City of Stockton – Municipal Utilities Department

Gravity Sanitary Sewer Collection System – Asset Management & Master Plan

Water Advisory Group
September 5, 2018

Gravity Sanitary Sewer Collection System – Asset Management & Master Plan

Background:

- Municipal Utilities Department – Implement a tool for assessing and prioritizing gravity pipeline repair and rehabilitation projects for the Capital Improvement Program
- In April 2016, Request for Proposals
- Awarded contract in September 2016 to HDR Engineering, Inc. of Folsom, CA
- Completed Study in June 2018

Gravity Sanitary Sewer Collection System – Asset Management & Master Plan

Purpose:

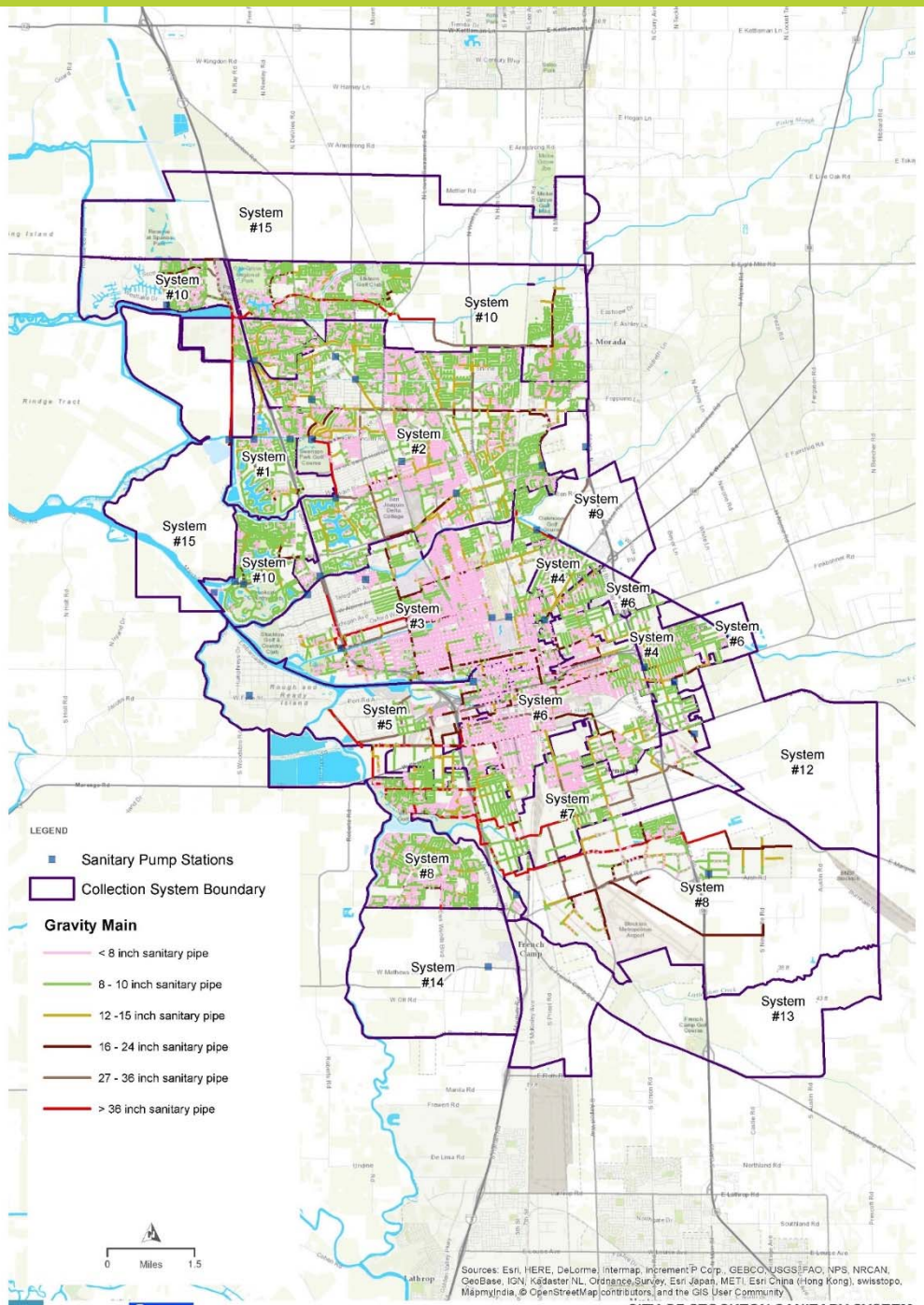
- Evaluate and consolidate all closed-circuit television (CCTV) data into a single data repository
- Develop risk models
- Prepare capital improvement priority and budgets for the repair and rehabilitation of the City's gravity sanitary sewer collection system; 878 miles – 97% of system
- Does not include pressurized sewer pipe systems (Force Mains); 30 miles – 3% of system

Scope of Study

1. Data Gap Analysis
2. Level of Service Goals
3. Alternatives & Sensitivity Analysis
4. Validation of Recommendations
5. Capital Improvement Development and Prioritization

