



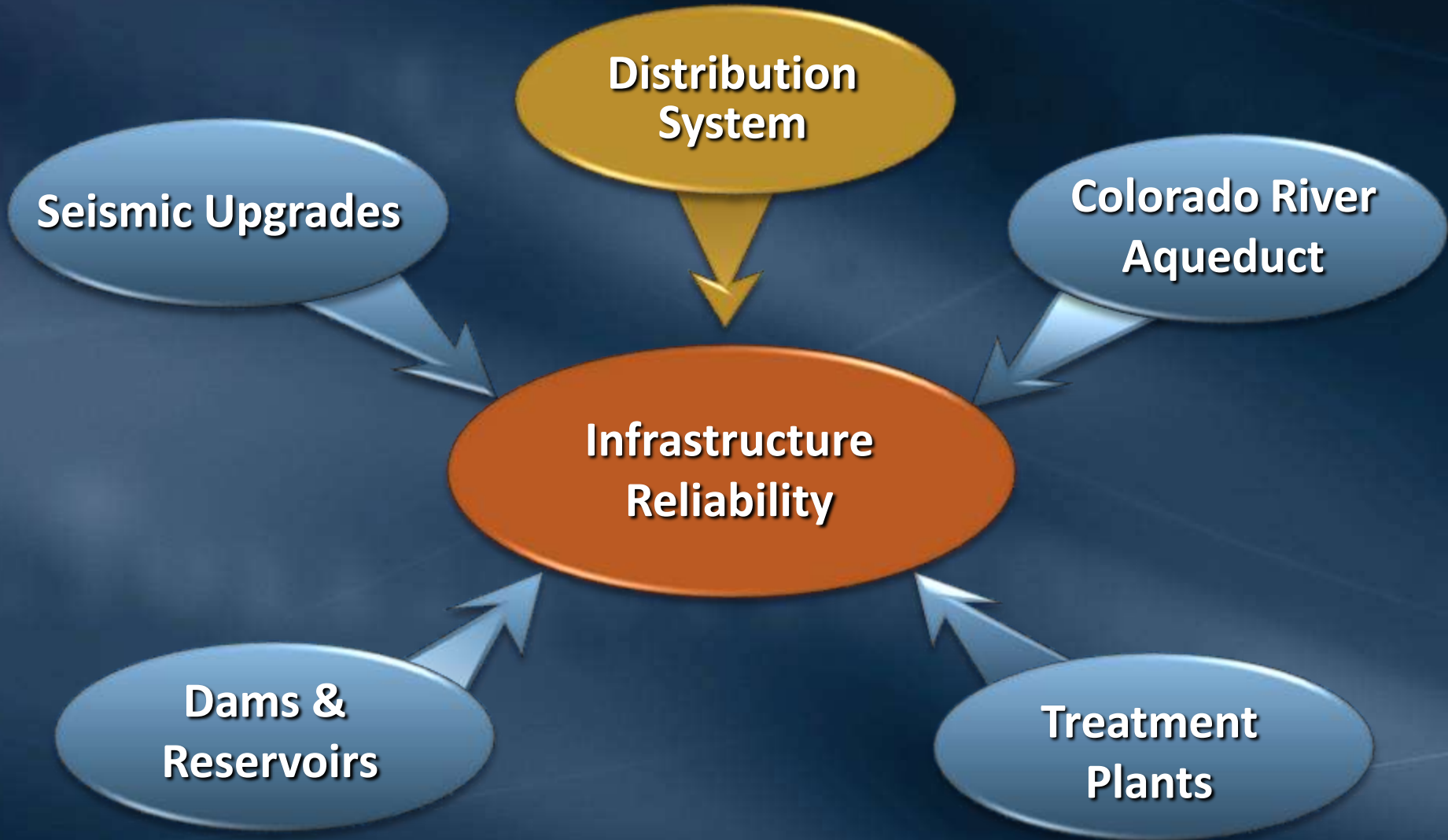
PCCP Rehabilitation & Replacement Program

