

## Full-Service Infrastructure Solutions

Carollo Engineers' Infrastructure Group offers complete engineering services for the complex infrastructure challenges facing water, wastewater, and storm water utilities today. We provide complete program management, design, rehabilitation/replacement, and construction services for pipelines, pump stations, and storage facilities. Our services also include water, wastewater, and storm water system master planning; hydraulic modeling; geographic information system (GIS) mapping; sanitary sewer overflow (SSO) and combined sewer overflow (CSO) elimination programs; asset management services; permitting and regulatory assistance; and public relations programs.



*Carollo's Infrastructure Group helps clients develop solutions for today's complex water, wastewater, and storm water infrastructure challenges.*

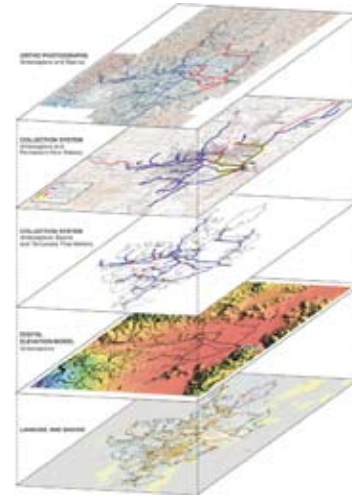
Today's infrastructure problems require real-world solutions. Carollo has been a leader in the planning and design of infrastructure projects since our inception in 1933. Our experts combine a "big picture" perspective gained from working with some of the country's largest utilities with a focus on client service and responsive engineering that has been a cornerstone of Carollo's success.

Our staff includes civil, environmental, structural, mechanical, electrical, instrumentation, and corrosion control engineers, as well as planners, modeling experts, construction managers, and public relations professionals. Services provided by Carollo's Infrastructure Group include:

### Master Planning

As communities grow, public works professionals must continually find cost-effective methods to expand their collection and distribution facilities. Carollo is a leader in the development of comprehensive water, sewer, and storm water master plans for agencies facing a variety of complex issues. Within the past 15 years, we have completed collection/distribution master plans for more than 100 agencies. These master plans have demonstrated our ability to successfully simplify complex technical,

*"Dedicated to creative, responsive, quality solutions for those we serve."*



*Our modeling tools and GIS are customized to meet the needs of each project.*

legal, regulatory, and institutional issues to produce clear, concise, cost-effective, and implementable recommendations.

### Modeling and GIS

Carollo is an industry leader in computer modeling and GIS—critical tools for infrastructure management. Wastewater collection system models are essential for analyzing existing facilities and designing cost-effective new facilities. We apply the latest in industry-standard hydrologic and hydraulic models—we are not tied to any one model, but help each client with the model that best fits their needs. Our dynamic hydraulic modeling experts use the latest technology to simulate average dry weather flows (ADWF), peak wet weather flows (PWWF), and determine the current/future capacities of collection systems under either gravity or surcharge flow conditions. By coupling these models with monitored flow data, we can help clients understand and address the effects of infiltration and inflow (I/I) on collection systems.

Today's water distribution system models offer the sophistication of determining not only pressure and storage requirements, but also water quality throughout the distribution system. As facilities age, the ability to predict these conditions becomes increasingly important in showing regulatory agencies that water quality standards are being met. Our experts can provide extended period simulations (EPS) as a means to evaluate distribution system components over time, a useful tool in evaluating not only storage and pumping requirements but how disinfection is established as required by regulatory agencies.



Carollo uses the latest in GIS technology to link geographic information with existing infrastructure data. This gives utilities the ability to efficiently and cost-effectively share data between departments via common data layers. In addition, Carollo provides clients with the ability to access their GIS data over the web to more efficiently locate and use their GIS information when and where it is needed.

### SSO and CSO Elimination

Although the Clean Water Act mandates the elimination of SSOs, the U.S. EPA estimates that approximately 40,000 SSOs occur across the country annually. To combat the increasing incidence of SSOs, the EPA has proposed an SSO rule focused on the capacity, management, operation, and maintenance (cMOM) of sanitary sewer collection systems. Carollo has helped communities develop and implement sewer master plans, SSO elimination programs, asset management plans (that address both cMOM and GASB 34), and holistic watershed management programs. Our efforts have helped clients simplify the regulatory framework and improve resource infrastructure.

Likewise, helping communities manage CSOs can present significant challenges. Carollo has applied CSO management practices; designed wet weather treatment, transport, and storage facilities; developed rehabilitation programs; and helped implement green solutions for a variety of clients.



*Our expertise includes a variety of trenchless pipeline rehabilitation construction techniques.*

### Pipelines

Carollo has provided engineering services for more than 1,000 miles of water, wastewater, and recycled water pipeline ranging in size from 6 inches to 108 inches in diameter. We have helped clients resolve issues related to alternative alignments, easement requirements, utility research, encroachment permits, hydraulic constraints, pipe selection, challenging crossings, roadway/paving replacement, traffic control, constructability, and stakeholder coordination/education. Our pipeline rehabilitation designs have incorporated traditional cut-and-cover and jack-and-bore construction methods, microtunneling, horizontal directional drilling, tunnel boring, pipe bursting, fold-and-form pipe, cured-in-place pipe, and sliplining techniques.



*To minimize visual and neighborhood impacts, Carollo has designed pump stations to look like single-family homes, and screened reservoirs from the view of surrounding residents.*

### Pump Stations

We have designed over 1,000 water and wastewater pumping facilities with capacities as large as 600 mgd. Our pump station designs serve a number of specific functions and include various types of pump configurations including wet pit, dry pit, submersible, self-cleaning, vertical, horizontal, solids handling, and screw pumps. Pump drives include constant-speed and multi-speed electric motors and various types of variable-speed drives including variable frequency drives (VFDs); gas, diesel, and dual-fuel engines; gear drives; and V-belt drives. Many of these pumping facilities also involve special architectural treatments and odor/noise control measures.

### Reservoirs

Carollo has designed more than 200 water reservoirs ranging in size from 0.5 to 120 million gallons to help various utilities meet their needs for raw water, recycled water, and potable water storage. Our designs have helped clients enhance system reliability, improve treatment plant operation and system hydraulics, meet distribution system demands for fire suppression or other emergencies, and minimize visual and environmental impacts. Our ability to successfully resolve complex design and construction and community impact issues has led to engineering awards from nationally-recognized organizations such as the American Concrete Institute.

### Public Involvement

Our experience includes coordinating public awareness programs and providing transportation planning and control to minimize the disruption to residents and businesses during construction. We are aware of the need to maintain close communication with all parties involved during the design and construction phases of projects in order to minimize potential conflicts and maximize project delivery on time and within budget.