



# Telecommunication & Network Engineering Services

## INTRODUCTION

Burns & McDonnell offers a full range of telecommunications and network engineering services. Our knowledge of telecommunications, wide area local area network technology along with consulting, planning, financial, engineering, and design services makes us uniquely qualified to provide your company with the service and expertise not found in most traditional telecommunications consultants. Our telecommunications services include: feasibility studies, business planning, complete system design and turnkey construction. Our clients include cities, counties, municipal utilities, investor-owned utilities, rural electric cooperatives, industrial companies, and state and federal governments.

## EXPERIENCE

Burns & McDonnell has provided telecommunications engineering services on major projects for nearly 20 years. Our staff has expertise that encompasses fiber optics, digital microwave, wireless data and Land Mobile Radio (LMR) systems, for a wide array of critical applications. These telecommunications technologies enable Smart Grid, Supervisory Control and Data Acquisition (SCADA) systems, Energy Management Systems (EMS), Substation Automation (SA) systems, Distribution Automation (DA) systems, Advanced Metering Infrastructure (AMI) systems, Intelligent Transportation Systems (ITS), enterprise Wide Area Networks (WANs), public safety communications and remote security surveillance of your mission-critical assets.



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## RECENT COMMUNICATIONS CLIENTS

### **KCPL (FORMERLY AQUILA) KANSAS CITY, MO**

Burns & McDonnell is currently providing planning, design engineering and project management of a new digital microwave backbone and trunked land mobile radio system project for KCPL's Missouri operations. The new systems will replace aging analog microwave backbone and a conventional UHF land mobile radio system.

The new digital microwave system will include 29 microwave communication paths. Existing tower sites will be improved with new equipment buildings, fencing, power systems, generators, in addition to the telecommunication network electronics. An entirely new site at Butler will be constructed, complete with radio tower. Two of the existing microwave sites will be served by fiber optic interconnections.

A variety of tower work is required in the project. Towers construction will include five newly constructed towers. Six existing towers will be extended anywhere from 10 to 35 feet. Three existing towers will have structural modification. Tower lighting will be updated on all existing towers.

The new land mobile radio system will consist of a wide-area trunking system in the UHF band for dispatch-type voice communications. The new trunking system will consist of approximately 93 trunked repeaters distributed among 27 repeater sites, approximately six base stations, and approximately 800 mobile radios. The new system will employ existing radio tower sites or other structures (water towers, etc.). The new system will also include the design and installation of new radio control consoles at the Lee's Summit System Operations Center and the Raytown General Office. This project will also accomplish the integration of the land mobile radio systems in the St Joseph Light & Power and Missouri Public Service territories.

### **PEPCO HOLDINGS, INC. WASHINGTON D.C.**

Burns & McDonnell was hired to perform four projects for Pepco Holdings, Inc. (PHI) since 2002. These projects included an analysis of telecommunications and protective relaying schemes, an assessment of remote alarming connectivity, a plan for integrating the networks of three legacy companies and designing SMART Grid communications. Pepco Holdings Inc. (PHI) is an energy holding company engaged in

**Burns & McDonnell merges traditional experience with next-generation expertise to create new and innovative solutions for our clients seeking highly reliable engineered connectivity.**



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regulated utility operations and the sale of competitive energy products and services to residential and commercial customers. PHI delivers electricity and natural gas to more than 1.8 million customers in Delaware, the District of Columbia, Maryland, New Jersey and Virginia, making it one of the largest electricity delivery companies in the mid-Atlantic region.

In 2007, Burns & McDonnell completed a strategy for a highly reliable integrated telecommunications platform that would provide efficient and secure use of corporate voice and data networks for its three electric utilities.

In 2008, Burns & McDonnell designed the power delivery data network (PDDN) to deliver communication for SMART Grid applications. These applications included: DA, substation remote access, SCADA, voice over IP, radio over IP, AMI, Secure Corporate data network access, network management, and others.

