Carollo offers a full range of water system planning, water treatment plant evaluation, and treatment pilot study services. Water master planning has been an integral aspect of Carollo’s experience for more than six decades. Many of our long-term client relationships began with long-range planning projects. In the past 15 years alone, we have provided planning services for over 200 municipal clients with service area populations from 5,000 to over 1 million. These projects have involved water supply and resource evaluations, water quality and treatment analyses, area characteristic studies, water conservation alternative evaluations, resource alternative studies, user evaluations studies, and financial analyses. Using this information, we have completed water management plans and developed funding mechanisms.

We are experienced in creating workable, user-friendly computer simulation models of water distribution and storage systems with several well-known models including: H₂ONET®, WaterCAD®, WATSYS, KypiPe, and EPANET.
## Major Projects Summary - Water Planning Projects

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Water System Master Planning

Carollo has provided water master planning services to the City of Phoenix since the 1950s. In 1992, Phoenix retained Carollo to complete a comprehensive, system-wide master plan update. This study encompassed a more than 500-square-mile area served by several water sources, including the Colorado River, and consisting of ten pressure zones, each containing key booster pumping, storage, and transmission facilities.

The project’s goal was to provide a comprehensive master plan incorporating the concepts of source development, conservation, reuse, water quality, and system reliability and flexibility. Carollo appraised existing and possible future sources of water to meet the projected requirements, analyzed usage trends and management techniques, reviewed conservation concepts and reuse plans, and presented general guidelines for source economy and a reasonable reduction in demand. To provide a viable framework to expand the water system, the master plan considered Phoenix water quality goals, the new requirements of the Safe Drinking Water Act, and other state and federal regulations. The master plan resulted in the development of a phased capital improvements plan and long-term recommendations to meet increasing demands.

Carollo was also a key member of the team that updated the water system master plan in 1998. The 1998 update involved extending the water system service area from 500 square miles to 650 square miles with a planning horizon through the year 2050. Project elements included evaluating long-range water resources and developing infrastructure to meet future demand conditions. The work included developing a new water model and calibrating the model using geographic information system-based land use and water demand generation programs. The planning effort resulted in the first-ever detailed and system-wide model of the entire Phoenix water system.

Carollo has since applied and built upon this water system model as part of two significant projects for Phoenix: the Gravity Zone Study and the North Phoenix Capacity Increase Study.
The City of Yuma is experiencing significant growth in both residential and industrial water demands. In response to this growth, Yuma selected Carollo to update its water distribution master plan. The scope of work includes short-term system improvements, a long-range system master plan, and a water quality study. The project’s primary objectives included:

- Building a new hydraulic model for the entire water system based on Yuma’s digital water atlas using H₂ONET® Version 3.
- Preparing a data collection protocol and assisting Yuma in conducting a detailed fluoride tracer study, including trihalomethane (TTHM) measurements.
- Performing extended period simulations to evaluate chlorine residuals and TTHM formation.
- Building a new demand generator to project future demands based on customer billing information, population projections, and land use data.
- Evaluating the existing system and developing recommended short-term improvements.
- Evaluating the future water service area and developing the long-range water system master plan that identifies future water system requirements.

The long-range master plan includes the identification of required improvements, phasing of facilities, and preparation of a capital improvements program.

As part of the Yuma Water Distribution Master Plan, Carollo built a new water distribution system model that incorporates relevant data for developing Yuma’s capital improvement program.
System-Wide Water Disinfection Study

The City of Anaheim retained Carollo to prepare a system-wide disinfection study to serve as a planning tool for the development of operational strategies and capital costs. Anaheim currently uses groundwater, which is chlorinated, supplemented by Metropolitan Water District of Southern California surface water, which is chloraminated. Furthermore, the topography of Anaheim’s western half is relatively flat and contains the majority of the supply wells, while Anaheim’s eastern half consists of hills and canyons and contains the majority of the City’s water storage facilities.

Carollo used a hydraulic water distribution system model, assembled with H2ONET® and containing over 10,000 pipes, to run water quality simulations. The team used these simulations to trace water sources, monitor water age, and evaluate water quality residuals. The project included identifying disinfection alternatives, along with recommended facility improvements.

Carollo’s disinfection system study for Anaheim included an H2ONET® distribution model involving 10,000 pipes.
The Contra Costa Water District’s Treated Water Master Plan included a detailed hydraulic model of all pipelines eight inches in diameter and larger in the distribution system.

