



Council Agenda Report

From: Tim Murphy, Lieutenant
Subject: Consultant for 9-1-1 Center Communications Project
Date: January 17, 2017

Facts

1. The Police Department operates a communications center Public Safety Answering Point (PSAP) located inside the Public Safety Center at 900 Park Street. The center is responsible for answering incoming calls (three 9-1-1 lines and eight non-emergency business lines), as well as handling all radio communications for police, public works and emergency services events in the City of Paso Robles.
2. The communications center is the critical component of the City's first responders' ability to effectively communicate during mission critical incidents affecting the life, health, and safety of the public.
3. The main radio is a Motorola MTR 2000 conventional analog system, with three Motorola Centracom Gold Elite dispatch consoles. These consoles control radio communications, as well as interoperable resources or communications to other agencies through control stations. The console also controls access within the Public Safety Center.
4. The radios and repeaters were all purchased during the move to the Public Safety Center from the Police Department's prior location in 2001.
5. The service agreement for the existing communications system equipment and software will reach its end of service life in April, 2018. At that time, Motorola will no longer support this equipment resulting in no firmware updates, limited parts availability, and limited support from any third-party vendors.
6. The City Council authorized a capital expenditure of up to \$50,000 in fiscal year 2016-17 for the purpose of initiating this project.
7. The Police Department has identified the need for a qualified communications system consultant to guide the department through the process of understanding the status and viability of the current public safety communications system and to support long-range decisions.
8. The Police Department created a working group of personnel from the City Information Technology, Emergency Services, and Public Works Departments to collectively research this issue and identify qualified consultants.
9. Seven of the nine identified consultants submitted project proposals.
10. The working group reviewed all of the proposals and completed an initial qualifications-based selection of consultants to be interviewed.
11. The working group interviewed three consultants and made a qualifications-based selection.
12. Black & Veatch was selected as the consultant to be recommended for this project. Their base fee is \$33,540. This fee includes a needs assessment and a 'system enhancement recommendation report.' Black and Veatch will also provide procurement support services as an option. That optional fee is \$6,400. This fee includes development of technical specifications and procurement of the system replacement.

Options

1. Do nothing.
2. Authorize the City Manager to engage the services of Black & Veatch to assist staff in preparing a needs assessment and prepare bid documents to replace the public safety communications system.

Analysis and Conclusions

1. If we do nothing, the communications center equipment and software will reach its end of service life in April, 2018. At that time, Motorola will no longer support this equipment and there will be no firmware updates, limited parts availability and limited support from any third party vendors. As such, the ability of the City's first responders to effectively communicate during mission critical incidents affecting the life, health and safety of the public will be compromised.
2. By hiring Black & Veatch, the City will be in the position of using independent, vetted experts to determine the true scope of the City's public safety communications needs and optimum course of action for replacement of the communications system.

Fiscal Impact

The adopted budget for the current fiscal year includes \$50,000 to initiate this project. The proposed expenditure of \$39,940 is within this budget.

A project budget is proposed:

Contract	\$39,940
10% Contingency	<u>\$ 3,994</u>
	\$43,934

Recommendation

Authorize the City Manager to enter into an agreement Black & Veatch to assist staff in preparing a needs assessment and prepare bid documents to replace the public safety communications system, in an amount of \$39,940 and approve a project budget of \$43,934

Attachments

1. Black & Veatch proposal – 2016 Communications System Upgrade Project

2016 Communications System Upgrade Project

City of Paso Robles

19 AUGUST 2016



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Cover Letter

August 19, 2016

Timothy Murphy, Lieutenant
Paso Robles Police Department
900 Park Street
Paso Robles, CA 93446
Phone: 805-227-7444
Email: tmurphy@prcity.com

RE: 2016 Communications System Upgrade Project

Dear Lt. Murphy,

Thank you for reaching out to Black & Veatch for support of your telecommunications needs. It is my pleasure to make your acquaintance and we are very pleased to be able to offer our consultative services to the City of Paso Robles (the City). We believe our qualifications demonstrate an exceptional range of experience and the depth of resources necessary to meet the needs of the City.

As the attached document demonstrates, we specialize in the planning, design, procurement, implementation, and optimization of governmental and public safety communications and information systems. We are well suited to assist the City in this important project. Each member of our team is a seasoned veteran of the communications industry, bringing to the City years of experience in developing strategies for improving the efficiency and effectiveness of public safety communications and information systems.