To accomplish this, Burns & McDonnell created an IP addressing scheme, designed a data network, procured equipment, and engineered Ethernet over fiber and multiple vertical routed and switched networks. Program management services were provided to ensure project completion.

### **CITY OF GLENDALE, CALIFORNIA**

The City of Glendale Water and Power (GWP) retained Burns & McDonnell to design a network for internal electrical substation communications that would utilize a fiber optic cable plant. The substation applications include SCADA, high-speed protective relaying, voice, data, and video.

GWP has undertaken a project to deploy a fiber optic cable system throughout the City. The fiber optic cable contains 144 strands of singlemode fiber and will be deployed in phases, and include terminals at the City's primary electric utility facilities. These facilities include fourteen electric utility substations, a power plant and two control centers. Burns & McDonnell considered the City's initial and future requirements in conducting the network design. We identified the most beneficial network for GWP in terms of cost, performance and reliability.



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## JOHNSON COUNTY TRANSIT OLATHE, KS

Johnson County Transit initiated a project to equip their eighty buses with advanced transit system capabilities. These capabilities included automatic vehicle location, voice annunciators, automated passenger counters, on-board cameras, and traffic signal pre-emption capability.

Other system requirements were to provide on-the-fly vehicle reports, real-time mapping of bus locations, creation of driver/bus manifests, provide internet access to schedules by the passengers, predicted arrival service, passenger notification, computer aided dispatching, route optimization software, and historical trip data.

Johnson County Transit (JCT) is a division of the Johnson County Department of Infrastructure and Transportation that administers fixed-route and curb-to-curb transportation service in Johnson County, Kansas. Burns & McDonnell was hired to design the advanced transit system and develop an RFP. The project began with the development of a comprehensive needs analysis generated after stakeholder interviews. An outstanding requirement was to ensure that system selected complimented the existing ITS infrastructure in the Kansas City area. This included the interconnection of the new JCT system with the rest of the area's initiatives. Burns & McDonnell qualified vendors for the job. An RFP was created that reflected the priority requirements along with those longer-term needs.

It was determined that the existing land mobile radio frequencies could be used for this application as long as the bandwidth requirements did not exceed the frequency allotment. Other communication options were to lease capacity from a local land mobile radio provider, install a new radio system on an existing county-owned tower, or use cellular carrier services.

Burns & McDonnell performed a vendor bid evaluation using a weighted selection matrix. Vendor interviews were conducted between JCT, Burns & McDonnell, and the bidders. After some bid clarification, a vendor was recommended and project costs were clearly established.



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## **POTOMAC ELECTRIC POWER COMPANY WASHINGTON D.C.**

Burns & McDonnell was hired to perform three projects for Pepco Holdings, Inc. (PHI) since 2002. These projects included an analysis of telecommunications and protective relaying schemes, an assessment of remote alarming connectivity, and a plan for integrating the networks of three legacy companies that comprise PHI.

Pepco Holdings Inc. (PHI) is an energy holding company engaged in regulated utility operations and the sale of competitive energy products and services to residential and commercial customers. PHI delivers electricity and natural gas to more than 1.8 million customers in Delaware, the District of Columbia, Maryland, New Jersey and Virginia, making it one of the largest electricity delivery companies in the mid-Atlantic region.

In 2002, Burns & McDonnell prepared a fiber optic design audit and system analysis for improvements to PHI's internal communications system, including correction of configuration settings and other corrective measures to avoid outages as encountered in a severe storm in early 2002. In subsequent projects, Burns & McDonnell prepared an Alarm Manual to document existing and new system alarms in support of an RTU change-out and we performed a needs analysis, created an RFP and evaluated vendor responses for a pilot Distribution Automation system.

PHI recently hired to assemble a strategy for long term development of a highly reliable integrated telecommunications platform that would provide efficient and secure use of corporate voice and data networks for its three electric utilities.

## **CITY OF GENESEO, ILLINOIS**

Burns & McDonnell was hired by the City of Geneseo, Illinois to plan and design a City-wide fiber optic municipal area network.