The Contra Costa Water District’s Treated Water Master Plan included a detailed hydraulic model of all pipelines eight inches in diameter and larger in the distribution system.

Treated Water Services Area Master Plan

The Contra Costa Water District (CCWD) hired Carollo to update their Treated Water Service Area Master Plan. The master planning effort, which was completed on a fast-track schedule, focused on the water distribution facilities only, since raw water and treatment facilities are addressed in other CCWD master plans.

The work included a land use-based analysis for estimating current demand and projecting future demands. Carollo analyzed operations data, including supervisory control and data acquisition (SCADA), to determine maximum day to average day and peak hour to maximum day peaking factors. The analysis included normalizing the annual, drought-reduced historical water demand to estimate peak annual water use. The project also evaluated the effects of water conservation on existing demand and demands projected for buildout.

Carollo developed a detailed hydraulic model, including all pipeline eight inches in diameter and larger in the distribution system. The hydraulic model helped to determine facilities needed to meet existing peak demand conditions, and to identify demands at buildout. The master plan identified reservoir storage, pipeline capacity, and pump station capacity deficiencies and developed additional storage, pipelines, and pumping facility improvements for correcting these distribution system deficiencies.

The project evaluated CIP projects for meeting near-term and buildout demand requirements. It also identified excess capacity within the existing distribution system that can be utilized by future development. The value of the excess capacity in the pipelines, reservoirs, and pump stations can later be used in determining the facility reserve charge (connection fee) assessed to new development. The master plan will also be used to estimate the cost of improvements recommended for projects not included in the current CIP.

I believe that the document is first rate, and I want to acknowledge your effort and that of your team in putting together a highly useful and practical plan that will help guide the District in meeting future needs in its Treated Water Surface Area.”

—Greg Gartrell, Director of Planning, Contra Costa Water District

Evaluation of alternative facilities, including pipelines, pump stations, and reservoirs, to meet treated water service area demands.

Successfully addressed client concerns.

Completed within an aggressive, fast-track schedule.

HIGHLIGHTS
Carollo completed an evaluation of upgrades to the San Francisco Sunol Valley Water Treatment Plant. This project involved an objective review of previous studies and developing a logical, coordinated implementation plan. By conducting extensive staff interviews, Carollo received input from operations, engineering, management, and water quality staff regarding areas of concern and priorities for improvements. Carollo then formulated potential improvements for further discussion in workshops conducted with the Public Utilities Commission staff and other interested parties. This process was very successful in obtaining consensus for needed improvements at the facility. These improvements will improve system reliability, provide more flexibility for use of existing water sources, improve finished water quality, and reduce the potential for uncontrolled discharges of chlorinated water and side streams.

Carollo’s evaluation addressed the following technical issues and elements:

- Separation of different raw water sources for parallel treatment.
- Flocculation basin upgrades and expansion.
- Sedimentation basin/solids removal upgrades and expansion.
- Additional filters and possible filter rehabilitation.
- Instrumentation and control upgrades and addition of pre- and intermediate ozone.
- Seismic upgrades and drainage and discharge control.
- A 40-million-gallon balancing reservoir.
- Raw/finished water piping and pump station improvements.

“Carollo set the standard for engineering consultants on this project.”
— Patricia Mallet, Project Engineer, San Francisco Public Utilities Commission

For San Francisco’s Sunol Valley Water Treatment Plant Improvements Plan, Carollo effectively used previous work and staff resources to achieve a comprehensive plan on a limited budget.
COLORADO SPRINGS UTILITIES, COLORADO SPRINGS, COLORADO

Planning and Design Projects

Carollo has provided engineering services to Colorado Springs Utilities (Springs Utilities) for several projects. These include planning studies and design services for Springs Utilities’ Pine Valley, McCullough, Mesa, Ute Pass, and Woodman Water Treatment Plants.

The 42-mgd Mesa Water Treatment Plant has excessive wintertime fluoride concentrations in its finished water supply. The facility faced recommended upgrades approaching $40 million in capital costs, including a reverse osmosis (RO) system, and substantial O&M requirements to reduce the fluoride concentrations below the secondary maximum contaminant level (MCL). Carollo performed bench-scale testing to determine whether enhanced coagulation using existing aluminum coagulants (alum and sodium aluminate) with pH adjustment was effective for necessary fluoride removal. As a result of Carollo’s findings, Springs Utilities has successfully implemented the process recommendations. Carollo’s approach utilizes existing chemical feed systems at the Mesa plant and will result in a minimal increase in O&M costs.

