



EPIC Solutions

 **carollo®**

The Equation is Simple:

Best-in-class

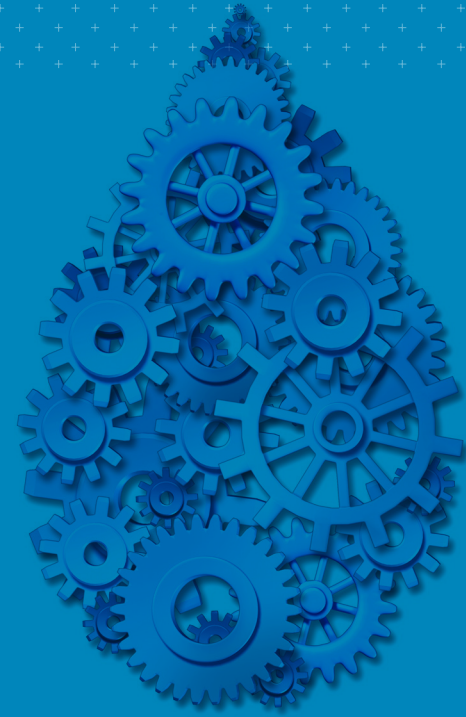
Electrical + Programming +

Instrumentation + Control = EPIC® Solutions

The world of electrical power, instrumentation, and control is constantly changing—today, automation and a reliable power system are critical to the success of any utility, allowing for simplified, reliable, and efficient operations and maintenance. Given this context, innovation is the key to remaining ahead of the curve.

EPIC® provides full-service electrical, programming, instrumentation and control (I&C), and operational services to our clients, allowing us to design effective solutions for operational resiliency, efficiency, safety, and sustainability. Carollo is an established leader in the water and wastewater industry and has developed solutions for clients across the country, offering the following benefits:

- **Best-in-class Solutions.** EPIC® combines Carollo's EI&C design group with its programming services to find the most reliable power and control solutions customized to client needs.
- **EI&C Innovation.** From advanced predictive controls to holistic power-saving techniques, our EPIC® team is focused on optimizing your process and making your operations and maintenance staff more efficient.
- **Collaborative Approach.** We understand that the EI&C systems we design are ultimately our client's responsibility to operate and maintain. Thus, our approach is to listen to our clients' needs and customize solutions around them. Soliciting stakeholder input through workshops and field investigations is paramount to designing a system that our client's can be proud to operate.



Core Services



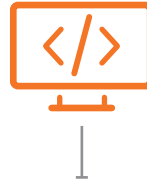
Electrical

Power system designs focus on energy reliability, power savings, and sustainability. Our approach incorporates “safety by design”, to minimize electric hazards through planning.



Instrumentation and Control

From the simplistic to the cutting edge, our I&C designs are customized to provide reliable, optimized process control.



Programming

Whether working on programming standards, remote operation, or high-performance interface, we personalize all of our programming implementation.