The project objective was to install a fiber optic backbone that would connect major City facilities, schools and utility sites for internal voice, data and control purposes, while providing a strategic asset, serving as a point of departure for a telecommunications enterprise that may include leasing dark fiber, cable television, Internet, wide-area networking, and competitive local exchange. Initial uses for the system include SCADA, local government data networking, and Ethernet for the area schools. Other planned uses include Internet access for local schools, City PBX, distribution automation, and enterprise applications.

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The cable is deployed in a protected loop topology. 120 fibers are provided in the primary backbone cables, with lower-fiber count cables serving local schools. Burns & McDonnell provided the overall system planning and budgeting studies.

Burns & McDonnell then provided design services for the complete system that includes 8 miles of fiber optic cable and 12 equipment sites, plus a wireless network to reach some out-of-the-way water facilities. Our services included fiber optic cable route engineering (overhead and underground route design, make ready, pole attachments, clearances), and network equipment engineering. We developed complete drawings and specifications for the entire network including both fiber optic and wireless spread-spectrum portions.

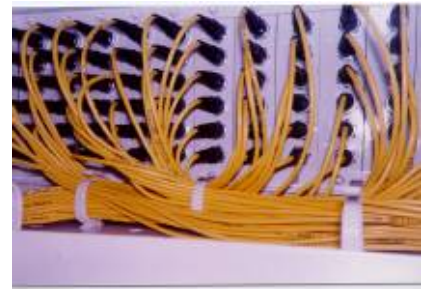
### **CITY OF BATAVIA, IL PUBLIC WORKS DEPARTMENT**

Burns & McDonnell performed a feasibility study and provided design services for this municipal fiber optic network that serves utilities, schools, public safety and local government users.

The City of Batavia decided to investigate the possibility of a citywide broadband network to deliver video programming, to interconnect the various telephone systems within the city government, to provide a private communications link for a future electric and water SCADA system, to provide Internet access, to interconnect the various local area networks within the city government, and to provide connectivity and bandwidth to the public schools. The city selected Burns & McDonnell to conduct a feasibility study of owning and operating a municipal broadband network.

The study examined four aspects of municipal ownership of a broadband communication system: technical, economic, legal and political. Technical aspects included selection of cable routes, selection of the number of fibers for various sections of the fiber optic cable plant, assessment of technologies available, identification of possible users of the system, and selection of the type of electronics to be used.

Burns & McDonnell designed the municipal broadband communications system for the City. This system consists of approximately twenty-one miles of fiber optic cable connecting eighteen locations, including utility substations, city government facilities and public schools. The initial network utilizes SONET transmission technology in a redundant ring topology, for SCADA, relaying, voice, and wide-area data networking. Burns & McDonnell is providing complete design services for the project including outside



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plant cable design, network design, drawings and specifications, and contract administration.

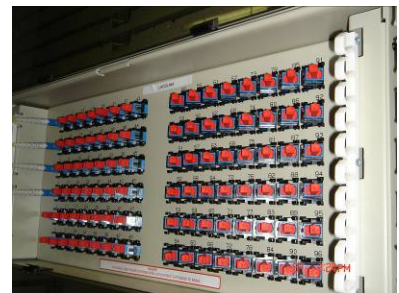
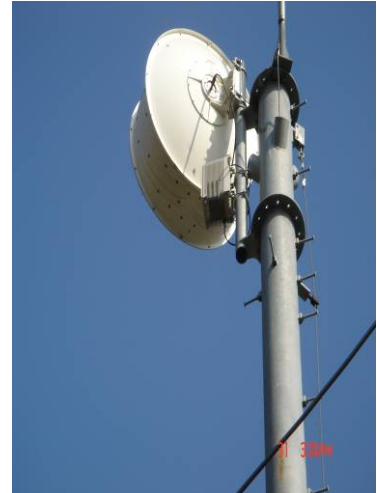
### **CITY OF RIVERSIDE, CA. PUBLIC UTILITIES DEPARTMENT**

Since 1988, Burns & McDonnell has been providing all of the City of Riverside Public Utilities' communication system planning and design, including needs assessments, master plans, fiber optic design and construction management, SONET network design, Land-Mobile Radio (LMR) design, radio tower design and construction management, digital microwave systems design, cyber security policy development, City Wide Area Network (WAN) design and documentation standards development.