Carollo also performed a process improvement evaluation for the Mesa plant. The study involves optimization of finished water quality, plant operability, and O&M costs. Project elements include a hydraulic/process evaluation of the entire treatment plant, determining recommended improvements for the largest treatment train to improve flocculation and sedimentation, assessing the need for raw water quality mixing basins, and addressing filter run-time problems. Anticipated recommendations include physical retrofits to existing unit processes for enhanced water quality as well as upgrades to the basin capacities.

Additional work for Springs Utilities includes:

- Final design of hydrofluorosilicic acid chemical feed systems for the Pine Valley and McCullough Water Treatment Plants.
- Design of finished water storage and plant improvements to double the capacity of the Ute Pass Water Treatment Plant.
- Evaluation of and improvement recommendations for iron and manganese removal at the Woodman Water Treatment Plant.

Additional work for Spring Utilities includes:

- Final design of hydrofluorosilicic acid chemical feed systems for the Pine Valley and McCullough Water Treatment Plants.
- Design of finished water storage and plant improvements to double the capacity of the Ute Pass Water Treatment Plant.
- Evaluation of and improvement recommendations for iron and manganese removal at the Woodman Water Treatment Plant.

Carollo has assisted Colorado Springs Utilities with projects at five of its water treatment facilities, including the Mesa Water Treatment Plant, shown here.
St. Johns Forest Desalting Master Plan

United Water Florida (UWF) selected Carollo to develop a water treatment master plan for their St. Johns Forest service area. Currently, UWF pumps from deep and shallow wells and blends water to meet total dissolved solids (TDS) and sulfate standards. UWF anticipates that their capacity needs will quadruple over the next 10 years. Extended use of their shallow well supply is not feasible since it may impact local wetlands, and consumptive use permits are more difficult to obtain.

Carollo evaluated various desalting technologies to treat UWF’s brackish deep well supply. Study results indicate that energy-efficient, low-pressure reverse osmosis (RO) will provide the most cost-effective solution. Carollo conducted modeling and pilot tests to develop design criteria for future desalting facilities. Work included site selection, developing preliminary layouts, and estimating costs for implementing RO in stages over the next 20 years. Carollo also conducted evaluation of RO concentrate disposal alternatives in concert with the Florida Department of Environmental Protection. Viable disposal alternatives included: golf course irrigation, disposal to a wastewater treatment plant, and surface water disposal to a tributary of the St. Johns River.

Carollo evaluated United Water Florida’s 6-mgd RO, nanofiltration (NF), and electrodialysis reversal (EDR) water treatment plant for the desalination of brackish well water. RO offered the lowest cost due to the higher rejection and smaller footprint.
Water Master Plan

In 1997 the City of Lewiston selected Carollo to provide an update of its water system master plan. Lewiston plans to update the master plan every five years in order to keep a current capital improvements plan (CIP). The last master plan for the water system was prepared in 1991. The update provided by Carollo included a conversion of Lewiston’s existing water distribution system computer model to an off-the-shelf software (Haestad Methods’ Cybernet®) in addition to updating the model to reflect changes in planning over the last five years.

Carollo also prepared updated population and water demand projections and prepared and scheduled recommendations for distribution system capital improvements projects in an updated CIP. The CIP also included projects required to meet current and proposed water quality regulations relating to Lewiston’s sources of supply.

Lewiston operates five wells, both for domestic and irrigation use, as well as a water treatment plant with a nominal capacity of 15 mgd. The source of supply for the treatment plant is the Clearwater River. An update of water quality regulations since the last master plan resulted in recommendations for the upgrading of chemical feed, flash mix, and filtration facilities. In addition, the construction of a new 5-mgd capacity base-flow water treatment plant is recommended, with completion by the year 2001.

The master plan also includes a financial plan with recommendations for funding the proposed CIP.
East Chicago Water Filtration Plant Predesign Study

The East Chicago Water Filtration Plant was originally put into service in 1964. Although the plant had a design capacity of 32 mgd, it was using only 75 percent of its capacity due to a history of lower water demand. To meet the standards of the Safe Drinking Water Act of 1986 and ensure protection against chlorine resistant pathogens, the City of East Chicago hired Carollo to conduct a predesign study to evaluate operation methods and to determine if physical modifications were needed.

