SECTION VIII
CAPACITY MANAGEMENT

The Capacity Management Section describes the capacity management element of the District's collection system, which includes a discussion of capacity assessment, system evaluation, and capacity assurance. The purpose of this element is to document the process used to assess the hydraulic capacity requirements for the District's collection system, discuss the results of the evaluation, and demonstrate that all significant deficiencies are properly addressed through the District's Capital Improvement Program (CIP).

Capacity Assessment

A critical function of the District's wastewater collection system is to provide adequate capacity to handle current and future wastewater flows. A capacity assessment examines the collection system under varying flow conditions from current dry weather to future wet weather flow scenarios to determine the adequacy of the collection system to handle these flows.

The previous capacity assessment effort began in November 2006 when the District contracted with RMC Water and Environment (RMC) to initiate a multiple phase study beginning with the development of a hydraulic model for the District's trunk sewer system (pipe sizes ≥ 10"). This initial effort required RMC to perform a number of tasks including:

- Review existing sewer system information
- Wet weather flow monitoring
- Developing current and future dry weather flows
- Developing design flow and hydraulic criteria
- Evaluation and selection of hydraulic modeling software
- Developing a hydraulic model of the collection system

The hydraulic modeling software utilized was InfoWorks™ and was developed and calibrated using collection system and wet weather flow monitoring data. In order to evaluate the collection system, a design storm was developed to represent a future peak wet weather flow event. The design storm utilized was adapted from the City of San Jose's 10-year design storm at San Jose Airport which is based on the intensity-duration-frequency (IDF) statistical data and guidelines described in the County of Santa Clara Storm Design Requirements. The end result was the use of a 10-year, 24-hour synthetic rainfall event.

Since the 2009 hydraulic study, the District has completed several major CIP projects which have addressed some of the major hydraulic deficiencies identified. However, it was

recognized that the 2009 hydraulic model was somewhat limited in that it only incorporated pipe ≥10" diameter or approximately 338,000 linear feet of sewer (15% of the District's system). Since a majority of lines (88%) in the District's system is comprised of 6 and 8-inch pipe, there was a considerable number of small lines serving as trunk sewers that needed to be included in the hydraulic model in order to achieve more accurate results. Subsequently, the District began efforts to update and improve the hydraulic model and re-evaluate the hydraulic deficiencies in its collection system. On June 25, 2014 the Board approved a new contract with RMC (now referred to as Woodard & Curran, or W&C) to expand the model to include an additional 241,000 linear feet of sewer, increasing the total hydraulic model to more than 550,000 linear feet (25% of the District's mainline system). The comparison of the two hydraulic model maps is illustrated in the map provided in Appendix E.1. The updated hydraulic model and capacity analysis was completed in May 2018 and is presented in Appendix E.2. Similar to the 2009 analysis, the design storm remains a 10-year, 24-hour design storm, except the storm pattern and hourly rainfall intensities are based on the updated (2007) Santa Clara County Drainage Manual.

System Evaluation

As in the 2009 hydraulic model and collection system evaluation, the design storm was superimposed on the base wastewater flow (BWF) such that the peak intensity of the rainfall dependent inflow and infiltration (RDI/I) coincided with the daily peak BWF at 6 am. Model simulations were conducted to identify areas that may have insufficient capacity to convey peak dry weather flow (PDWF) and design peak wet weather flow (PWWF) using the criteria below. This approach gives a conservative flow response in the collection system and is a typical methodology in determining the peak wet weather flow generated by a design storm.

In the hydraulic analysis the determination of whether a line is deficient is based on the following hydraulic analysis criteria:

Small Pipes (≤15")

- No surcharge at PWWF - minimal surcharge allowed if pipe is deep, max. d/D=0.75 at PDWF

Large Pipe (>15")

- No surcharge at PWWF - surcharge of 1 foot if MH depth ≥5', max. d/D=1.00 at PDWF

Due to the increase in collection system modelled, it was expected that the 2018 hydraulic model would reveal a greater number of deficiencies than identified in the 2009 hydraulic analysis. The updated hydraulic analysis described a total of 34 deficiencies found in the District collection system involving the footage of pipe shown in parenthesis; 15 deficiencies (40,000 lf) were classified as significant, 9 (8,500 lf) were classified as moderate, and 10 (8,000 lf) were classified as minimal. In addition, each of these deficiencies were ranked with relative priority ratings from 1 to 4 (with 1 being the highest priority). In Table 6 of this study, there are 6 significant deficiencies that are ranked with a 1 priority. Between the planned 5 and 10-Year CIP projects, including the San Jose CIP projects involving joint trunk lines, all of these deficiencies will be addressed. Maps

showing the deficiency rating and priority ranking are included in the 2018 Analysis and is also presented in Appendix E.3. The evaluation also confirmed that essentially all of the District's collection system is capable of handling PDWF conditions as only two of the identified PWWF deficiencies (ST-1 and ST-2) also showed PDWF deficiencies. The results of the 2018 hydraulic model have now been incorporated into the District's Risk Prioritization Model. Recognizing that there are hydraulic deficiencies that remain in the system, the District has installed fourteen flow level monitoring at critical overflow points at manholes identified in the hydraulic study. Mission M-80 manhole floats are being used to monitor these manhole levels by providing real time data alerts to operations staff ahead of potential overflow events.

Capacity Assurance Plan

Design Criteria

The District ensures that its collection system is properly designed and any new or rehabilitation work conforms to design capacity standards. Reference Section V – Design and Construction Standards for additional discussion. These design standards are more conservative that the hydraulic analysis criteria shown above and include:

Small Pipes (≤15")

- Max. d/D=0.50 at PDWF
- Max. d/D=0.75 at PWWF

Large Pipe (>15")

- No surcharge at PWWF
- Max. d/D=0.75 at PDWF

Capacity Enhancement

The District's CIP addresses both short and long term projects to address identified hydraulic deficiencies. As a result of the Risk Prioritization process and the consideration of other parameters (pipe condition, SSO history, potential SSO magnitude, community impacts, etc.) not all hydraulic deficiencies identified may be captured in the District's CIP. Although other parameters are considered, hydraulic deficiency carries significant weight as a parameter in the Likelihood of Failure (LoF) matrix when determining a pipe's risk score (ref. Appendix B.7).

In addition to increasing pipe size as part of the short and long term CIP, the District embarked on a concurrent effort to reduce RDI/I. In FY 2014-15 the District initiated its Inflow and Infiltration Reduction Program by hiring V&A Consulting Engineers to analyze basins within our service area in order to identify sources of I/I. Based on previous flow monitoring data, sixteen drainage basins were selected for analysis (designated as E01 to E16). Over the next two fiscal years, additional flow monitoring and analysis was performed to further delineate these original sixteen basins into smaller sub-basins in an attempt to pinpoint specific I/I sources. In the December 2016 V&A Study, the sixteen basins were evaluated and ranked in terms of their Peaking Factors for inflow and infiltration (Ref. Appendix E.4.). In June 2018, smoke testing was performed on Basin

E10, which was previously identified as being ranked 2nd in inflow peaking. The results of the smoke testing is very positive showing a total of 7 “smoke returns” found, with 2 of these being significant sources of inflow (Ref. Appendix E.5).

CIP Schedule

Reference Section IV for a discussion of the District’s CIP, schedule, and budget.
The District’s 5-Year CIP budget is shown in Appendix B.9. A map of completed District CIP projects from 2000 including the current 5-Year CIP projects are provided in Appendix E.6. This map also includes some future San Jose joint trunk sewer projects.