Burns & McDonnell has a long history of service to the City of Riverside. From needs assessments and master plans to Wide Area Network design using Gigabit Ethernet technologies, the City's telecommunications infrastructure has been evolving and growing with the help of Burns & McDonnell.

Burns & McDonnell's design services to the City have included:

- Expanding the current fiber optic system to 22 additional municipals and public safety facilities.
- The development of a City-wide communications needs assessment study and master plan for improvements in communications for all fourteen City departments.
- The design and construction management of more than 60 miles of fiber optic cable, including both aerial (ADSS) and underground segments.
- The design of a SONET fiber optic transmission system consisting of 36 nodes configured in multiple self-healing rings for protective relaying, SCADA, voice, data, and wide-area Ethernet services.
- The design and construction management of a VHF land mobile radio system upgrade to provide better performance and coverage for the utility voice dispatch.
- The design and construction management of new radio tower facilities including towers and buildings to support improved radio communications for the City of Riverside utilities, police and fire departments.
- The design of 18 GHz digital microwave radio systems for inter-site communications at locations not accessible with fiber.
- The development of Cyber Security policies for SCADA/EMS systems.



- The development of improvements to the City’s Ethernet wide –area network (WAN) to improve reliability and utilize fiber resources more efficiently.
- The development of standards for drawings / documentation pertaining to the communications systems.

### **MISSOURI DEPARTMENT OF TRANSPORTATION ST. LOUIS AND KANSAS CITY**

Burns & McDonnell was retained by the Missouri Department of Transportation (MODOT) to design expansions to their Intelligent Transportation System (ITS) communications infrastructure on projects in metro Kansas City and St. Louis, Missouri.

The Kansas City project was associated with MODOT’s “Kansas City Scout” ITS program and included expansion of their fiber optic network along I-70 included portions of I-70 from Independence to Blue Springs, Missouri. The project supports field traffic controllers, DMS, and closed circuit video systems.

The St. Louis project was associated with MODOT’s “Gateway Guide” ITS Program and included the expansion of their ITS network along Route 30 in Jefferson County. The network includes both underground fiber optic cable and 4.9 GHz wireless Ethernet for traffic signal control, video and DMS applications.

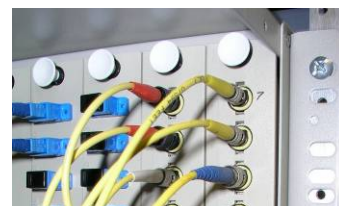


### **CITY OF ANAHEIM, CA. PUBLIC UTILITIES DEPARTMENT**

The Anaheim Public Utilities Department hired Burns & McDonnell to perform a feasibility study of its telecommunications infrastructure.

The City’s 30-year-old system of copper telephone cables had deteriorated, capacity limits had been reached in many areas and performance was poor. Burns & McDonnell’s study concluded that a fully digital fiber optic transmission system was the best option. Burns & McDonnell was hired to provide design and contract administration for the new system.

Anaheim’s fiber optic system includes two loops in a figure-eight pattern with a common hub between the loops. The main transmission electronics employ SONET OC-3 technology, and the protected loop configuration eliminates single points of failure in emergencies. Separate subloops, utilizing T1 multiplexers, provide secure and critical communications for HCB pilot wire relaying among ten electrical substations. The project included one hop of digital microwave to a mountain-top radio facility.