Black & Veatch offers significant benefits to the City, including:

- **Public Safety Voice and Data Communications System Expertise** – We are regarded as one of the best public safety communications system consulting and engineering firms in the United States. Our project teams have supported the planning, design, procurement and implementation of more than 200 advanced interoperable trunked radio systems. Black & Veatch assisted the City of Independence, Missouri in implementing the Nation’s first 700 MHz P25 radio system. We are currently assisting dozens of public safety clients across the country with their emergency communications needs, including the analysis of current system and implementation of new systems, similar to the needs outlined in our recent phone conversation.
- **Project Management Oriented Company** – We take project management seriously and has implemented a companywide training program based on the Project Management Institute (PMI) project management guidelines. This standardized approach ensures that each project is professionally managed, which helps ensure that the project meets its objectives and stays on schedule and within budget. As you

will see, many members of our project team are PMI-certified Project Management Professionals.

- Independence – we are not affiliated with, nor do we have any financial interest in, any communications equipment manufacturer, distributor, or supplier. We do not receive or accept remuneration of any type from any manufacturer, distributor, or supplier for recommending any of their products. Our unbiased independent position provides our clients a capable partner in meeting their project requirements without the potential for conflicts of interest.
- Proven Project Methodology – We have provided a detailed Scope of Work which is based on our proven project methodology that has been refined over thousands of projects over our 30+ year history in public safety communications. Our project has been customized to meet the specific needs of the City and addresses all of the City's requirements.

Black & Veatch, with its industry leading turnkey design/build capabilities and our strong expertise in the public safety industry, has more capability than any other consulting firm in the industry. This vertically integrated approach benefits our clients with end-to-end delivery solutions that reduce deployment costs while improving schedule durations. It is also important to note that Black & Veatch has achieved the number one ranking worldwide in telecommunications for U.S.-based engineering companies for six consecutive years.

We look forward to the opportunity to support the City in its quest for a new and or improved Public Safety communication system. If there are questions regarding this submission or if you would like to schedule an in-person meeting, please do not hesitate to contact Leslie Paramo at (562) 345-9313 (office), (913) 428-6704 (mobile) or by e-mail at paramole@bv.com. We look forward to meeting with you to discuss your project in more detail and demonstrate that we are the best firm to meet your needs for this project.

Sincerely,

INTRODUCTION

Black & Veatch is pleased to present our proposal for public safety radio consulting services to the Paso Robles County. As our proposal shows, Black & Veatch provides experienced and capable resources that will execute a carefully developed work plan to achieve the goals of planning, acquiring, implementing, and maintaining a voice communications solution that meets the County's needs, is based on industry best practices and supports a competitive process.

Black & Veatch has strong telecommunications systems capabilities and experience that makes our organization an ideal candidate to support the County in this endeavor. We understand that the County seeks a qualified and experienced consulting firm to support the needs analysis, design, procurement, and implementation of a multi-site telecommunications solution.

CAPABILITIES

Black & Veatch's capabilities are built from a history of "real world" network projects in planning, design, engineering and field deployments. As a full-service Engineering, Procurement and Construction (EPC) company, Black & Veatch has designed and deployed some of the most sophisticated telecommunications infrastructures in operation today including electric, water and gas utilities and telecommunications carriers. Our demonstrated experience delivering successful large-scale, multi-year telecommunications projects and programs has helped us earn high rankings and awards.

Black & Veatch maintains a group of full-time consultants and engineers dedicated to telecommunications systems. The Black & Veatch Public Safety Telecommunications Team includes subject matter experts with operational experience with large scale telecommunications systems; Registered Communications Distribution Design engineers; electrical engineers experienced in power system design, lightning and grounding protection, and emergency backup power system design.

We provide a full range of planning, engineering, procurement and construction services to the telecommunications industry. As an internationally recognized engineering firm, Black & Veatch brings established credibility, proven experience and methodologies, along with an in-depth understanding of telecom systems and operations, including security, reliability, and business process integration. These capabilities will enable Black & Veatch to deliver our highest value services in support of your multi-project and multi-phase scope of work.