1. Data Gap Analysis

- Identify areas where data may impact the quality of the results
  - GIS Data, Asset Attributes (pipe size, pipe material, pipe age, etc.), CCTV Data
- Results: Reviewed sample of 10 miles of CCTV data, scoring was 98% consistent



CITY OF STOCKTON SANITARY SYSTEM
ASSET MANAGEMENT & MASTER PLAN
FIGURE 1. STOCKTON SANITARY SEWER COLLECTION SYSTEM

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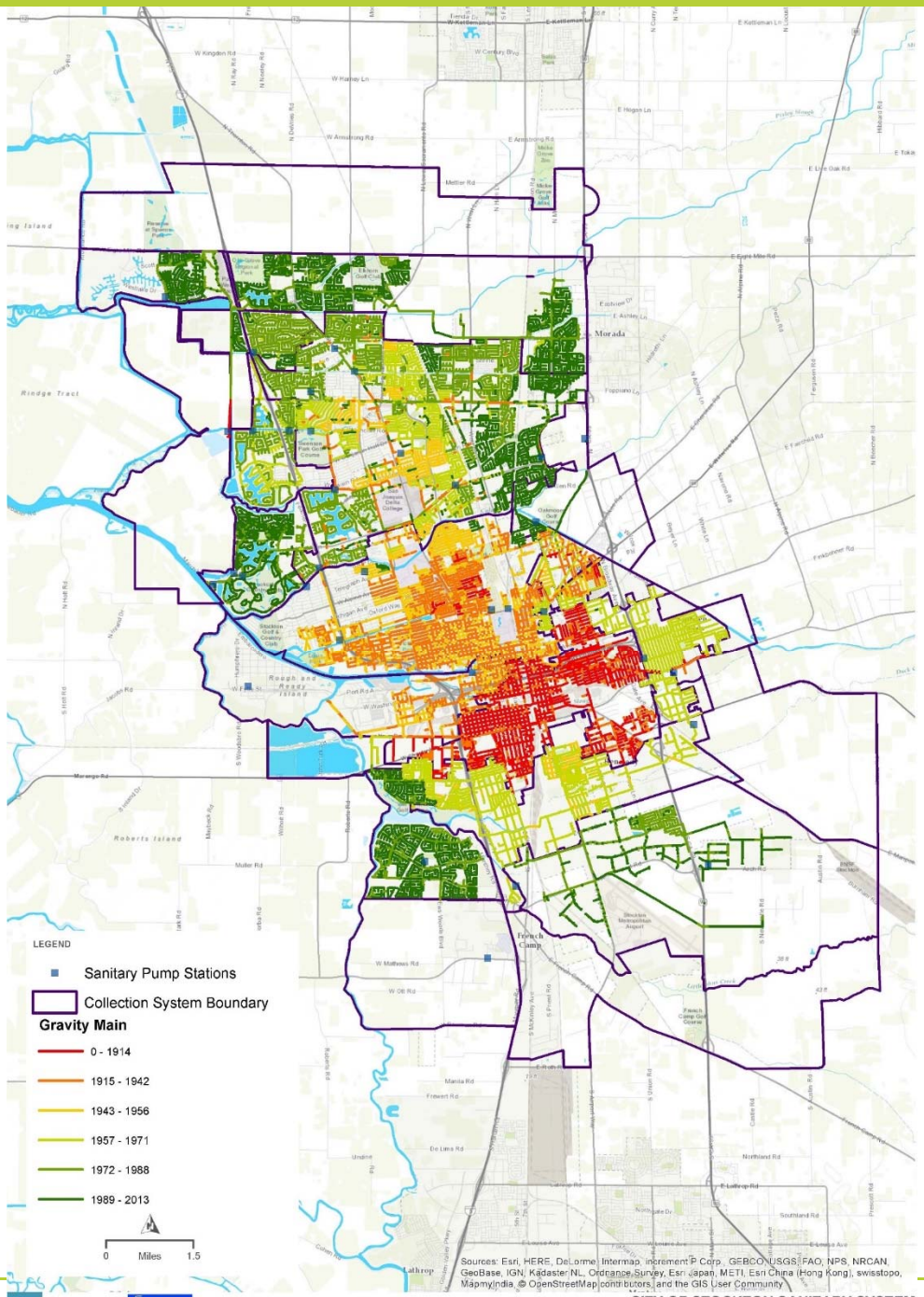

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FIGURE 4. ESTIMATE PIPE INSTALLATION YEAR

2. Level of Service Goals

- Manage risk & appropriate repair/rehabilitation (R&R) method to maintain service levels.
- Risk

  Combination of Likelihood of Failure (LOF) and

  Consequence of Failure (COF)

  Risk = LOF + COF

  LOF based on pipe condition

  COF related to public health, public safety, & environment
- Cost of Service for Construction Alternatives (R&R)

  For various construction alternatives (Open cut, slip lining, etc.), costs were developed from available bid results locally, regionally, and nationally

3. Alternatives & Sensitivity Analysis

- Goal of this task was to determine the appropriate R&R recommendation for each pipe segment.
- This task includes developing a decision process for those pipe segments that ranked highest based on industry experience, input from City engineering, and system risk.