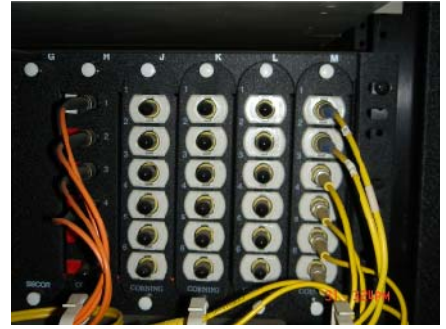


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## **TURLOCK IRRIGATION DISTRICT TURLOCK, CA**

Turlock Irrigation District (TID) provides retail electricity and water to approximately 100,000 customers, including more than 5,800 growers, in California's San Joaquin valley. Burns & McDonnell provided planning and design services for TID's substation fiber optic network.

TID installed a fiber optic cable system consisting of 85 miles of plant in several geographic rings. Burns & McDonnell performed a needs analysis and prepared a planning study recommending a network technology and topology. The resulting network designed by Burns & McDonnell consists of multiple SONET rings incorporating 28 multiplexer nodes at 24 different locations. These network locations include substations, power plants, and primary and backup utility operations centers. Burns & McDonnell provided the initial planning study and needs assessment, system design, specifications, and assisted in the system testing.



## **CITY UTILITIES OF SPRINGFIELD SPRINGFIELD, MO**

The City Utilities of Springfield (CUS) hired Burns & McDonnell to design a 30-mile water pipeline from Stockton Lake to Fellows Lake in Missouri. In addition to the pipeline design, Burns & McDonnell was retained to do a study to determine the best method of communicating telemetry, control and surveillance information between the intake pump station and booster station located along the pipeline and CUS' Water Operations Center.

The study considered the use of copper cable, radio, satellite, leased line and fiber optics as alternative methods of communications for the pipeline project. A fiber optic transmission system was recommended.

Burns & McDonnell designed the fiber optic cable system for the project. The cable was a dual-armored single mode fiber optic cable that was direct buried alongside the 36" water pipe for the entire length of the pipeline. Our specifications and drawings covered the procurement of the cable, cable installation, splicing and testing. Burns & McDonnell also provided a conceptual design and recommendations for the communication electronics that were purchased and installed by CUS.

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**WILLMAR (MINNESOTA) MUNICIPAL  
UTILITIES COMMISSION  
WILLMAR, MN**

Willmar Municipal Utilities (WMU) retained Burns & McDonnell to handle the design of its new substation and transmission facilities and to develop the design for an affordable yet reliable communications network. The new communications system would not only serve the new electrical facilities associated with the project, but would replace the aging and unreliable buried telephone cables that serve three other locations.

As copper conductor pairs began to fail on their aging direct-buried telephone cables, Willmar Municipal Utilities (WMU) decided to implement a new and more reliable system of communications for their substation telephone, SCADA and protective relaying applications. The time to remedy the problem came in 1996 as WMU embarked on the design and construction of a new 69/12-kV substation and transmission line to serve the growing demand for power in Willmar, Minnesota.

Burns & McDonnell analyzed several alternatives. Looking to the future, WMU wanted to invest in fiber optics, but the costs were prohibitive for the total network. Fiber optic ground wire (OPGW) was justified for installation on the new transmission line. This fiber optic link spanning from WMU's Willmar Substation to the newly constructed Southwest Substation, was combined with three hops of 6-GHz spread-spectrum digital microwave radio to form a secure loop-protected digital communications network.

The network serves WMU's power generating plant, South Substation Willmar Substation, and the new Southwest Substation in a self-healing ring configuration. Intelligent T-1 multiplexers, specially designed for utility substation applications, have the capability to automatically sense a failure in the network and reroute signals around the failed segment.

Burns & McDonnell performed all design functions for the new system, application engineering, drawings, specifications, and inspection.

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## **TENNESSEE VALLEY AUTHORITY (TVA) KNOXVILLE, TN**

Burns & McDonnell has provided telecommunications engineering services for the Tennessee Valley Authority (TVA) since 1995. Over 100 projects in the seven states served by TVA have been completed, ranging from stand-alone communications improvement projects to communications projects in support of relaying and metering.