With Lake Michigan being the source water for the filtration facility, the primary issues for evaluation were particulate removal and microbial control. The study also addressed secondary issues like taste, odor, and algae removal. Although the facility already employed conventional treatment using flocculation and sedimentation, it more often ran in a direct filtration mode. This resulted in minimal solids removal during pretreatment. The plant met current turbidity standards, but only when referring to the combined effluent of all filters. Individual filter evaluations showed turbidity and particulate breakthrough during start-up and filters were not equipped to operate in a filter-to-waste mode.

In addition to upgrade and improvements issues, the study addressed the issue of water supply and demand. A 20-year projection showed that with the expansion of industrial customers the facility would need to be increased to a capacity of 32 mgd. Carollo’s predesign study detailed needed improvements, along with costs and a phased schedule for implementation.

Carollo will apply its experience in rehabilitating older water treatment facilities to develop a phased implementation plan to improve the 37-year-old East Chicago Water Filtration Plant.
Faced with increasingly-stringent water quality regulations and growing public awareness, Mankato retained Carollo to recommend alternatives to optimize its water treatment plant and increase capacity.

**Water Treatment Plant Evaluation**

The Mankato Water Treatment Plant treats a high quality raw water source from a horizontal collector well constructed beneath (and for regulatory purposes considered to be under the influence of) the Blue Earth River and two other deep groundwater wells. Water treatment challenges include seasonal fluctuations in the levels of nitrates, total organic carbon (TOC), and disinfection by-products (DBP) precursors. The existing lime softening plant, constructed in the mid-1960s, has consistently produced an excellent finished water quality. As part of a long-range planning effort, Mankato hired Carollo to:

- Assess the challenges facing the plant from increasingly stringent water quality regulations and heightened consumer awareness.
- Evaluate existing and emerging technologies to meet/exceed the expectations of Mankato’s water customers and increase plant capacity.

The Mankato Water Treatment Plant evaluation involved two phases. Phase 1 consisted of a regulatory analysis and a water treatment plant process evaluation. The regulatory analysis included a summary of existing and future regulations, an overview of plant compliance, a comprehensive filter evaluation, and confirmation of the CT available in the on-site reservoir.

Phase 2 involved surveying new technologies, including ozone, ultrafiltration, nanofiltration, and ultraviolet (UV) disinfection, to determine if they hold promise for future application at the plant. The team shipped softened water to Carollo’s Water Research Laboratory for the development of zone demand and decay data using Carollo’s unique bench-scale equipment. Carollo presented and discussed the results of the investigations with Mankato’s staff in a series of workshop meetings. A project report detailed the conclusions, recommendations, and preliminary costs of optimizing the existing facility, increasing water treatment plant capacity, and adding other technologies to enhance water quality.

Currently, Carollo is working with Mankato to implement improvements recommended in the study including new filters and UV disinfection facilities.
Evaluation of Membrane Technologies for Removal of Atrazine and Other Synthetic Organic Compounds

Carollo conducted pilot testing of three low-pressure membrane ultrafiltration (UF) systems, a microfiltration (MF) ceramic membrane, and various nanofiltration (NF) membranes using softened recarbonated Missouri River water at utilities located in St. Louis and Kansas City, Missouri. The purpose of this project was to evaluate membrane technologies as an alternative to ozone and biological filtration in addressing multiple treatment objectives including removal of Cryptosporidium and other disinfectant-resistant pathogens, disinfection by-products (DBP) control, and atrazine removal. To achieve atrazine removal, the three UF and MF systems were operated in conjunction with powdered activated carbon (PAC).

Challenge studies showed superior removal of atrazine from UF and MF systems operated in conjunction with PAC as well as varying degrees of rejection from tested NF membranes. Coupled with the high fluxes demonstrated during this study, as well as superior water quality with respect to pathogen removal and future proposed turbidity standards, UF and MF membrane technologies are believed to be competitive with the implementation of ozone and biological filtration. Cost estimates developed as part of this work confirm the viability of membranes as a treatment alternative. Operation of UF and MF in conjunction with chloramines for residual disinfection also provides a means for decreased DBP formation.