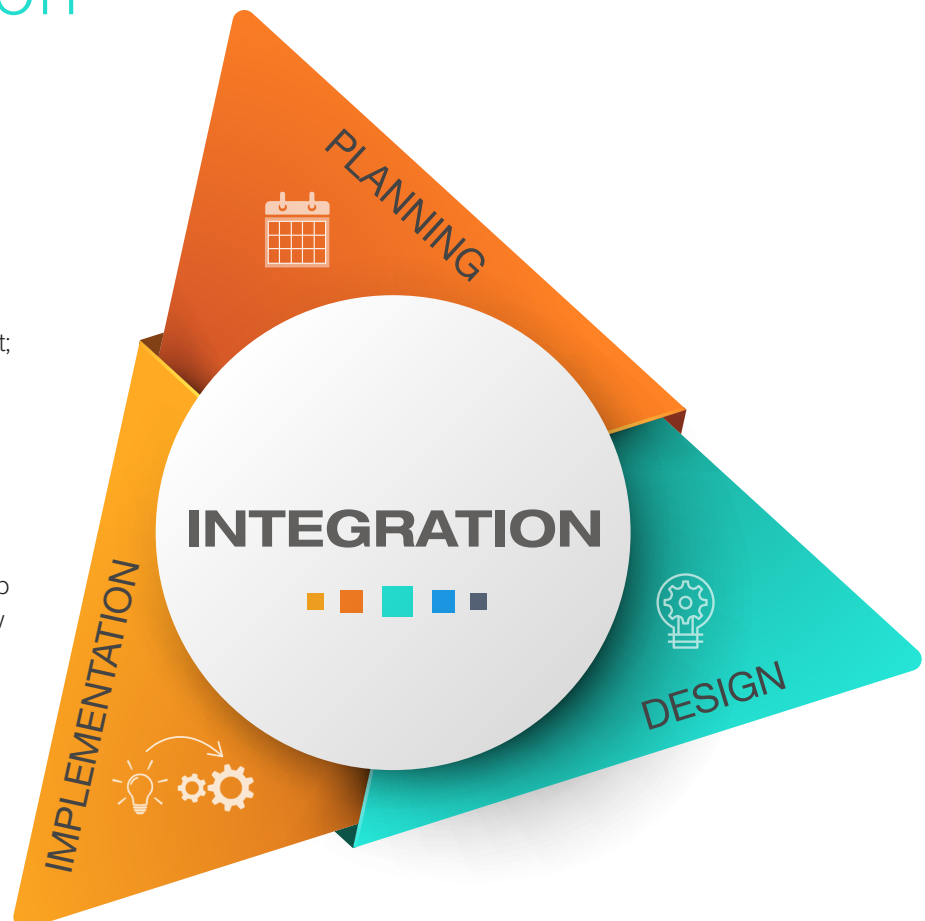


Strategic Services

From SCADA and electrical master planning to cybersecurity, our industry leaders develop comprehensive programs to prepare our clients for the future.

EPIC® Integration

EPIC® provides a one-stop shop for an array of electrical, programming, instrumentation, and control services from the planning phases to design and through implementation. These services include master plans; electrical systems and arc flash studies; full-service electrical and I&C design; control and business systems network design; electrical safety programs; cybersecurity program development; HMI and PLC migration; programming standards development; and PLC, DCS, and HMI programming. Our engineers and programmers use a unique collection of tools and methodologies to get stakeholder input and generate ideas that gain support and are financially defensible. With these plans, we help our clients manage their assets, migrate to new systems, and update their critical infrastructure so they can face the challenges that lie ahead.



Innovative Tools

We leverage innovative tools such as RESERVOIR®, an information management system, to efficiently coordinate cross-discipline efforts, document assets, and minimize risk through database management. We base our selection of which tools are right for your project on the project's unique challenges and needs. We do not specialize in “cookie cutter” designs. The purpose of our tools is to automate the minutia so we can focus our time on our client's specific needs.



EPIC® FOOTPRINT



Project Spotlight

Oak Harbor Clean Water Facility El&C Design and SCADA Integration and Programming

Oak Harbor, Washington

The City of Oak Harbor built a new water reclamation facility in its thriving downtown area adjacent to a popular City park. To help the City carry out this complex and challenging project, Carollo provided design, programming, and services during construction for the facility. This effort included the following:

- Developed contract documents, including P&IDs, electrical power, control, lighting and grounding plans, panel drawings, control narratives, and network diagrams for bid.
- Developed PLC and SCADA standards with the client.
- Programming of the plant PLCs and developed customized high-performance graphics.
- Completely networked the power system, allowing operations to track energy usage for the overall facility, each process, or each asset.
- Implemented a data rich power system design aimed at providing operations and maintenance staff with the ability to implement preventative maintenance throughout the electrical distribution system.
- Procured, tested, and installed networking racks for the PLC, business, SCADA, security, and fire alarm fiber networks.

Through our involvement on the project, Carollo was able to help the City integrate SCADA, PLCs, and the power distribution system into its new, one-of-a-kind facility.

30

Programmable Logic
Controllers

12

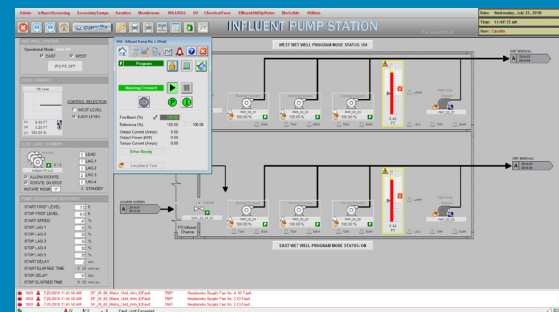
Coordinated Vendor
Control Systems

3000+

Assets Incorporated
into customized CMMS

100+

Intelligent Motor
Starters and VFDs



Our EPIC® design was focused on the public, maintenance, and operational efficiency, including non-obstructive park lighting to accessible electrical room layout, to a high performance SCADA interface.



Project Success Stories

Henry C. Garnett Water Purification Plan Expansion, Electrical Service Entrance Upgrades and 1.0 MW Solar Photovoltaic Facility

Kern County Water Agency, California

In response to rapid population growth and increasing water demands, Carollo provided engineering services for expansion of the 105-mgd Henry C. Garnett Water Purification Plant. For this project, Carollo designed a complete replacement of an obsolete PG&E service entrance substation and electrical power distribution process control systems. The following are key elements of the design:

- A new customer-owned, fully redundant 115 kV electrical substation and a new 4.16 kV power distribution system.
- Remote controls for the substation and power distribution system's circuit breakers so they could be opened and closed from a control room outside the arch flash approach boundary.
- New PLC based control system for both the new plant and the fully renovated existing plant.