Engineering & Operations Committee

Item 6a

June 10, 2013

Infrastructure Programs



Distribution System R&R Programs

- **Comprehensive Programs**

- PCCP Lines
- Metallic Pipelines
- Distribution System Infrastructure Protection
- Reservoir Covers
- Hydroelectric Plants

- **Individual Projects**

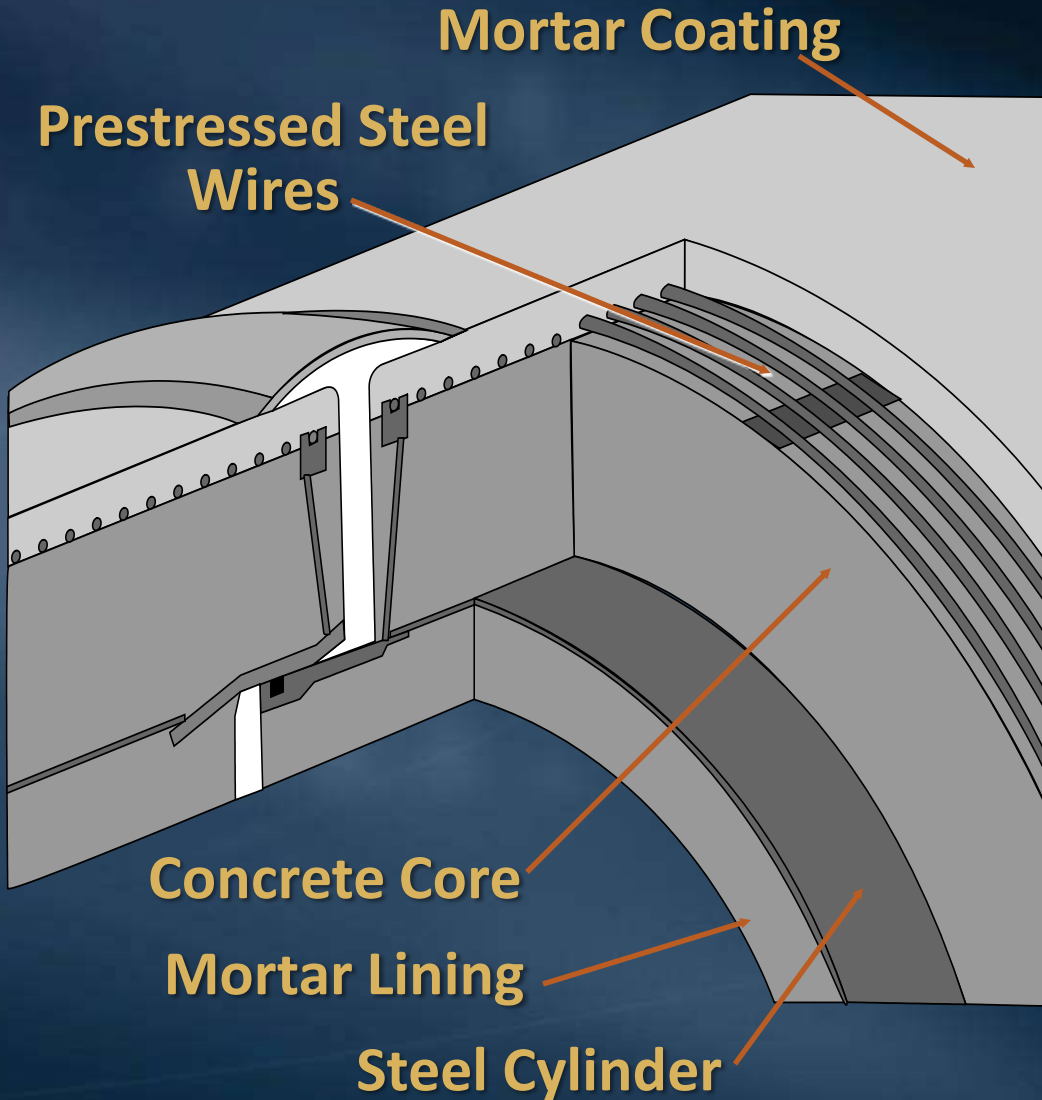
- Gates, Valves
- Pressure Control Structures
- Dams

Prestressed Concrete Cylinder Pipe (PCCP)