EXPERIENCE

Black & Veatch has been helping state, county, and municipal governments plan, design, procure and implement telecommunications projects for 100 years. We are confident that our team provides the County with several unique benefits other than

just providing individual consultants. Most importantly, the County and Black & Veatch, together, make the strongest team to successfully implement telecommunications solutions for these main reasons:

- **In-depth Telecom Systems Experience Combined with “Real World” Engineering Knowledge** - Our industry expertise and experience is unsurpassed, uniquely qualifying us to provide our clients with reliable services from start to finish. Our subject matter and technology expertise covers all relevant telecommunications project areas from voice and data systems, budget development and grants funding assistance, procurement support of technology systems, project management, implementation oversight and acceptance testing. Our team recognizes the mission-critical nature of telecommunications systems and ensures that the design and implementation will meet the high standards required by your project stakeholders.
- **Speed to Value** - You don't have to spend the time, money or resources reinventing the wheel since we've done this before: Black & Veatch's consulting and engineering teams are on the leading edge of telecommunications systems. We have successfully completed voice and data telecommunications system projects of similar size and complexity for state and local agencies throughout the U.S. The project plan we propose focuses on responsible project delivery that will permit Black & Veatch to provide responsive leadership and availability for meetings and other project events.
- **Thought Leadership** - We believe that active participation in our industry is an essential component of responsible corporate citizenship. Black & Veatch consultants and engineers are frequent contributors to nationally recognized industry and standards-setting organizations, such as the Telecommunications Industry Association (TIA), Institute of Electrical and Electronic Engineers (IEEE), Integrated Justice Information Systems (IJIS) and American National Standards Institute (ANSI).
- **Optimum Depth and Flexibility** - You have more control over time, money and resources with our ability to deliver on “demand” resource adjustments: We have the depth and flexibility to provide a highly adaptable level of experienced consulting and engineering staffing support as needed by each region, and the ability to adjust our staffing up and down by skill set as needed by the County's project schedule and staff availability.
- **Reduced Risk** - You will improve the efficiency of the project team and mitigate the risk of cost and schedule overruns teaming with a firm who is able to integrate into your project team. Our professionals work well in an integrated team approach and we have a long, successful track record of doing this for our clients: We believe our record of successfully teaming with clients is unrivaled in our industry. We know how to integrate with our clients and create cooperative, “one team” project environments among our consultants and your technical/user/administrative groups.
- **Best Cost Value and Certainty** - We are proposing staffing for this project that allows the County to achieve the lowest possible project cost, based on your choices of staffing needs. We are also providing firm hourly rates for Black & Veatch professionals to enable the County to define initial resource requirements and project cost from the beginning of the project.

OUR PEOPLE

Black & Veatch has gained the reputation of being a respected leader in all of the markets we serve because of the depth and breadth of our knowledge and experience. We have a diverse team of more than 10,000 professionals with a rich variety of experience and qualifications – all who are carefully matched to projects based on our clients' specific objectives. The Black & Veatch Telecommunications Division maintains a strong virtual workforce, providing flexibility to serve our clients and their local needs.

Demonstrated History of Successful Projects

ABOUT BLACK & VEATCH TELECOMMUNICATIONS

Black & Veatch is constantly looking at critical telecommunications infrastructure in new ways, making it more efficient, reliable and intelligent. Telecommunications continues an evolutionary transformation that has seen the convergence of technologies leading to the era of the Information Society. With a storied history, an inspiring mission, innovative solutions, and a unique culture, Black & Veatch integrates consulting, site acquisition, engineering, procurement, construction and program management capabilities to generate value-engineered solutions. We support each stage of a project, giving us more control over cost, schedule and quality to execute projects seamlessly.

With approximately 2000 Telecommunications professionals strategically located around the country, Black & Veatch can deploy services anywhere and scale to any size project, offering you maximum schedule flexibility. Black & Veatch supports clients in both the public and private network space, including commercial carriers, utilities, municipalities and government agencies. This gives us a unique perspective and added insight to build and upgrade future-ready, sustainable networks for legacy and emerging technologies.

BLACK & VEATCH'S TELECOMMUNICATIONS QUALIFICATIONS

Black & Veatch's proven history of serving the unique network integration needs of our clients provides us with the required skills and background necessary to execute projects with the utmost quality, on-time and on-budget. Currently, Black & Veatch is ranked #1 in Telecommunications Design by ENR for the five consecutive years, 2010-2015.