Tacoma Process Control System Upgrade

City of Tacoma, Washington

Carollo served as owner's representative for the City as it converted its obsolete DCS control system to a new PLC- and HMI-based control system for its two wastewater treatment plants. This effort involved reviewing the City's existing system, developing instrumentation and control standards, developing P&ID, designing the fiber network, completing system selection and development, providing procurement assistance, and more. The following are keys elements of the design:

- Replacing seven existing ABB System Six distributed control units with Rockwell Automation Plant PAX.
- Adding a new system with 23 ControlLogix PLCs with 30 remote I/O cabinets integrated within 14 ComactLogix and 12 MicroLogix PLCs.
- Adding a fiber backbone network with ring topology, Profibus, Ethernet/IP DLR fieldbus technologies.

Southeast Surface Water Treatment Facility Design

Fresno, California

For the past few years, Carollo has helped the City of Fresno design its new 80-mgd Southeast SWTF and provide construction services. This facility has helped the City transition from groundwater to a more sustainable surface water. The following are key elements of the design:

- Thoroughly networked lighting and controls that can be accessed and programmed through a lighting control system software.
- Distributed PLCs, a security access control system, a fire alarm system, VOIP phone and intercom system, and other items.



A new 1.0MW single-axis tracking solar photovoltaic system operating in parallel with PG&E provides renewable energy.



Upgrade increased system reliability, improved process, enhanced diagnostics, and expanded data collection.



Redundant 8MVA, 115kV substation transformers, arc-resistant 5kV and 480V variable frequency drives for up to 70HP motors, and two 2.5MW medium voltage paralleling standby generators.

South Secondary Improvements Design and CM Services

Metro Wastewater Reclamation District, Denver, Colorado

The goal of this project was to convert the South Secondary Complex from high purity oxygen to a biological nutrient removal, air activated sludge process to meet discharge permit limits and increase overall capacity to 100 mgd. The following are key design elements:

- Detailed bus networks, including more than 9,000 I/O points, Profibus DP/PA and DeviceNet nodes, and multiple MODBUS RTU, Ethernet/IP, and Ethernet TCP/IP connected devices over a secure fiber optic backbone.
- Network junction boxes placed throughout the facility allowing easy access to MODBUS TCP, Profibus PA, and Profibus DP.
- Instrumentation components supported by FDT DTMS, allowing for remote access and monitoring for instrumentation and equipment health.



Extensive additions to the power infrastructure including 15kV, 5kV, and 480V SWGR, and 480V MCC's, all featuring a digital bus for communications.

PLC Upgrades for Wemlinger Griswold Treatment Facilities

Aurora, Colorado

For the City of Aurora's Wemlinger Water Purification Facility and Griswold Water Treatment Plant, Carollo performed design, procurement, programming, and construction services to replace the existing PLCs with Allen Bradley ControlLogix PLCs. The following are key elements of the design:

- Modernized the existing control room, adding a new wireless network for PLC/SCADA, and configuring a new gigabit PLC/SCADA and security network.
- Developed client PLC and HMI programming standards.
- Optimized existing process control through programming without the need for adding infrastructure.



Project included the complete redesign and modernization of the control room.

On-call SCADA Assistance

Fort Collins, Colorado

Since 1992, Carollo has been providing on-call electrical, control, and instrumentation design and construction services to the City of Fort Collins' water and wastewater facilities. This effort has involved design of the electrical power systems, control and instrumentation design, construction services, field testing, system troubleshooting, master planning, and asset management for water and wastewater improvements. The following are key elements of this effort:

- Design and instrumentation support for the digital bus instrumentation and smart motor control centers.
- Master planning services for replacing the existing PLCs and SCADA and PLC software.
- Master planning of the electrical power systems for the water and wastewater facilities and as a complete electrical studies including fault current, protective device coordination, arc flash, and standby power generation.



Since 1992 Carollo has completed dozens of EPIC®-focused improvement projects.

carollo.com



Points of Contact

Jeff Martin

Chief of EPIC® Marketing

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Principal EPIC® Engineer



Since 2008, EC&M has continuously rated our electrical group among the top 21 electrical design firms in the United States. Our EPIC® team of over 125 engineers, designers, and programmers is dedicated to serving all of our water and wastewater clients' electrical, instrumentation, control, and programming needs.

Carollo's commitment to the water industry has been a hallmark of the company since our inception in 1933. This single-minded focus allows us to deliver innovative water solutions, a collaborative environment, and exceptional client service. Our passion about ALL water systems means we strive to sustainability maximize the use and benefits of this precious resource.