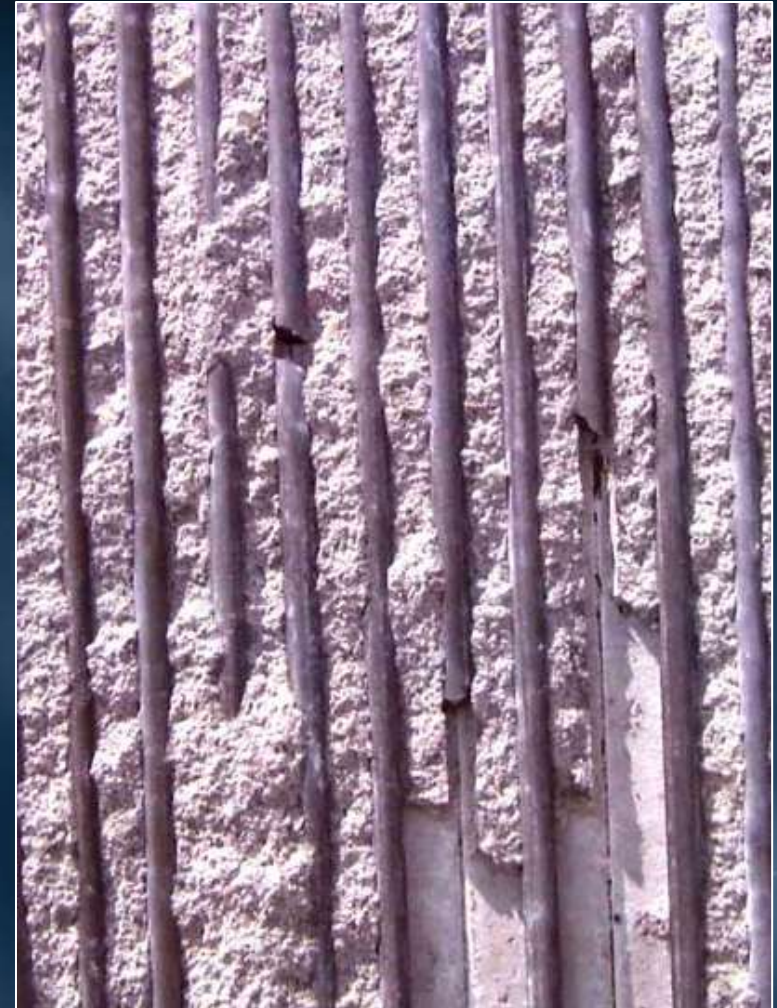


Prestressed Concrete Cylinder Pipe (PCCP)

Cross Section



Broken Prestressing Wires



Industry Experience w/ PCCP

- Viewed as economical alternative to steel pipe
 - Handles high pressures
 - U.S. & Canada - 30,000 miles installed from 1960s to 1980s
- Elevated risk of failure
 - Broken prestressing wires
 - Cracked mortar
 - Corrosive surrounding soils
 - Third party stray current interference
 - External loading
- Reduced service life vs steel pipe
 - Early design standards untested
 - Claims of defective pipe
 - Highly susceptible to quality control lapses
- Failures often catastrophic
- Requires diligent monitoring by pipe owner

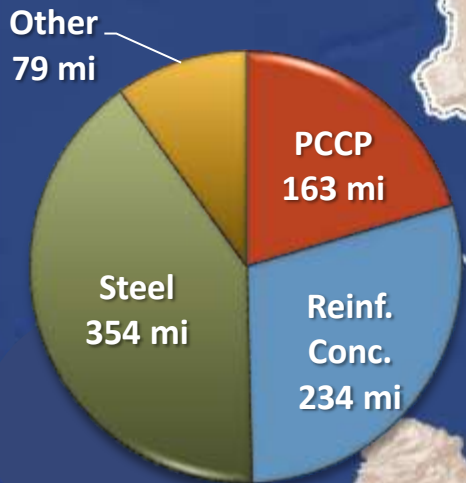
Maryland PCCP Wire Break



**60-in diameter
PCCP**

Metropolitan PCCP Lines

PCCP = 163 miles (20%)
Diameter = 42 to 201-inches
Pressures up to 300 psi
Constructed 1962 to mid-1980s