This project also included the evaluation of alternative pretreatments to NF including conventional and UF or MF pretreatment. In these instances, NF would serve not only as an advanced treatment process for removing DBP precursors and atrazine, but also would achieve softening. Testing indicated that inadequate particle removal was achieved through granular filtration. From this perspective the study determined that an integrated membrane system consisting of UF or MF treating presettled Missouri River water would serve as the best pretreatment for NF. The study also investigated mechanisms affecting atrazine rejection through NF.

This project was instrumental in preparing participating utilities for meeting future drinking water regulations while also serving as the first demonstration for using UF and MF technologies as a polishing treatment in lime softening plants in the United States. Participating utilities included the Kansas City, Missouri, Water Services Department, Water District No. 1 of Johnson County Kansas, United Water Missouri, St. Louis County Water and the City of St. Louis. Other sponsors included the Electric Power Research Institute and the Missouri River Public Water Supplies Association.
Water Treatment Plant Evaluation and Water System Master Plan

The City of Havre owns and operates a 4.5-mgd conventional water treatment plant which treats water from the Milk River. The Milk River at Havre can be characterized by large seasonal variations in total suspended solids, color alkalinity, turbidity, and total organic carbon (TOC). Havre selected Carollo to perform an evaluation of the Havre Water Treatment Plant and distribution system and to develop a water master plan to guide Havre in renovating and upgrading the water treatment plant and distribution system. The project was driven by several issues, including the need for renovation and/or replacement of aging plant facilities and distribution system components, additional water treatment capacity to replace poor quality well water, and positioning Havre's facilities for compliance with upcoming water quality regulations.

The project team began work with an onsite treatability study during an episode of high color and turbidity caused by spring runoff. Other project tasks included:

- Regulatory analysis.
- A pretreatment evaluation of chemical mixing efficiency, application sequence, location, doses, and storage facilities.
- A comprehensive facility evaluation of key water treatment plant process components and support facilities (e.g., HVAC, lab, administrative needs, instrumentation, and control).
- A capacity analysis involving desktop and computer simulation methods to establish the water treatment plant process and hydraulic capacity.

- Development of alternatives and cost estimates for renovating and upgrading the existing facilities.
- Development of a hydraulic simulation model (Cybernet®) of the existing distribution and storage systems.
- Presentation and discussion of the study findings with staff in several interactive workshop sessions.
- Development of a master plan for renovations and upgrades to the Havre water supply system complete with a CIP for scheduling the improvements.

The raw water source for Havre's water treatment plant can be characterized by large seasonal variations in total suspended solids, color alkalinity, turbidity, and total organic carbon.
Comprehensive Water Master Plan

Carollo completed a comprehensive plan for water and wastewater management for Carson City, Nevada. Given its arid climate, Carson City’s goal was to attain maximum use of all available water sources. The management plan considered more than 70 alternatives to meet the area’s water and wastewater needs. Alternatives included various types of reclamation, wetlands development, groundwater recharge, and direct reuse.

The recommended plan, which qualified for 10 percent extra grant funding as an innovative alternative project, consisted of reclamation of treated effluent during the winter months, with the secondary effluent being stored in the reservoir. During the irrigation season, stored and treated effluent is used to irrigate the City golf course, pasture lands, and a prison farm. No discharge to surface water occurs.

Potable water needs are made up by a combination of groundwater and surface sources. Up to 2,100 acre-feet per year of surface rights may be exchanged for the treated effluent applied to private and state lands. Conservation and groundwater management also helps to offset future water supply needs. The water conservation program consists of education, installation of water conservation devices, and encouragement of native landscaping. The program is expected to reduce water and wastewater flows by 1.71 mgd and 0.97 mgd, respectively.

“It is difficult to find a consultant who can solve a problem and provide the community consensus building necessary to get projects from the planning stage to the construction stage. Carollo Engineers has always provided Carson City that type of engineering service.”

— Dorothy Timian-Palmer, Former Carson City Utilities Director

The Carson City master plan provides up to 2,100 acre-feet per year of surface rights to be exchanged for treated effluent applied to private and state lands.
Long-Range Water Master Plan

Carollo completed a long-range supply plan for the City of Ashland, Oregon. Ashland relies on a reservoir on Ashland Creek for its supply storage. The reservoir is small and has inadequate capacity to supply Ashland with water during drought years. Ashland has had to implement strict conservation and rationing measures during prolonged drought periods. Ashland also had concerns regarding the reliability of its drinking water supply since both the reservoir and treatment plant were potentially vulnerable to catastrophic failure.

