



Civil/Structural Department

INTRODUCTION

Burns & McDonnell's civil/structural department provides design support for the majority of our substation, transmission and distribution projects. Whether designing a control building elevated above grade, standardizing a client's equipment supports, or routing underground cables through a heavy urban corridor, our civil and structural support group stands ready to solve the toughest challenges facing your company. We have also provided support for clients' substations ranging up to 500-kV, performed extensive distribution upgrades, and designed transmission-line structures.

At the project conceptual stage, our work includes suggesting and analyzing design alternatives, developing design parameters, anticipating design challenges, and evaluating permitting requirements and flood project risk. The breadth of our design and field support experience includes structures, foundations, oil containment, duct bank routing and layout, and site work. We have developed structural designs for lattice, wide-flange, structural tubular, and tapered-tubular structures. Our foundation design expertise includes spread-footing, slab-on-grade, drilled-shaft, and wall footings. We have provided a wide range of oil containment option designs for our clients' diverse needs. We have also provided extensive support for duct bank and cable tray routings for a number of highly congested sites.



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DESIGN TOOLS

Burns & McDonnell augments the expertise of its personnel by utilizing many modern computing tools. We endeavor to streamline the design process by incorporating several automation tools. For site work, we have SoftDesk available to run inside the AutoCAD environment. AutoCAD and MicroStation have both proven themselves to be indispensable tools for overlaying and integrating several sources of existing data to verify underground routings and foundation placement in highly congested sites. Foundation designs are made more efficient using PCAMats, MathCAD documents, and



Excel spreadsheets. We have efficiently predicted structure behavior using tools such as IMAGES, GTSTRUDL, STAAD-III, and RISA3D.

SPECIFICATIONS AND STANDARDS

Because Burns & McDonnell has a civil-structural support group that exclusively serves the power delivery and communication industry, we have specific knowledge of the design and construction standards that apply specifically to your company. Burns & McDonnell can access high levels of expertise in a number of other specialized areas that occasionally appear in a project to include power generation, transportation and industrial construction, and hazardous waste remediation, to name a few.



RECENT PROJECTS

AMERICAN CABLEVISION

American CableVision is a major cable-television supplier owned by Time-Warner Communications. Recently, American CableVision began to upgrade its network to a fiber-optic transmission system, requiring careful coordination with three municipal governments and another engineering design firm. They requested Burns & McDonnell to provide design support for the installation of six optical transmission nodes (OTN's). Burns & McDonnell contributed the site work design, foundation design, and minor electrical design associated with installation of the shelters. In order to complete the work, and at the request of the client, we examined county property records, followed the work through the permitting processes of the municipalities, provided a presentation at a public meeting, and provided field services during construction.

Our civil engineers exclusively serve the power delivery and communications industry

CAPE HATTERAS ELECTRICAL MEMBERSHIP CORPORATION

In a geographically isolated location, Cape Hatteras, North Carolina is a popular resort area that is frequently exposed to the eastern seaboard's harshest weather. The substation design had to include design provisions for the high-winds and precipitation associated with hurricanes. In addition to the substation work, the design included civil and structural design of a nearly three-mile long cable attachment to the Bonner Bridge that connects the Cape to the mainland.



CINERGY

Burns & McDonnell had successful on-going relationships with Cincinnati Gas & Electric and PSI Energy prior to their merger into Cinergy. That relationship continues with the new single entity. For CG&E, we provided a steady flow of designs for substation structures, foundations, site work, and oil containment. Our enduring working relationship with PSI Energy has allowed Burns & McDonnell to develop a long-range point of view with this valued client. Providing construction drawings for dozens of substations in Indiana, Burns & McDonnell significantly contributed to this client's substation standards. For both of these clients, oil containment and steel structures were standardized and foundation design procedures streamlined to provide a cost-effective, efficient method of providing new substation construction drawings and specifications.



COLORADO RIVER COMMISSION

The ever increasing demand for water in the thirsty desert of Las Vegas required the Colorado River Commission to develop a project to add two new substations and several transmission lines to feed huge water pumps. The design included all work associated with the new substations, substation structure designs, and duct bank routings - including a submerged routing across the bottom of Lake Mead. This project included coordination with administrative, design and construction personnel in several agency offices. Making numerous trips for site visits, coordination meetings and construction meetings, Burns & McDonnell aggressively pursued completion of this design and continues to provide support through the construction phases.



IMPERIAL IRRIGATION DISTRICT

Our work with IID began with a design-build partnership with Irby Construction Company. This project began with an extensive scope that grew with the client's needs. The work eventually encompassed full design and construction, including civil and structural design, for five new substations, one new switching station, one switching station rebuild, and one substation enlargement.



KANSAS CITY, KANSAS BOARD OF PUBLIC UTILITIES

Burns & McDonnell has a general services agreement with BPU that has resulted in providing civil and structural support on a number of tasks. We are often called upon to quickly provide foundation designs, structural additions, or retrofit oil containment to an existing facility. In addition, we have provided complete civil and structural design support for the design of two substations, one of which was constructed for the new General Motors' Fairfax Plant.



KOCH REFINING COMPANY

We have provided civil and structural design support for Koch Refining Company projects at four of their processing plants in three states. Following projects from initial conceptual design and evaluation procedures through completion, we have endeavored to develop a seamless working relationship with our clients and adapting our own procedures to meld with the procedures and goals of the client. We have provided designs for two 69-kV substations, one of which includes an elevated control building designed for blast-resisting loads, the other includes a two-story concrete building enclosure for a gas-insulated-substation (GIS) and an industrial sewer relocation. Other support for this client has included extensive work involving duct bank and cable-tray routing, structure design and existing structure evaluation.



MIDAMERICAN ENERGY

In addition to providing site work and foundation design for two of MidAmerican's substations, Burns & McDonnell provided structure designs that have become standardized for the utility. Eight standard structures were designed and fabrication drawings provided for general substation use.

We have endeavored to develop a seamless working relationship with our clients

OHIO EDISON COMPANY

Ohio Edison is another valued client for whom Burns & McDonnell provided support for dozens of substations. Much of the work for this client involved enlarging existing substations and retrofitting oil containment into older substations. A large portion of this work also included developing standard steel substation structures.

CITY OF RIVERSIDE, CALIFORNIA

Part of the study for installing a new communications system for the City's emergency services included evaluations of candidate locations for constructability. The work included installation of a pre-fabricated concrete equipment shelter and radio-tower. Our civil engineers provided evaluation and construction estimates to assist in the client's site evaluation.



TENNESSEE VALLEY AUTHORITY

TVA needed a new 230/115-kV in Murray County, Georgia. As a way of controlling cost and maintaining schedule, TVA awarded the project to the joint venture of Burns & McDonnell and a construction contractor, New River Electrical Corporation. The project required design and construction of grading and site work, foundations, an extensive oil containment system, installation of a pre-fabricated control building, a warehouse and maintenance building, and provisions for potable water supply and sanitary sewer connections.

US ARMY CORPS OF ENGINEERS-LAKE CITY ARMY AMMUNITIONS PLANT

The Lake City Army Ammunitions Plant in Independence, Missouri was constructed during World War II to supply materiel for the war effort. Continuing to be used today, the original distribution system failed to meet modern needs. Burns & McDonnell took on the formidable task of taking inventory of the existing system and designing a two-phase, multiple-option construction project that included construction of two new substations, numerous back-up power supplies, and extensive duct bank routing and installation through the plant's existing underground utility network.