Metropolitan Experience

- Electromagnetic inspections initiated in 2000
 - Three cycles of inspections completed
- Data compiled over 13 year period
 - Little or no deterioration of 63 miles (22 pipelines) – Stable
 - Continued deterioration of 100 miles (5 pipelines) – Rehabilitation will be needed
- Former strategy
 - Perform regular electromagnetic inspections
 - Install cathodic protection when needed
 - Repair individual distressed pipe segments
- Higher cost to repair single pipe segments
- Remainder of PCCP segments continue to deteriorate

PCCP Repair History Since 1999

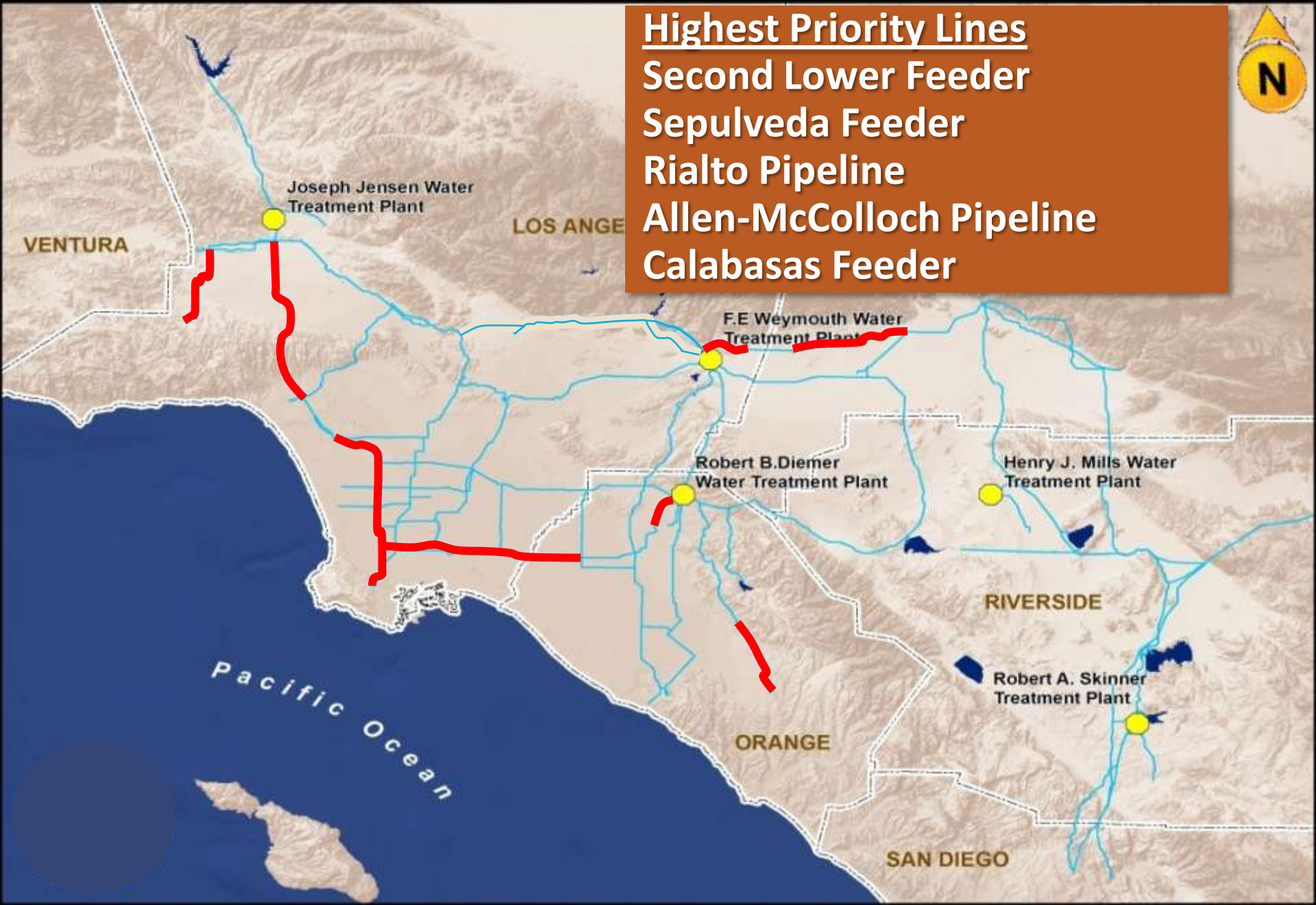
	Repaired (ft)	Costs (\$M)	Remaining Pipe Length w/ WBs (ft)
Second Lower Feeder	4,620	6.9	5,560
Allen-McColloch Pipeline	831	11.4	0
Calabasas Feeder	520	5.0	800
Sepulveda Feeder	321	6.9	2,020
Rialto Pipeline	255	12.3	2,280
Box Springs Feeder	491	6.6	0
West Valley Feeder No.1	240	0.9	100
Lake Skinner Outlet Conduit	94	4.4	40
San Diego Pipeline No. 5	72	0.8	0
San Diego Pipeline No. 4	66	0.3	220
Foothill Feeder	60	8.9	100
Auld Valley Pipeline	24	0.3	20
TOTAL	7,534	64.7	

