

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

Control Strategies That Work

Most communities that manage combined sewer overflow (CSO) systems have made significant progress in adopting key provisions of the CSO control policy. However, according to the U.S. EPA, to date only about 33 percent of these communities have implemented all of the nine minimum controls, and even fewer have adopted long-term control plans. The EPA has estimated that current efforts have reduced CSO volumes and pollutant loads by approximately 12 percent since 1994. There is still much work to be done to improve water quality and meet regulations. Carollo Engineers can help. We specialize in water resources.

One of the biggest challenges in completing CSO programs is finding adequate funding. Estimates place the price tag on improving CSO infrastructure at as high as \$1 trillion over the next 20 years. Although State Revolving Fund (SRF) loans have provided some help to address these needs, agencies are still in need of funding sources to close the gap. Carollo helps clients find alternate sources of funding.

Managing CSOs

Planning and design challenges presented by CSOs can vary significantly. CSOs contain a variety of pollutants, vary in volume and frequency, and result in a myriad of impacts on receiving waters. To compound matters, there is also a wide range of available control measures with a wide range of associated costs. Effective abatement strategies must consider site-specific conditions and match technology with economic issues and water quality impacts. Our services include:

- ▼ Source control and reduction programs.
- ▼ Sewer system evaluations.
- ▼ Hydrologic and hydraulic modeling.
- ▼ Water quality monitoring and modeling.
- ▼ Collection system maintenance programs.
- ▼ Equalization and storage facility design.
- ▼ Collection system design and rehabilitation.
- ▼ Sewer separation programs.
- ▼ Wet weather treatment facility design.
- ▼ Outfall and diffuser design.
- ▼ "Green solutions" such as best management practices (BMP) and low-impact development (LID) programs.

Along with CSO management, Carollo also offers extensive experience in sanitary sewer overflow (SSO) elimination programs.

Carollo can help you develop a cost-effective and environmentally-sound wet weather control strategy that also protects public health. We will work with you to implement the nine minimum controls, as well as to develop a cost-effective long-term control plan that is right for your system.

Experience Counts

Our engineers have 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.

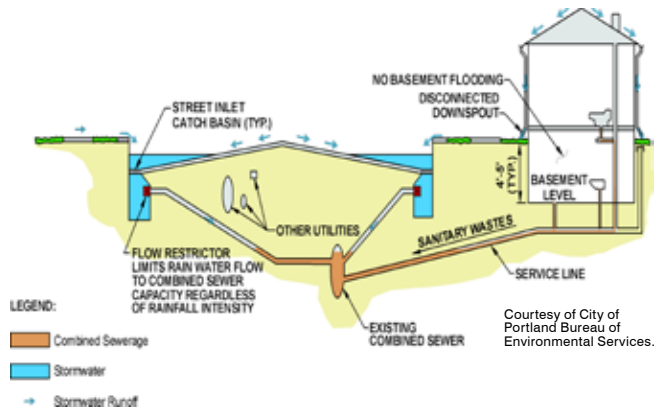


The \$26 million influent pump station and headworks is the cornerstone of Portland's planned CSO projects. The 300-mgd facility is quiet and odor free, as well as an attractive addition to the neighborhood.

City of Portland, Oregon - CSO Program

Carollo has assisted the City of Portland with several projects related to a 20-year program to reduce CSOs to the Willamette River and Columbia Slough. Projects include:

- ▼ Design of a 220-mgd CSO pump station to pump combined sewage for treatment at Portland's Columbia Boulevard Wastewater Treatment Plant. Designed for both dry weather and wet weather capacity, this pump station is 160 feet deep to accommodate flow from two CSO tunnels along the Willamette River. The 135-foot-diameter pump station includes a trench-type, self-cleaning wet well.
- ▼ Design, in joint venture, of a 300-mgd headworks at Portland's Columbia Boulevard Wastewater Treatment Plant. The \$26 million headworks replacement



The Sullivan, Stark, and Holladay Basins Relief project modeled "green solutions" to reduce peak combined sewage flows. Street inlet controls are one of the recommendations for inflow control.

is the cornerstone of a series of planned improvements to Portland's main wastewater treatment facility. During dry weather, flows entering the plant average between 70 and 80 mgd. During periods of heavy rainfall, however, peak flows from Portland's combined sewer system have historically strained the plant's hydraulic capacity and overloaded its 40-year-old screening and grit removal systems. Carollo designed the facility to be quiet, odor free, and an attractive addition to the neighborhood. The facility meets rigid specifications for acoustical treatments, features architecture to blend with its surroundings, and uses low night back lighting. The design provides for future capacity addition without impacting the current operation.

- ▼ Analysis of 100-year-old combined sewers in a 7.4-square-mile area as part of the Sullivan, Stark, and Holladay Basins Relief project. Carollo used the SWMM hydraulic model to characterize existing problem areas and analyze solutions to hydraulic bottlenecks. In an attempt to reduce CSOs in this region, the recommended alternatives included evaluating green solutions to reduce the amount of inflow into the collection system. The project involved modeling these green solutions and identifying those that performed best. The final recommendations included a combination of additional conveyance capacity, storage facilities, and inflow reduction strategies.
- ▼ Design of several pipeline projects in joint venture. In the Wheeler basin, projects include a series of storm water drainage sumps to intercept storm flow runoff from the trunk sewer lines. In the St. Johns A basin, Carollo designed a separate storm water collection system that is routed through established neighborhoods. In the Alder basin, design work includes 9,700 linear feet of relief sewer to provide additional in-line storage to reduce peak flows.

East Bay Municipal Utility District, California - Wet Weather Program

In Oakland, California, where wet weather conditions typically result in wastewater flows 10 to 20 times greater than in dry weather, Carollo has assisted the East Bay Municipal Utility District (EBMUD) with several projects, including:

- ▼ Design of a series of level monitoring stations which allow EBMUD to optimize storage within its collection system and remote wet weather storage facilities. A sophisticated distributed control system monitors and routes flows.
- ▼ Design and construction related services for two major wet weather interceptors. The Adeline Street Interceptor consists of 2.5 miles of 30-inch to 60-inch-diameter pipeline to carry flows from portions of Berkeley to the main treatment plant in Oakland. The South Foothill Interceptor consists of 3 miles of 48-inch to 60-inch-diameter pipeline to carry flows from portions of Oakland to the Oakport remote wet weather treatment facility.



The 100-mgd Point Isabel Treatment Plant was one of the country's first remote wet weather treatment plants.



- ▼ Design and construction-related services for a new 11-million-gallon storage basin to hold flows in excess of 320 mgd entering EBMUD's main treatment plant. Once the incoming flows have subsided, the stored wastewater is returned to the plant for additional treatment.
- ▼ Design of the \$28 million Point Isabel remote wet weather treatment facility. This plant provides storage for up to 3 million gallons of wastewater until flows subside, then returns the wastewater to the main plant for treatment. If rainfall continues and storage capacity is exceeded, the plant provides primary treatment, disinfection, and bay discharge of up to 100 mgd of wet weather flow.