3. Alternatives & Sensitivity Analysis (cont.)

- The decision process was calibrated to balance risk and affordability.
- Analysis resulted in a risk threshold of 45 for point repair and 50 for other R&R methods to maintain service levels.

Figure 15. Final R&R Scenario Breakdown

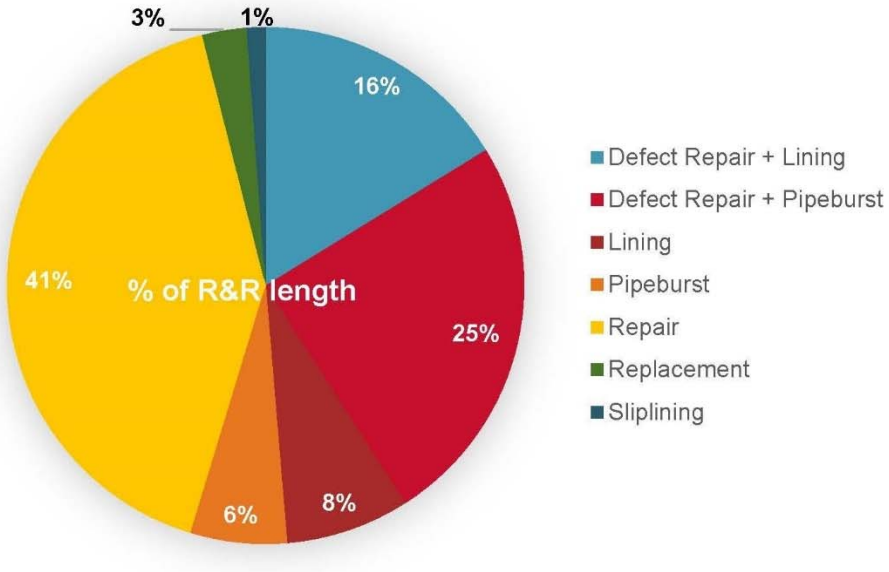

Table 26. Final R&R Scenario Cost Information

Final R&R Scenario	Risk Threshold (>45 Point Repair and >50 other R&R methods)
Total Cost	$131,663,246
Mileage	133.92
System %	15%
Cost/Mile	$983,148

4. Validation of Recommendations

- Of the 134 miles of the highest risk pipes with R&R recommendations, 67 miles were reviewed to make a final asset decision.

  Examples of information considered:

  Location and depth of pipe

  Adjacent utility conflict recommendations

Appendix C shows a list of every pipe, their associated R&R recommendation and the associated algorithm validation results. If the R&R recommendation went through the validation process, the "Validation" column will be marked "Yes" and the reviewer's comments are provided in the "Validation Comments" column.

Figure 16 shows the R&R breakdown after the sensitivity analysis and algorithm validation. Figure 17 shows all of the R&R recommendations and their locations within the City.

Figure 16. Recommended R&R Breakdown

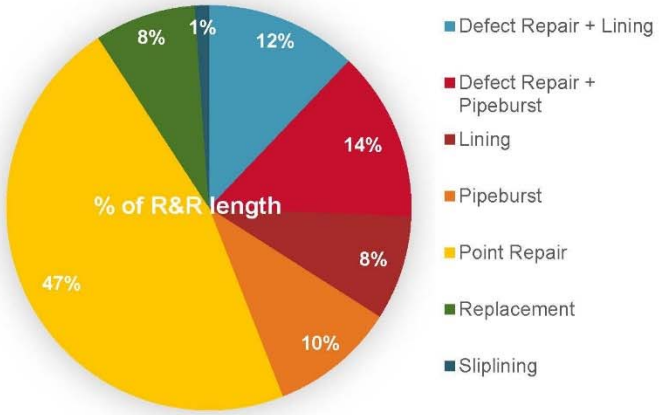

Table 27 shows the updated final cost information, after the sensitivity analysis and algorithm validation results, for the recommended R&R program. There is a $5.5M decrease in costs after the algorithm recommendation validation, primarily due to the algorithm being more conservative than the engineering review. The final recommendation includes the rehabilitation or replacement of 15% of the overall system. As the risk analysis and decision process approach is a desktop exercise, field assessments need to be completed before a project specific rehabilitation method is confirmed and the design process is started.

Table 27. Recommended R&R Program - Final Cost Information

Recommended R&R Program	Risk Threshold (>45 Point Repair and >50 other R&R methods)
Total Cost	$126,235,015
Mileage	131.7
System %	15%
Cost/Mile	$958,504

5. Capital Improvement Development and Prioritization

- Process assists in prioritizing Capital Improvement Program and programming associated construction costs in future budgets
- Process also assists in prioritizing repair work for operations staff

Key Takeaways

- Over 80% of gravity collections system in good shape
- Tools allow MUD to implement most economical repair solutions
- Supports efforts to effectively manage for the future
- Supports long-term sustainability and economic growth for the City of Stockton

Upcoming Activities

- Completion of Cost of Service Study for Wastewater Utility
- Annual Budgeting and Capital Improvement Program Development

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