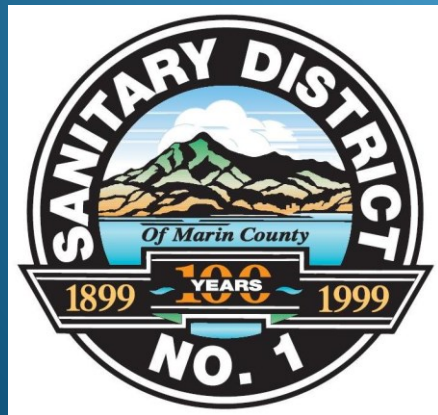# Dynamic Asset Management Using CMMS

Katherine Hayden, P.E.
Assistant Engineer
Stephen Miksis
Maintenance Superintendent
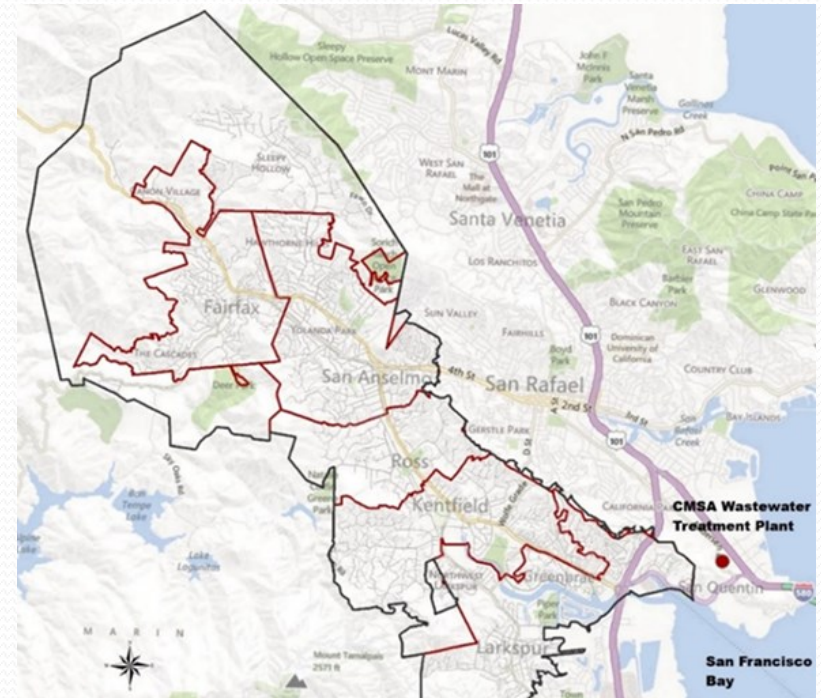
Ross Valley Sanitary District

Presentation Topics

- Defining the Problem
- Levels of Service
- CMMS
- CIP and Asset Management
- O&M Optimization
- O&M and CIP Integration

Defining the Problem

- 1899 District with 200 Miles of Pipe
  - Most of pipe beyond its design life, wear and tear
- System Characteristics
  - Small diameter
  - High risk trunk lines
  - Valley
  - Access
  - Shallow pipe
  - I&I

Defining the Problem

- ## Deferred Maintenance
  - Staffing and funding
  - Reactive with limited documentation

- ## Asset Inventory Data
  - Unknowns and inaccuracies
  - Inherited infrastructure

- ## Condition Data/Projects
  - CCTV data limited pre-2008
  - Project definition based on field crews

- ## Capital Program to 2012
  - 15% of system replaced by 2012
  - 2006 master plan pending project backlog
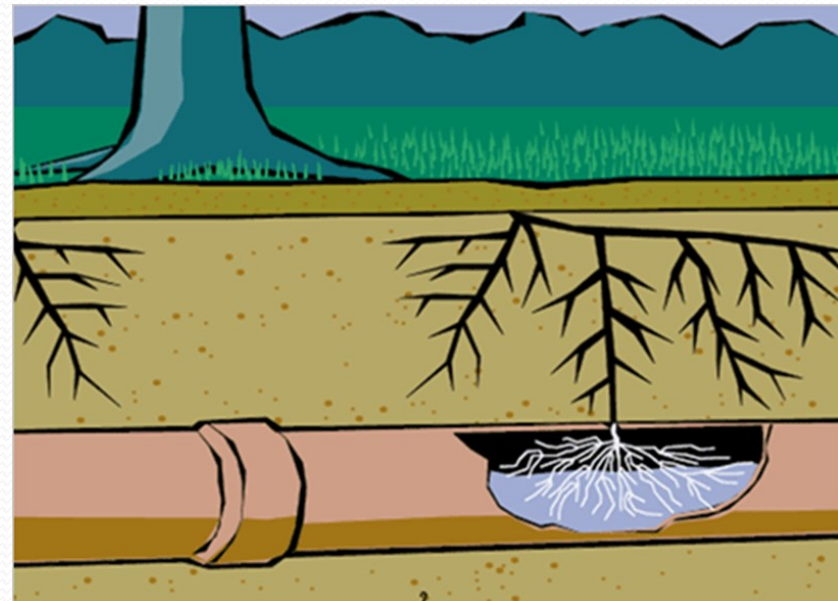
Levels of Service