TVA is the nation's largest public power company, with 33,000 megawatts of generating capacity. With the help of Burns & McDonnell, TVA supplies reliable electric power to nearly 8.5 million residents of the Tennessee Valley.

Burns & McDonnell has designed several communications systems for TVA. These systems have included many of TVA's facilities, including power generation plants, electrical substations and radio repeater facilities. The work performed is broad based and has included the following:

- Fiber optic systems including SONET
- Point-to-point Digital Microwave
- Land mobile radio
- Radio tower design and construction
- SCADA systems
- Wide Area Network systems
- Remote and backup power systems
- Protective relaying

## **WESTERN FARMERS ELECTRIC COOPERATIVE ANADARKO, OK**

Western Farmers Electric Cooperative hired Burns & McDonnell to study their plans and provide options for a backup control center. Burns & McDonnell is also currently designing a fiber cable route to connect the backup control center.

Western Farmers Electric Cooperative (WFEC) is a generation and transmission cooperative whose service territory covers approximately 75% of the state of Oklahoma. WFEC is a National Energy Reliability Council (NERC) control area within the Southwest Power Pool (SPP).

WFEC recently engaged Burns & McDonnell to perform a communications study related to the installation of a backup energy control center. The backup control center must provide all critical functions, and therefore must have supporting communications, in the event of a catastrophic failure or destruction of their primary energy



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control center in Anadarko, Oklahoma. This study is ongoing, with completion anticipated in 2007.

Burns & McDonnell is also providing engineering design services on the fiber optic cable line to connect the backup control center to the rest of the WFEC network. This span will utilize ADSS and OPGW fiber cable, and is expected to be completed by 2008.

### **KANSAS ELECTRIC POWER COOPERATIVE TOPEKA, KS**

Burns & McDonnell was retained by the Kansas Electric Power Cooperative, Inc. (KEPCO) to perform a frequency search, path engineering and FCC licensing for a multiple-address radio system.

The Cooperative is made up of 25 rural Cooperatives. Therefore, there were 25 master sites and 15 to 30 remote sites per master. The recommended configuration only covered communications between the master radio for each site and the remote terminal units for that master.

Burns & McDonnell searched the FCC's database for available frequencies using in-house software tools. Path analysis was performed using SIGNAL and RPATH radio propagation software, and a recommended configuration for the system was produced. All frequency coordination forms and the FCC Form 415 for each master and its associated remotes were compiled, including all required technical data and attachments.

### **U.S. ARMY OF CORP OF ENGINEERS FORT LEONARD WOOD, MO**

Burns & McDonnell designed a wireless Ethernet for the US Army at Fort Leonard Wood, Missouri.

The US Army at Ft. Leonard Wood in Missouri to design and engineer a fairly comprehensive wireless Ethernet communications network that provided connectivity to many high security chemical and meteorological monitoring sites throughout the base. Many of these sites are located in very remote areas in rugged and heavily wooded terrain. Burns & McDonnell's design required careful path engineering and testing to ensure reliable communications. Power supply for some of these remote facilities required solar and on-site generators.



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## **PACIFIC PUD NO. 2 OF PACIFIC COUNTY RAYMOND, WA**

Pacific PUD No. 2 retained Burns & McDonnell to provide planning and design services in implementation of Fiber to the Subscriber (FTTX) network. The network allows the PUD to offer bandwidth according to a wholesale open-access model, allowing third-party retail providers of voice, video and data services to operate over the PUD's fiber distribution network.

The first phase of this project included the design and construction of a fiber optic cable backbone along with a comprehensive upgrade of the PUD's digital microwave network to SONET OC-3 capacity. The second phase included the build out of the fiber optic distribution network consisting of Gigabit Ethernet over fiber to a group of educational, healthcare, and government facilities. This phase also included the implementation of access connections to the regional Northwest Open Access Network (NOANET) fiber optic network.

Future phases will include the build out of the fiber optic network to commercial and residential users and the opening of access to the network to various third part retail telecommunication service providers.

Services rendered by Burns & McDonnell include system planning, system design, microwave path analysis, and FCC licensing.