Complicating the planning process were often conflicting issues such as curbing growth, protecting the public's safety, providing opportunity for economic development, sustaining the quality of life, maintaining local control, and being environmentally responsible. Key project issues included identifying emergency scenarios and goals, evaluating water conservation measures, addressing water rights and jurisdictional issues, assessing reclamation and reuse benefits, and evaluating funding options.

Carollo projected water demands for the 50-year planning period using several water conservation scenarios. This revealed water deficits ranging up to 700 million gallons per year. The team then developed water supply alternatives to meet the water demand. Alternatives included wastewater recycling, developing a groundwater supply, using Talent Irrigation District water, developing increased reservoir storage, and connecting to Medford’s water system with a pipeline. The team developed each alternative to show conceptual infrastructure improvements, potential environmental benefits and constraints, capital and operating costs, and implementation feasibility. The result was a recommendation to share the cost of constructing a pipeline to Medford with neighboring communities.

The project team successfully addressed citizen concerns about the impact of water supply alternatives on community growth, business development, and public health through a proactive public involvement program. Carollo facilitated a citizen advisory committee, made presentations to the Ashland City Council, and participated on a Water Supply Forum attended by over 300 concerned citizens.

Ashland’s Long-Range Water Master Plan balanced a variety of issues to meet the needs of the community. These included emergency scenarios and goals, water conservation measures, water rights/jurisdictional issues, reclamation and reuse benefits, and funding options.

Addressed need for more reliable water supply.
Evaluated conservation scenarios for both emergency and day-to-day situations.
Extensive public involvement activities including facilitation of a citizen advisory group and open public forums.
Mount Pleasant Water Works, SOUTH CAROLINA

Membrane Replacement Study and Water Treatment Master Plan

Mount Pleasant Water Works (MPW) selected Carollo to perform a membrane replacement study and water treatment master plan. MPW has been using reverse osmosis (RO) to treat a brackish groundwater supply for approximately 10 years. Their membranes had reached the end of their useful life and required replacement. In addition, Mount Pleasant’s growing population was making it difficult for MPW to meet water demands. Key issues also included MPW’s desire for development of a standby well as a source for a new RO facility and the citizens’ desire for only membrane treated water.

To help MPW receive the lowest replacement cost for their RO membranes, Carollo used single-element RO pilot plants to screen membranes from three different suppliers. To balance hydraulics and the resulting capital cost implications, Carollo performed an economic analysis for four membrane replacement options. As a result of the study, Carollo recommended a hybrid low-pressure RO membrane configuration for replacement using two different types of membranes to balance system hydraulics. Carollo assisted MPW with membrane replacement and performance testing. Carollo also held a workshop at the time of replacement to train operations staff in proper membrane loading techniques. Replacement of the membranes has reduced energy use and helped save Mount Pleasant approximately $140,000 per year.

Carollo also assisted MPW with the development of a water treatment master plan. This master plan investigated the implementation of a new RO water treatment facility using an existing unutilized deep well supply. Design of the new facility will incorporate the no-acid approach. This will impact the chemical feed facility design and ultimately reduce capital costs.
Little Cottonwood Water Treatment Plant
Master Plan Update

The Metropolitan Water District of Salt Lake City and Sandy (MWDSLS), Utah, selected Carollo as part of a team of consultants to conduct the master plan project. Carollo’s role in the project was to conduct a process evaluation for the Little Cottonwood Water Treatment Plant and to evaluate the hydraulic capacity of each process. The purpose of this evaluation was to determine the maximum capacity of the plant and its ability to be expanded by 70 mgd (for a total treatment capacity of 180 mgd) to meet the future water demands of Salt Lake City and Sandy City. The study identified the process improvements required to meet future regulatory requirements, as well as to increase the hydraulic capacity.

As part of the master planning effort, Carollo led a team of structural and geotechnical engineers in the preparation of a geologic and seismic hazard evaluation for MWDSLS’s raw and finished water conveyance facilities and the Little Cottonwood plant.

As an alternative to expanding Little Cottonwood plant, Carollo evaluated the possibility of constructing a new water treatment plant at the Point of the Mountain in South Salt Lake City. MWDSLS selected this alternative and Carollo is now conducting a pilot evaluation of treatment alternatives for this new water treatment plant.

Carollo participated in a master plan update of the Little Cottonwood Water Treatment which evaluated alternatives for expanding the existing facility as well as constructing a new water treatment plant in South Salt Lake City.