- Capital and O&M Approach
  - 2006 Master Plan
  - Redefinition 2010-Present

- Infrastructure Asset Management Plan (IAMP) in 2013
  - CDO regulatory requirements
  - District-defined

- Level of Service (LOS) Goals
  - Preserve health and the environment
  - Provide excellent customer service
  - Provide and sustain a reliable system
  - Assure cost-effective system management

CMMS – Managing the Problem

Who? What? When? Where? Why? How?

- Collect, use and manage data
- Prioritize capital/maintenance
- Define projects
- Optimize resources
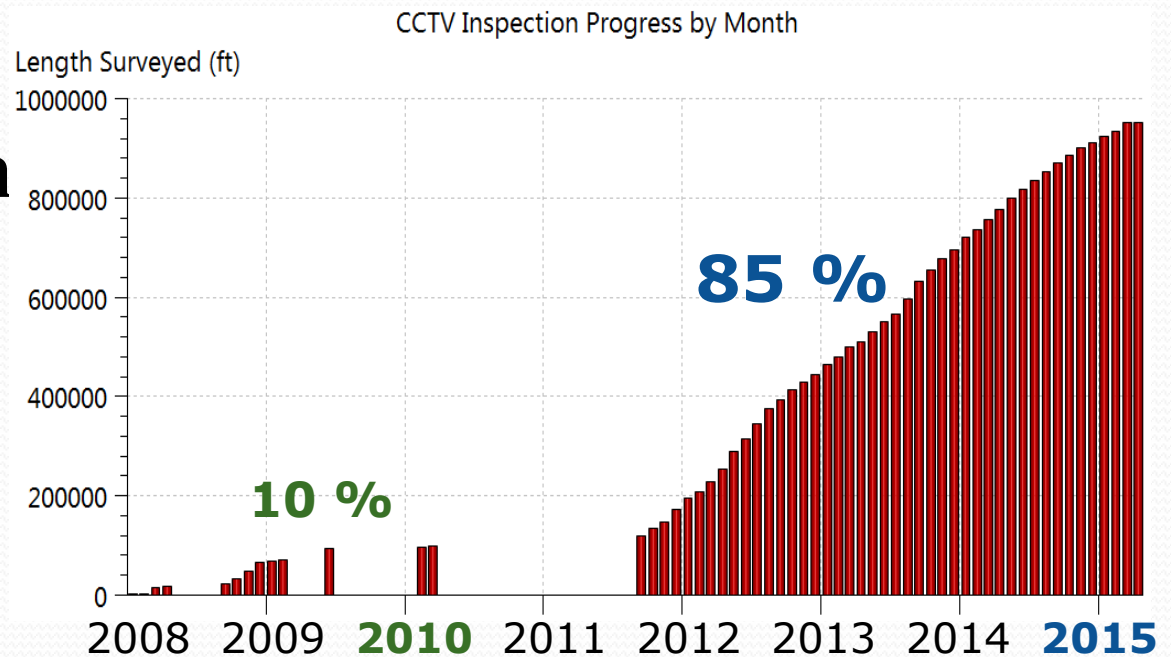- Track successes
- Add value

CMMS – System

- Software
  - InfoNet™ (2012)
  - Work orders
  - Asset management

- Data Collection
  - Paper to electronic
  - CCTV system-wide
  - Cleaning data
 - Update mapping & inventory

CCTV Inspection Progress by Month

Length Surveyed (ft)

85 %

10 %

2008 2009 **2010** 2011 2012 2013 2014 **2015**

CMMS – Condition Data

- PACP Grade 4 & 5 Structural Defects
  - 1,700 pipes of which 1,400 average of two **severe** G5s
- O&M Condition Data
- Incident Documentation
- Cleaning QA/QC