Moving Forward

- **Proposed New Strategy**
 - **Initiate projects to reline or replace entire PCCP lines**
 - **Continue regular electromagnetic inspection**
 - **Install cathodic protection where needed**
 - **Perform urgent repairs as needed**
- **Proactive replacement program**
- **Improves reliability with completion of each pipeline reach**
- **Less expensive per pipe segment**

Metropolitan PCCP Lines

- Highest Priority Lines
- Second Lower Feeder
- Sepulveda Feeder
- Rialto Pipeline
- Allen-McColloch Pipeline
- Calabasas Feeder



Second Lower Feeder – First Priority

● Background

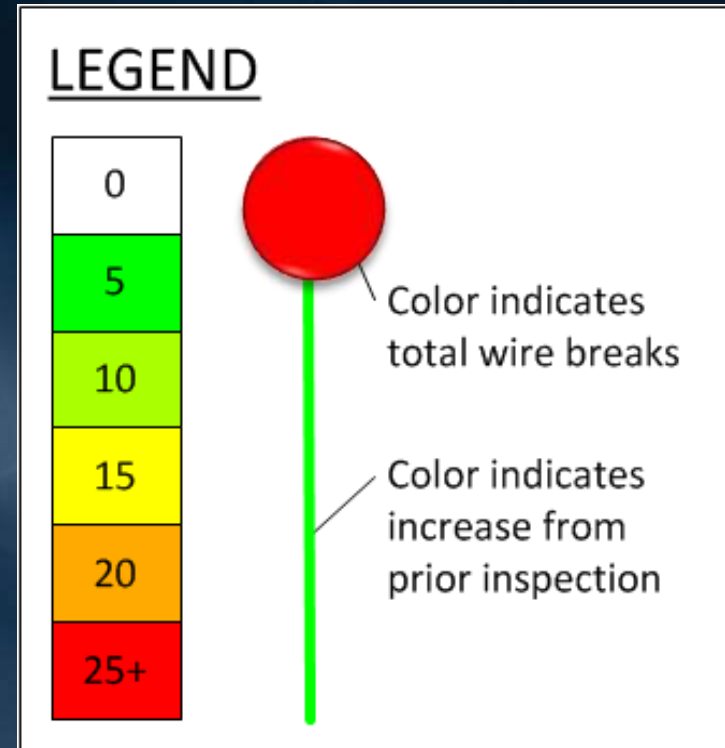
- Highly urbanized area
- High pressure pipe
- Highly corrosive soils
- 3rd party stray currents
- History of wire breaks

● In 1999, 2002

- Repaired 4,620 feet

● In 2013

- Increases in prestressing wire breaks in 19 segments
- 25 wire breaks in one segment









KW

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Next Steps

- **Board Letter to authorize repairs of the Second Lower Feeder in July**
- **Presentation of PCCP rehabilitation program within CIP in July**

