City of Stockton – Municipal Utilities Department

Gravity Sanitary Sewer Collection System – Asset Management & Master Plan

Council Water Committee September 26, 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











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.



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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



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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