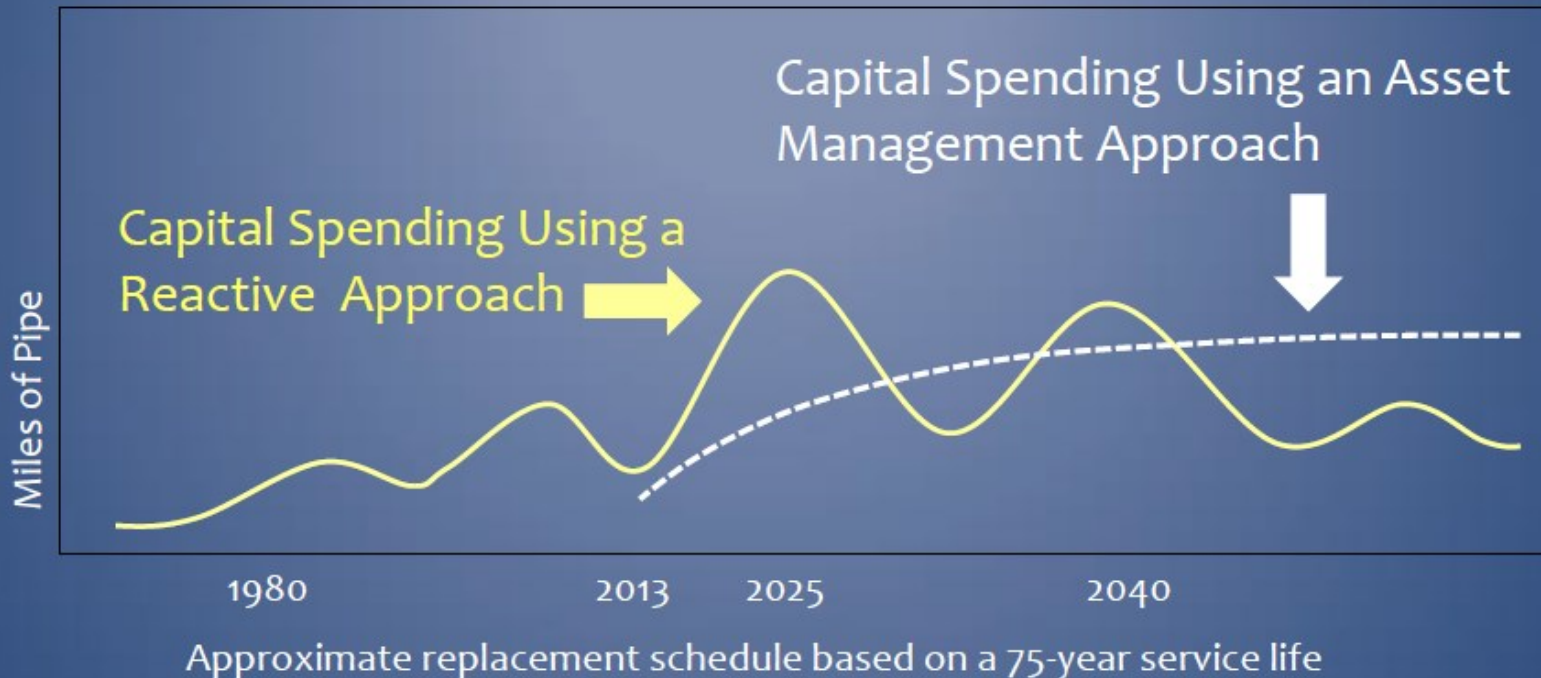| Defect Code	Defect Description	Distance Affected (ft)		Percentage Surveyed
RBC	Roots Ball Connection	673		3
RBJ	Roots Ball Joint	1,805		5
RBL	Roots Ball Lateral	207		1
RFB	Roots Fine Barrel	110		0
RFC	Roots Fine Connection	266		1
RFJ	Roots Fine Joint	206,572		47
RFL	Roots Fine Lateral	167		1
RMB	Roots Medium Barrel	112		0
RMC	Roots Medium Connection	515		2
RMJ	Roots Medium Joint	8,437		12
RML	Roots Medium Lateral	148		1