## **PALO ALTO UTILITIES DEPARTMENT PALO ALTO, CA**

The City of Palo Alto Utilities Department retained Burns & McDonnell to assist them in the planning and design of their fiber optic network.

Burns & McDonnell determined how best to use their existing fiber optic cable infrastructure for internal electrical utility operation communications between their utility control center and ten electrical substations.

The applications included mission-critical substation SCADA and protective relaying, and power quality monitoring, voice, data, and video. Burns & McDonnell established the design criteria for the new network, analyzed bandwidth requirements, and recommended the best technology option to meet the needs of the utility.



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The new network combined both time-division multiplexing (TDM) technology and Ethernet to optimize the network with respect to cost, performance, and functionality. Burns & McDonnell then provided network design services including network block diagrams, specifications and equipment wiring diagrams, and start-up assistance.

### **U.S. NAVY-NAVAL AIR STATION PENSACOLA, FL**

This project involved the complete replacement and capability upgrade to the public works SCADA system at the Naval Air Station for electric, water and sewer utilities.

In September of 2004, Hurricane Ivan passed through the Pensacola area resulting in extensive damage and loss of power at the Naval Air Station (NAS) and related facilities at Corry Station and Saufley Field. The Government responded with a comprehensive project to harden the utility infrastructure at these facilities, including the installation of a new SCADA system for electric, water, and wastewater utilities. The new system was to have include relocation of master station facilities to a more secure and hardened location, replacement of the existing hardwired communications system with a wireless network less prone to damage from winds and flooding, and a complete replacement of all hardware and software, including RTU's for a more useful and up-to-date system.

Burns & McDonnell provided the initial Needs Assessment and Feasibility Study for the project. We were then retained to perform the radio path and coverage analyses for the wireless network, and provide complete system specifications for a turnkey project. Burns & McDonnell served as Owner's Engineer throughout the design and construction of the system, and provided testing and inspection services.

The new system includes 73 new RTU's at electrical substations, water treatment, storage, and distribution facilities, and wastewater collection and treatment facilities. The communications network includes licensed 420 MHz point-to-multipoint systems, and unlicensed 900 MHz wireless Ethernet. The new master station includes a dual-server system with two control centers; one at NAS and a second at Corry Station.



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## **CITY OF AMES MUNICIPAL ELECTRIC SERVICE AMES, IA**

The City of Ames Municipal Electric Service hired Burns & McDonnell to design a SONET wide area network including approximately 20 miles of fiber optic cable plant, SONET electronics, and relaying upgrades.

The City of Ames needed a network to support SCADA and protective relaying for their municipal electric utility. Burns & McDonnell designed a SONET ring system using GE Junglemux equipment. Ethernet, voice and digital serial connectivity is transported through the network for utility operations.

The city's pilot wire relays were upgraded, and an ADSS fiber optic cable plant was installed to 12 substations and the operations center. The cable was routed on both overhead poles and in underground conduits using directional boring.

The SONET network uses OC-3 over the optical fiber between substations and the city's control center, providing a secure, integrated network to support utility substation communications.



## **ROCHELLE MUNICIPAL UTILITIES ROCHELLE, IL**

Burns & McDonnell was hired by the City of Rochelle (Rochelle Municipal Utilities) to develop a plan for the implementation of a city-wide broadband fiber optic network.

The plan was to provide for internal city voice, data and Internet requirements, while being suitable to serve as a backbone for future expansion to a public enterprise network. Burns & McDonnell's plan was adopted by the city council.

Burns & McDonnell was then retained to provide the complete design and project management for the recommended fiber optic backbone network. Our service included development of equipment specifications, fiber optic cable and material specifications, splicing and testing requirements, construction drawings, outside-plant cable route design, and overall project technical supervision.

The network serves eight sites, including electric and water utility facilities, city hall, police and fire departments, and several schools. Network uses include telephone, high speed wide-area networking (WAN), utility monitoring and control, and Internet access. SONET OC-3 multiplexers are utilized that feature redundant self-healing ring



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technology to provide for a highly reliable and robust network.

