Comprehensive Solutions for Sanitary Sewer Systems

As wastewater service areas expand to support growing populations and existing sanitary sewer systems age, system owners and operators are faced with a variety of challenges. These include:

- Developing realistic growth projections for use in evaluating existing and future collection system and treatment capacity.
- Planning for the collection of data describing the physical condition and hydraulic capacity of the existing collection system.
- Developing and maintaining an up-to-date collection system hydraulic model.
- Identifying capital improvements and maintenance projects to provide for system expansion while optimizing the life of existing collection system assets.
- Balancing capital improvements and maintenance programs to maximize taxpayer investment and provide the level of service that ratepayers expect.
- Addressing existing and future regulatory requirements, such as the Government Accounting Standards Board Statement 34 (GASB 34), and the proposed EPA sanitary sewer overflow regulations (cMOM).

Carollo Engineers is a leader in sanitary sewer master planning because we take a comprehensive approach to meet these challenges. We have completed over 70 sanitary sewer master plans in the last 15 years, each customized to our clients’ individual needs.

Planning for Growth

Owners and operators of sanitary sewer collection systems and treatment plants are responsible for planning system expansion to serve developing areas. A comprehensive sanitary sewer master plan provides a road map to ensure that proposed system expansions are properly sized to accommodate upstream developments.

Using available local/regional planning data and national census data, Carollo works with each client to strategize the timing of capital improvements by developing realistic growth targets. These growth targets allow for the organization and timing of capital improvement projects to serve developing areas within annual budgetary constraints.

Analysis with Hydraulic Models

A hydraulic model is a necessary and important tool to evaluate collection system capacities under a variety of flow conditions in order to identify and prioritize capital improvement projects. Carollo has a long history of developing dynamic hydraulic models for sanitary sewer systems using a variety of software packages, including SWMM, MOUSE, InfoWorks, Hydra, H2Omap-Sewer, and SewerCAD. Our experience allows us to efficiently identify data requirements and develop a computer model that accurately depicts both gravity and surcharge flows in a sanitary sewer system.

Our expert modelers can either work with clients’ existing models or introduce clients to a model that best meets their needs. We directly involve each client in the selection processes to assure that the chosen model fits master planning goals and allows the municipality to take over future modeling efforts if desired. We also provide on-site training to allow for an efficient transition of model usage.

Land use, population, or traffic analysis zone boundaries define dry weather flows that are essential to a sanitary sewer master plan.
Carollo maximizes the use of available data and provides assistance in collecting supplemental data needed to accurately model a collection system. Existing information may be collected from a geographical information system (GIS), a supervisory control and data acquisition (SCADA) system, CAD drawing files, or as-built plans. If supplemental data is needed, we assist clients in collecting coordinate information (such as manhole inverts) using the Global Positioning System (GPS), completing pump station condition assessments, and initiating a flow monitoring program to collect both dry weather and wet weather flow data. Flow monitoring at strategic points throughout the collection system is crucial in calibrating the model to current conditions and helps project future flow estimates.

**Prioritizing Capital Improvements and Maintenance**

The capital improvement program (CIP) is the heart of a master plan. Carollo develops a CIP to identify and prioritize sewer system rehabilitation and replacement/expansion projects that maximize the performance of existing assets. We have expert knowledge on the effectiveness of sewer rehabilitation using a variety of replacement technologies. We also apply realistic design criteria so that improvements are neither under nor oversized.

Capital improvement projects can be costly and selecting rehabilitation versus replacement/expansion can be a difficult process. To minimize costs, we specialize in the application of optimization techniques to explore alternatives to assure the most cost-effective selection of projects. Life-cycle cost analysis can also be performed to include maintenance issues over the life of the improvements in order to maximize investments. Carollo also assists clients in financial planning and rate analysis to complete the implementation of the CIP. We have helped many municipalities acquire grants or secure State Revolving Fund loans to ease the financial burden on rate payers.

**Addressing the Regulatory Issues**

Collection system owners and operators are subject to a complex array of regulations. Our professionals know the regulators, understand the issues, and regularly advise clients on how to best meet existing and new/proposed regulations such as GASB 34 and the EPA Sanitary Sewer Overflow Rule. Part of our master planning process is to make sure that regulatory issues are taken into consideration throughout the master planning process to assure no surprises occur at the end of the project.

**Communication is Important!**

To make sure our final report meets a client’s needs, we involve them throughout the master planning effort. We incorporate project meetings, workshops, and technical memorandums in our project schedule in order to capitalize on the experience of the management and field personnel responsible for maintaining the system. This process helps us obtain a high level of “buy-in” from stakeholders when we deliver the final master plan.

**Experience Counts**

Carollo has a long history in sanitary sewer master planning. Some recent projects are listed below.

**City of Chandler, Arizona - Integrated Water, Wastewater, and Reclaimed Water System Master Plan Update.** Carollo completed a master plan that provided a CIP for new facilities to accommodate growth and meet future discharge requirements through the year 2020. This project included the use of the Hydro hydraulic model as well as ArcView GIS.

**Oro Loma Sanitary District, San Lorenzo, California - Collection System Master Plan Update.** Carollo completed a master plan that provided a CIP for new facilities to accommodate growth and meet future discharge requirements through the year 2020. This project included the extensive use of the InfoWorks hydraulic model as well as ArcView GIS, which Carollo customized to assist in growth projections. Carollo also completed a collection system inspection, condition assessment, and hydrogen sulfide corrosion model.

**City of Portland, Oregon - Sullivan, Stark, & Holladay Basin Predesign.** This project included significant hydraulic modeling using XP-SWMM to define basement flooding problems in three basins and determine their impact on combined sewer overflows. Carollo modeled every pipeline in the combined sewer system and developed alternatives that included storage projects, partial storm water separation, pipeline improvements, a roof drain disconnection program, and inflow reduction.