CIP – Data to Prioritized Projects

2012/13

2014/15
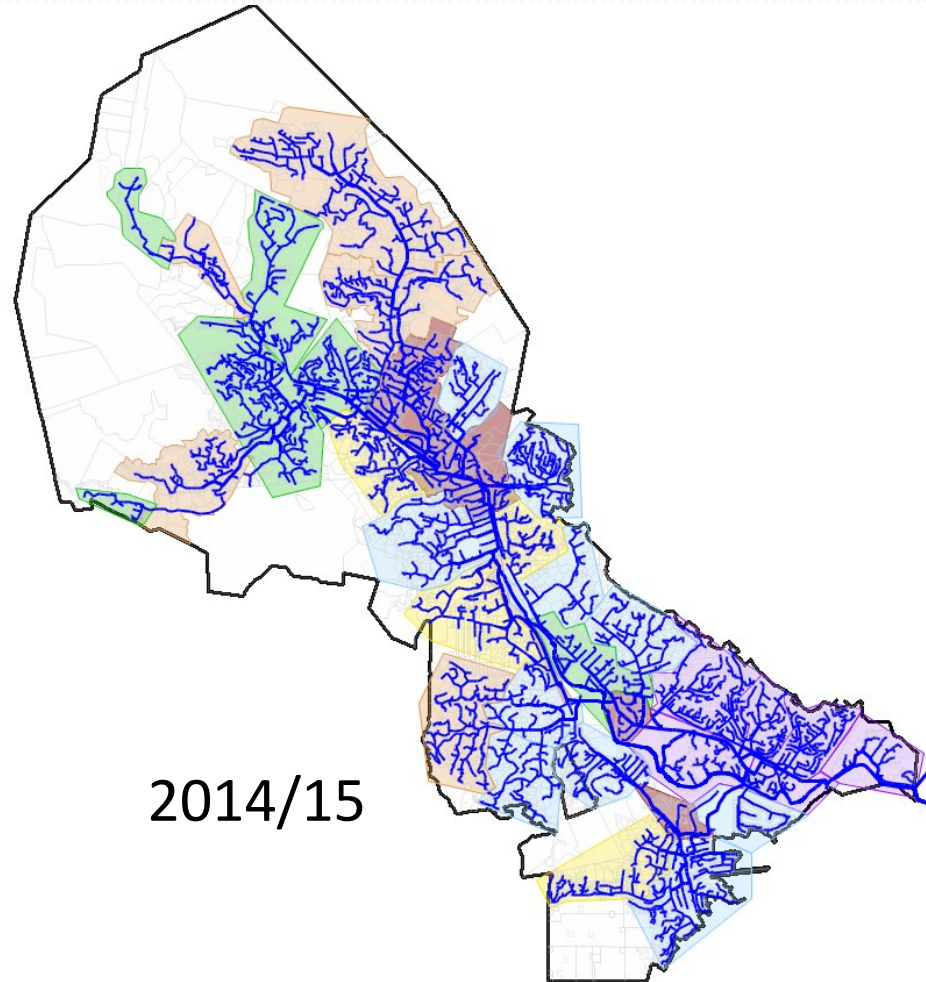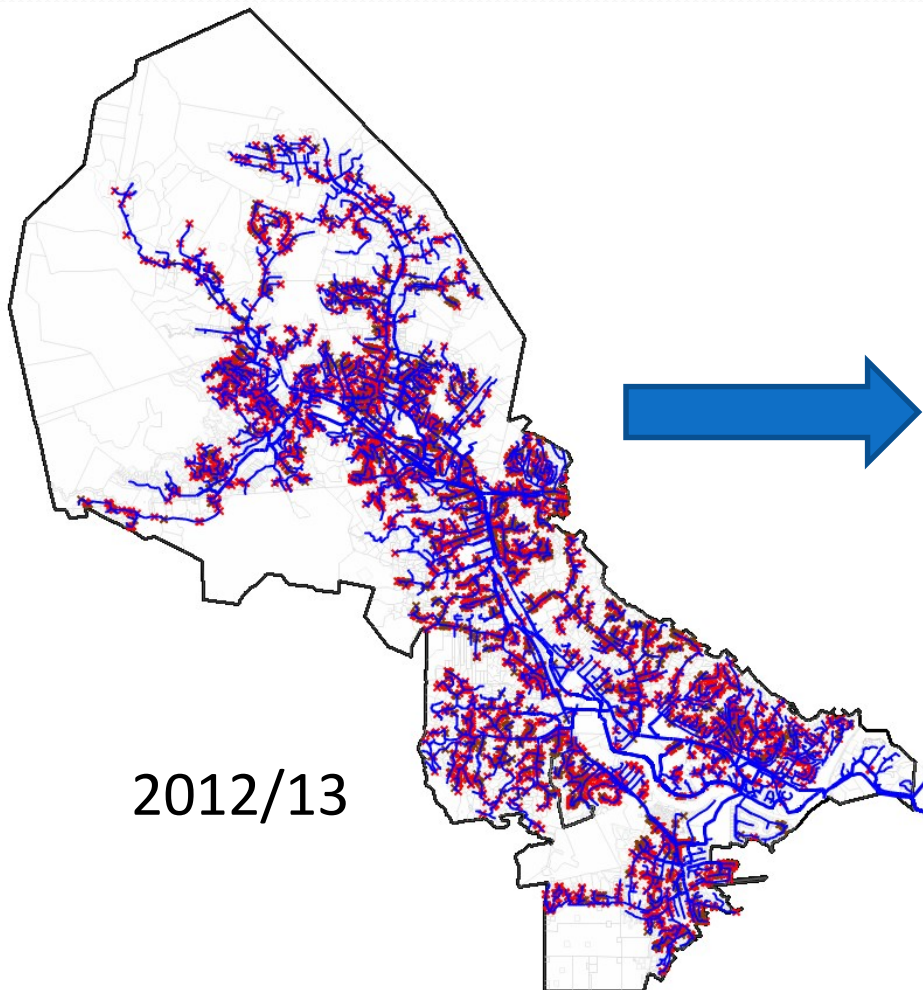
CIP – Asset Management