Burns & McDonnell assisted Rochelle Municipal Utilities in the evaluation of technologies and strategies for enterprise build-out of the system including hybrid fiber-coax (HFC) and fiber to the home (FTTH).

### **FIRST ENERGY CORPORATION NORTHERN OHIO**

Burns & McDonnell is providing substation design and Program Management services for First Energy on an on-going basis. In conjunction with this work Burns & McDonnell is providing design of multiple substation communication systems including wireless facility design, network integration and substation RTU design.

First Energy has divested their Telecommunications group into a separate, unregulated entity that provides revenue for the corporation. A small department remains part of the regulated company and designs critical communications for Power Delivery. Burns & McDonnell was called upon to leverage our substation communication design experience and to deliver new communication to substations receiving RTU upgrades.

Burns & McDonnell is also working to reduce recurring Telecommunication costs through replacement of more costly leased lines to critical locations such as the First Energy Customer Call Center.



### **GENESEO MUNICIPAL UTILITIES GENESEO, IL**

Burns & McDonnell was hired by the City of Geneseo, Illinois to plan and design a City-wide fiber optic municipal area network.

The project objective was to install a fiber optic backbone that would connect major City facilities, schools and utility sites for internal voice, data and control purposes, while providing a strategic asset, serving as a point of departure for a telecommunications enterprise that may include leasing dark fiber, cable television, Internet, wide-area networking, and competitive local exchange. Initial uses for the system include SCADA, local government data networking, and Ethernet for the area schools. Other planned uses include Internet access for local schools, City PBX, distribution automation, and enterprise applications.

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### **HOOSIER ENERGY REC, INC. BLOOMINGTON, IN**

Hoosier Energy (HE) is a generation and transmission cooperative headquartered in Bloomington, Indiana. Since 2001, Burns & McDonnell has been assisting HE with upgrades and expansions to their supervisory control and data acquisition (SCADA) and communications systems.

Hoosier Energy owns and operates both generation and transmission facilities serving sixteen rural electric membership cooperatives (REMC's). In 2001, Burns & McDonnell prepared a study and plan for improvements to HE's internal communications system, including an upgrade of HE's aging microwave radio system from analog to digital technology, and the deployment of 220 MHz radio technology for supervisory control and data acquisition (SCADA) and transmission switch automation.

Burns & McDonnell recently updated the 2001 communication plan, and also served as the Owner's engineer for the design of their 12-hop microwave system conversion from analog to digital (3xDS3). The project included new towers, shelters, and equipment at all sites, and the demolition of the old towers and shelters.

Another recent project involved assisting HE in the planning of SCADA and automatic meter reading (AMR) for HE's seventeen rural electric member cooperatives (REMC's). Many of these REMC's installed SCADA and/or automatic meter reading (AMR) injection equipment in their substations, and required varying levels of project management, engineering, and construction support from HE. Burns & McDonnell prepared estimates of the resources required meeting various support scenarios, intended to provide quantitative input into



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Hoosier's establishment of support policies. Burns & McDonnell also developed drawings and specifications that allowed HE and its members to obtain firm bids from equipment suppliers and electric contractors for the furnishing and installation of the SCADA equipment.

### **NORTHEAST UTILITIES SERVICE COMPANY CONNECTICUT**

Burns & McDonnell is providing design and Program Management services for Northeast Utilities Service Company (NUSCO) \$1.1 Billion Middletown-Norwalk 345-kV transmission project. In conjunction with this project Burns & McDonnell has provided design of multiple substations including telecommunications and substation automation networks.

Telecommunications have involved the design of transport systems consisting of optical ground wire (OPGW) systems, SONET, and Frame Relay. Burns & McDonnell has also worked with the NUSCO staff to develop standard designs for substation automation networks utilizing fiber optic LANs and IP servers for internetworking of relays, RTU's and various other intelligent electronic devices (IEDs).