RANKED #1 IN
TELECOMMUNICATIONS
DESIGN BY ENR FOR FIVE
CONSECUTIVE YEARS

- **Vertically Integrated Services** – We can provide in-house consultants, project managers, engineers, procurement, and construction resources for the entire life cycle of a project, offering better control over project variables.
- **Proven Project Management Capabilities** – Through our history of working with projects involving the design, and/or construction of telecommunication, energy and water infrastructure, we have developed excellent project management processes and tools. Along with these established methodologies comes a valuable pool of seasoned Project Managers.
- **Telecommunications Design-Build Experience** – We have an extensive resume of design-build experience supplying us with intimate knowledge of telecommunications project requirements not commonly available from firms offering only engineering and/or consulting services. Building and launching real world networks makes us a better design consultant and engineer.
- **Proven and Established Quality Assurance Practices** – Black & Veatch achieved ISO 9001:2008 certification in the area of Telecommunications Engineering and Deployment. This Quality System

establishes the requirements for the management, planning, design, procurement, construction, and evaluation of quality for services provided on all of our projects.

- **Financial Stability** – Black & Veatch offers an outstanding history and established credibility in the Telecommunications industry. Our long history and stability will provide assurance that you have partnered with a strong and viable company that will effectively complete any project.
- **Strategic Location** - Black & Veatch has regional offices strategically positioned across the United States in order to efficiently allocate resources and deliver quality engineering and construction services.
- **Committed to Safety** - Successful projects require a continual commitment to safety, and meeting the requirement for making a safe work environment on every job site for every worker.



Black & Veatch's safety performance consistently receives highest honors from OSHA and is considered by many to be a benchmark in the industry. The Black & Veatch Safety Program is applied to all our projects in order to provide the highest level of safety throughout construction.

History and Success of Public Safety Radio - Including P25 Experience

Black & Veatch believes that experience, qualifications and a history of success are the most important and valuable traits that a consultant brings to its clients. We recognize our experience enables us to develop and refine solutions, helping our clients achieve their objectives. We have learned this while performing more than 4,000 communications and information systems projects for governments, public safety agencies, and other essential service organizations over more than 32 years of operation.

We understand the importance of working successfully within our clients' organizational environments. The fact that 40% of our business is from former clients speaks volumes about our professionalism, our quality of work and our ability to work in a harmonious and non-adversarial manner with our clients. In order to be successful in a consulting role, the client – consultant relationship must be based on respect and trust.

Perhaps no other consulting firm has a better understanding of the public safety communications and governmental communications systems than Black & Veatch. Black & Veatch has or is currently assisting more than 300 public safety agencies with the planning, design, procurement and implementation of advanced public safety communications networks. Of these, Black & Veatch has worked with more than 200 agencies in the design and/or implementation of advanced trunked interoperable radio systems.

Black & Veatch has provided or is providing consulting services for more than 50 independent P25 communication system projects throughout the country. Black & Veatch leads all other consulting firms in P25 system development knowledge and experience. An overview of Black & Veatch's P25 system development experience begins with Black & Veatch's direct participation in the P25 Radio System Standards development process that helped pave the way for today's P25 Phase 2 TDMA based radio systems.

Proposed Staffing Plan

One of the benefits that Black & Veatch provides is the ability to add staff with specific expertise to address problems or issues that may arise during the course of the project. Black & Veatch has extensive experience in public safety information systems, and with our size and experience we are better able to assist in problem resolution. With a comprehensive knowledgebase, operational experience, and years of consulting, we are confident we can provide assistance with any problem.

Brief experience summaries for Black & Veatch’s proposed team members are provided in the table below. Detailed resumes are provided in Appendix B.

BLACK & VEATCH PROJECT TEAM EXPERIENCE SUMMARIES		
Name & Role	Project Role	Experience Summary
Mr. Mark Revis, PMP	Project Manager	Mr. Mark Revis, PMP, will serve as the Project Manager throughout the entire project and will act as the daily contact to the County. Mr. Revis will schedule and utilize the expertise identified in the project team as necessary to perform a particular task at hand, and may also take advantage of the broader Black & Veatch support staff as necessary to address unique or unforeseen items that may arise during execution of the project. Mr. Revis has significant experience and expertise in the following areas: project management, planning, design and implementation of communications systems; development of budgets and specifications; bid evaluation and contract negotiation; vendor oversight; schedule development and adherence; acceptance testing; site acquisition; training; and contract change management.