USING AN ASSET MANAGEMENT APPROACH, ROSS VALLEY GAINED CONTROL OVER THE CIP

Capital Spending Using an Asset Management Approach

Capital Spending Using a Reactive Approach

Miles of Pipe

1980   2013   2025   2040

Approximate replacement schedule based on a 75-year service life

IAMP – Risk Model

- SMARTool

Likelihood of Failure
(from InfoNet CMMS)   ✖   **Consequence of Failure**
(GIS Data)

- Material (Techite)
- Structural Condition
- O&M Condition
- Located in Bay Mud
- Located in Landslide Zone
- Capacity/SSOs
- Maintenance Needs

- Near Waterway
- Near School, Park
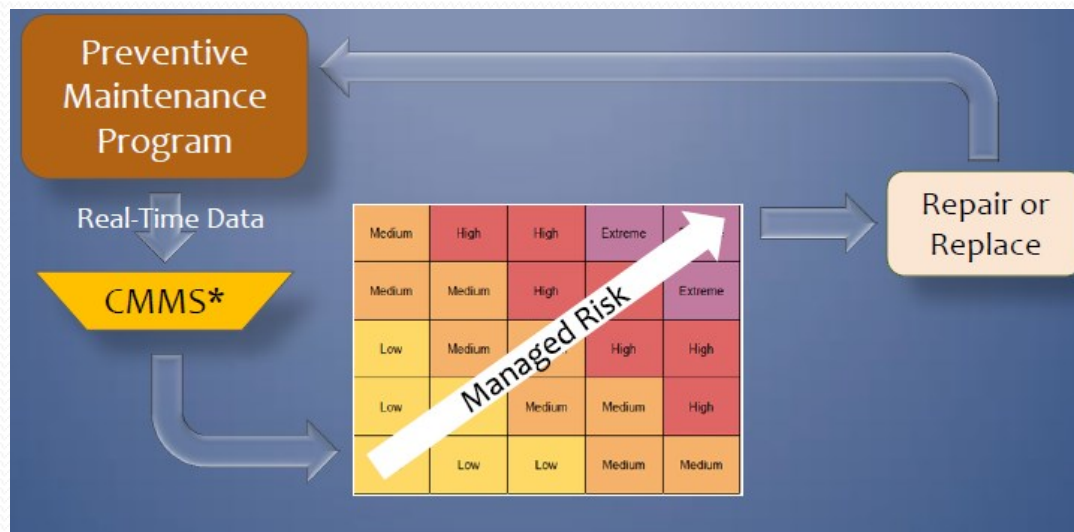- Crosses Major Roadway
- Serves Large Area

