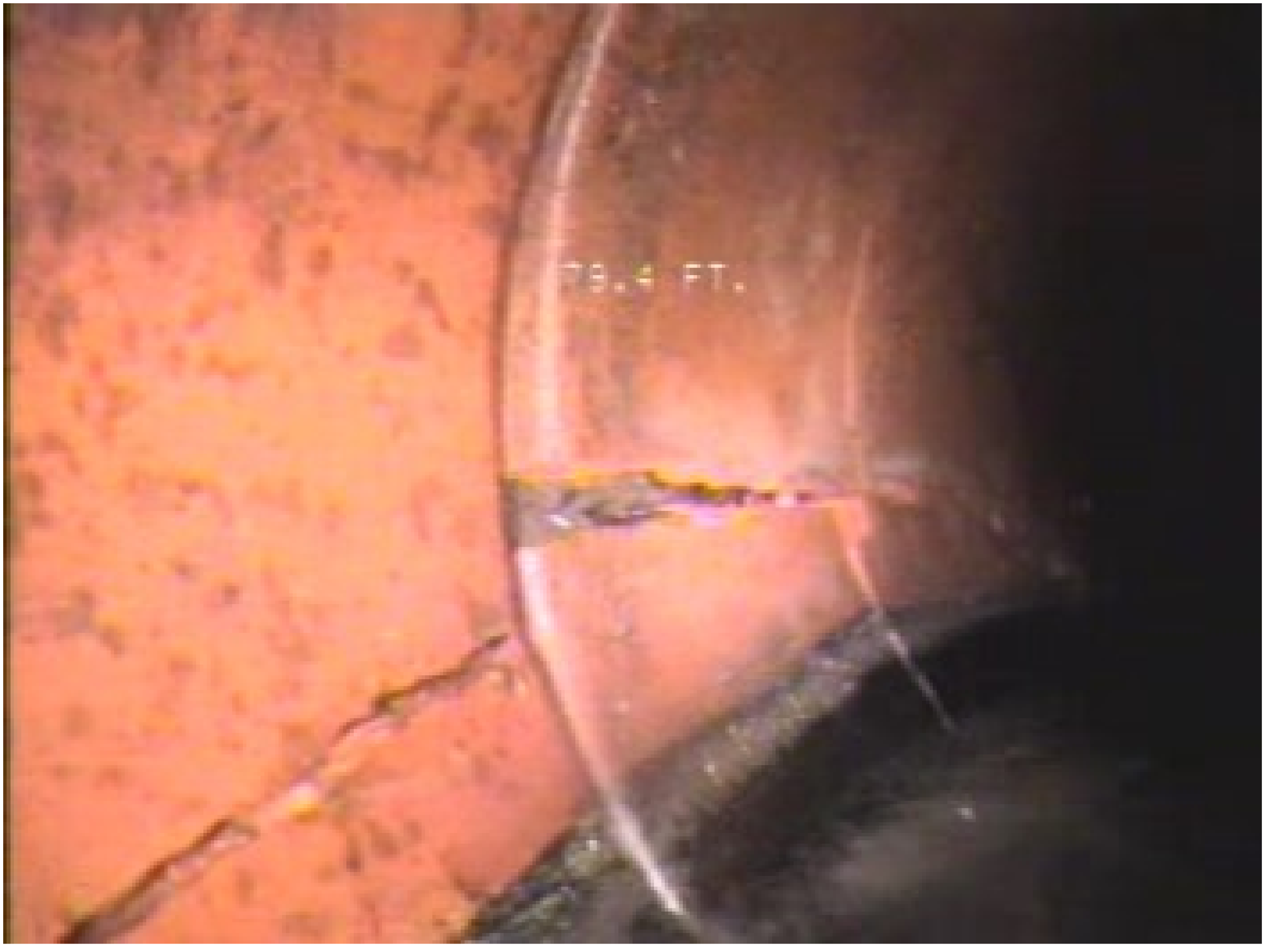


METROPOLITAN
COUNCIL

Overly Deflected PVC Pipe

METROPOLITAN
COUNCIL

Subsidence in Poor Soils



METROPOLITAN COUNCIL