= **Risk Score for Every Pipe Segment**

V.W. HOUSEN
& ASSOCIATES

CIP – IAMP to Rehabilitation Projects

- Risk prioritization
- Grouped by location
- Various construction methods
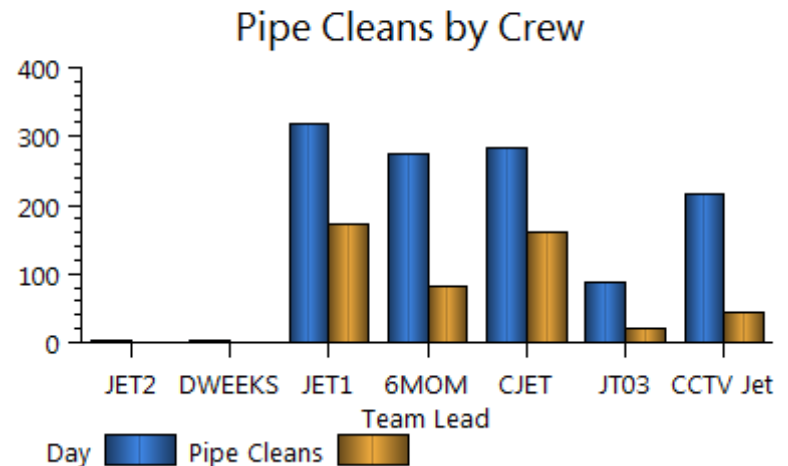- Resource optimization
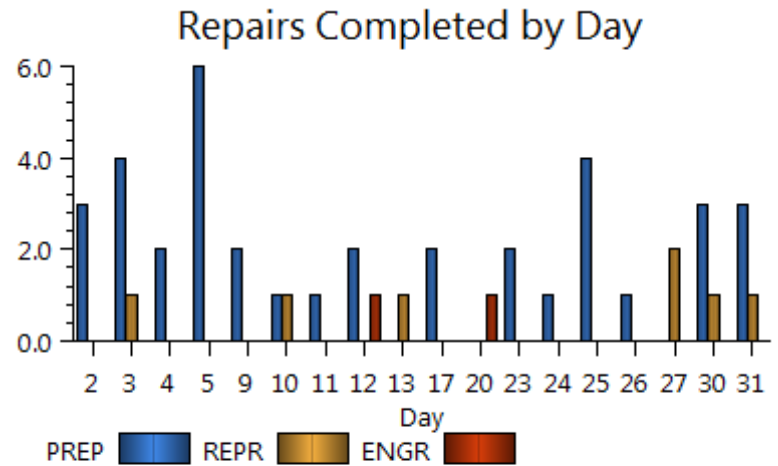- Built-in project flexibility
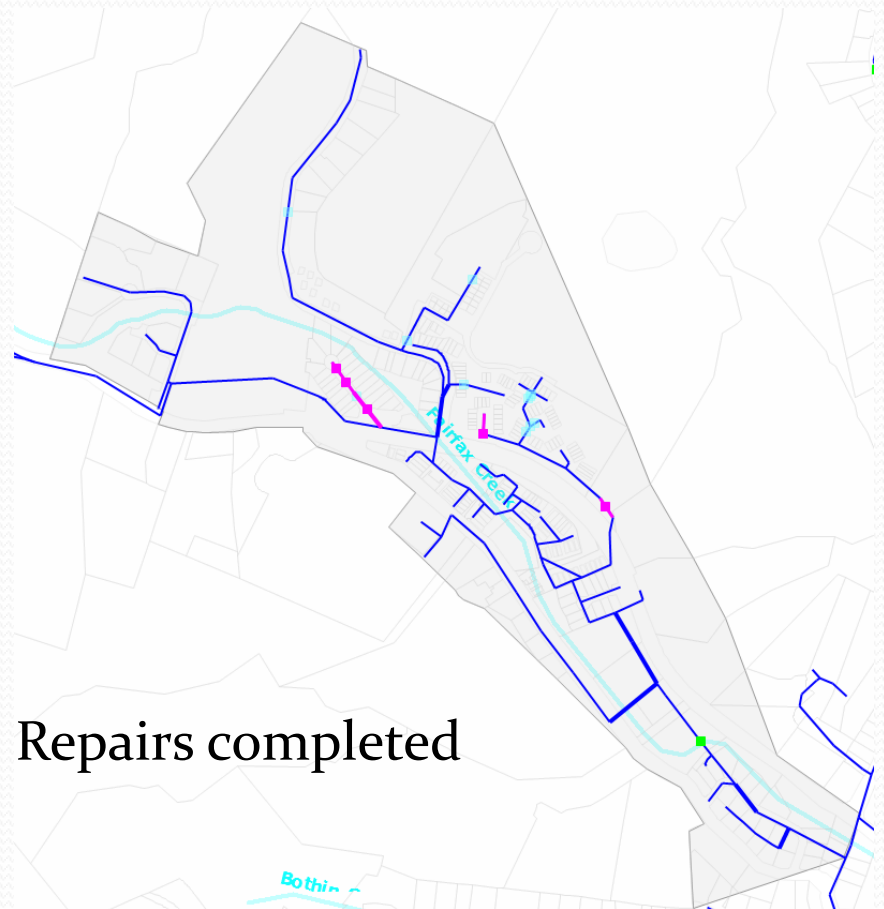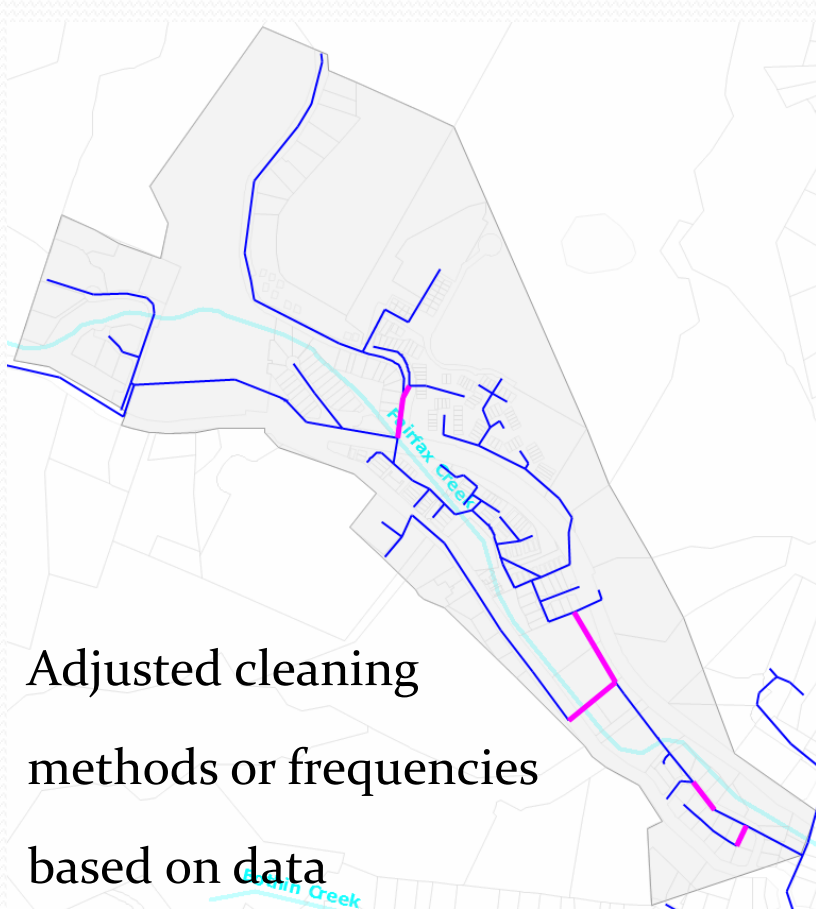
CIP – Gravity Sewer Projects

- Dynamic
  - New condition data and risk model updates
  - Plan and manage District repairs
  - Repairs connected to pre- and post-CCTV
  - O&M factors and priorities
  - 3 to 5 year rehabilitation or monitoring
  - $14M - $22M rolling capital plan through 2022
- 2014/15 Gravity Sewer Project
  - 2 rehab areas and 2 capacity projects
  - 185 District repairs completed in advance
  - 4 miles of rehabilitation/replacement plus restoration
  - 40 pipes that are currently 6 month maintenance
  - Re-prioritized a pipeline due to SSOs and O&M schedule
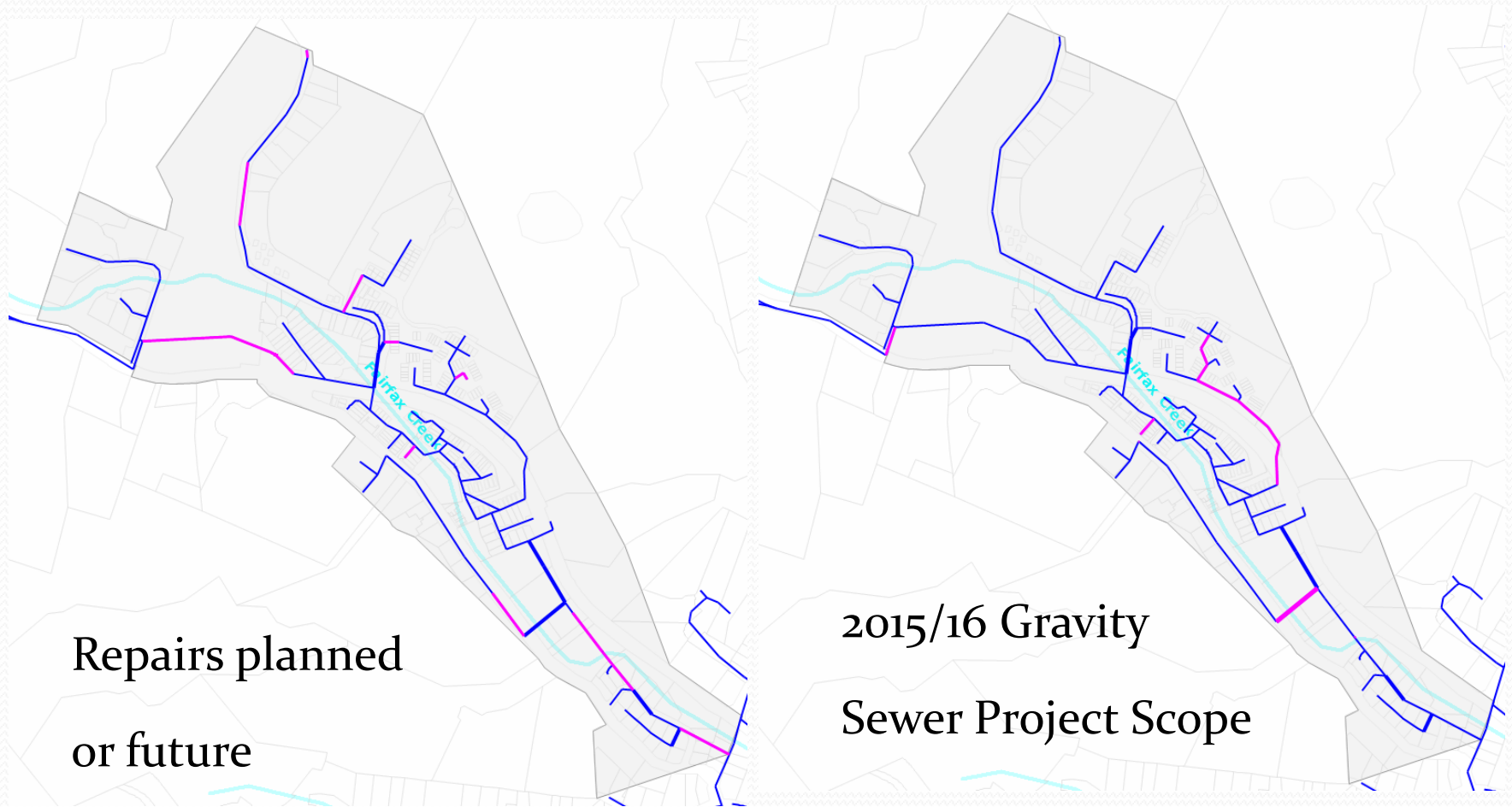- Not possible without CMMS

O&M – Optimization

- Data Driven Decisions

- Schedule and Track

- Effective Tools and Technologies

- Maximize Resources

- Performance Metrics

- CIP Projects factors

Repairs Completed by Day

PREP / REPR / ENGR

Pipe Cleans by Crew

Day / Pipe Cleans

O&M and CIP Integration – Downtown Fairfax Example

Adjusted cleaning methods or frequencies based on data

Repairs completed

O&M and CIP Integration – Downtown Fairfax Example

Repairs planned

or future

2015/16 Gravity

Sewer Project Scope

O&M and CIP Integration

- Resource Optimization
  - District resources work ahead of capital projects
  - Localized liner repairs support or restore pipe
  - Significant cost savings allow us to fulfill objectives
- CMMS
  - Data to SMARTool for risk
  - Capital projects scoping
  - Tracking and reporting
  - Confirm and reevaluate O&M post-rehabilitation
- **CMMS Data Showing Progress and Results**
- Pump/Lift Stations and Force Mains Same Principles
  - PS 12 Bon Air and PS 13 Greenbrae
  - Force main ARVs and cathodic protection

Work In Progress