BLACK & VEATCH PROJECT TEAM EXPERIENCE SUMMARIES		
Mr. John Birch	Alternate Project Manager	Mr. John Birch will serve as the Alternate Project Manager should Mr. Wayne Stack be unavailable. Mr. Birch will support Mr. Stack, the project team and the County as needed. Mr. Birch has more than 30 years of experience in the in the operational use and applications of technology to public safety and public service agencies. His experiences include project management, system procurement, specifications, proposal and bid evaluation, contract implementation, and acceptance testing. This includes needs assessments, planning, construction management, operational analysis, site and systems evaluations, systems maintenance, systems operational policies and procedures, and training. With his extensive background in public safety, Mr. Birch offers expertise in all aspects of public safety including Fire, EMS, and Law Enforcement Operations, Emergency Management and disaster planning, EOC Operations and practical training exercises.
Mr. Bobby Jones	Lead RF Engineer	Mr. Bobby Jones will serve as the lead RF engineer.

An organization chart of Black & Veatch’s proposed project team is shown below.

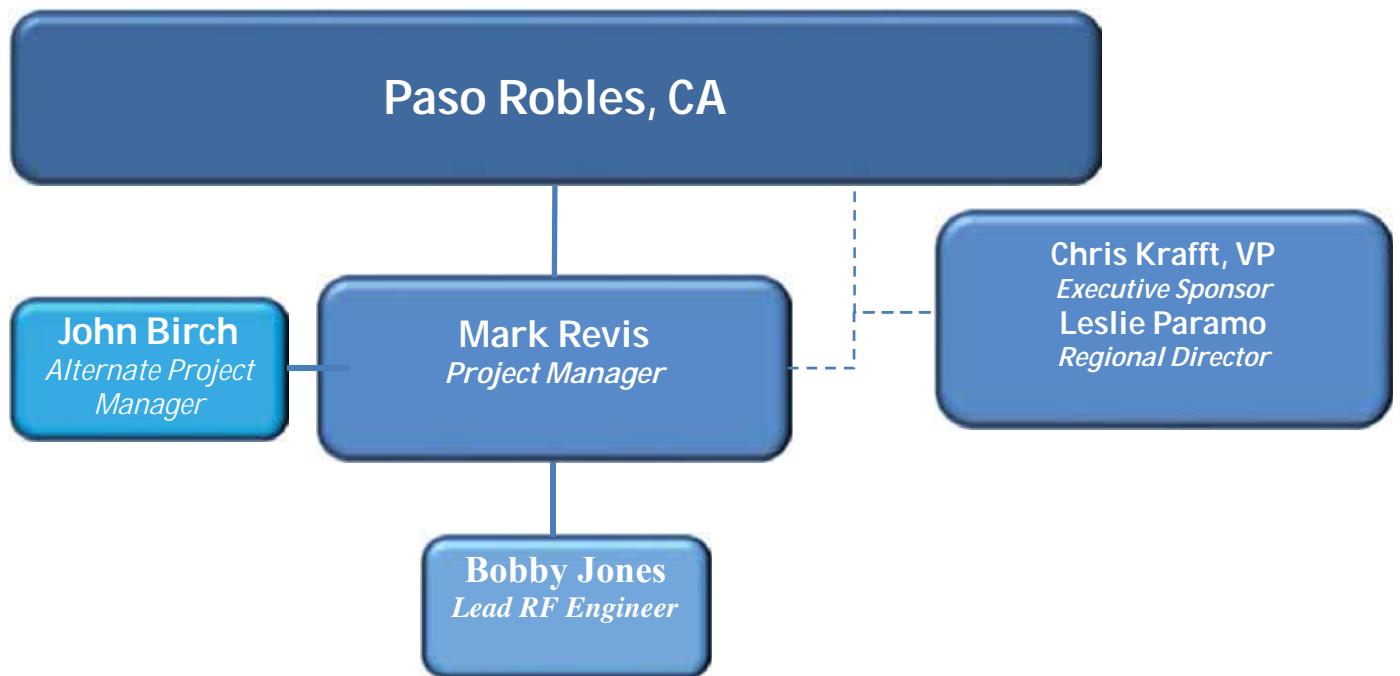


Figure 2. Project Team Organizational Chart

It is important to note that Mr. Mark Revis is based out of Los Angeles, is relatively a short distance from the County. Mrs. Leslie Paramo works out of the Irvine office in Southern California.

We carefully select our teams, taking into consideration the needs of the project and the workload of our experts. On projects of this size and significance, we typically take a two-tier approach to team member assignments. The first tier would consist of the Project Manager and Lead Consultant. For this core team, the project becomes their first priority. The additional team members, typically specific subject matter experts, are brought in and out of the project on as needed basis. With our fulltime staff of Public Safety consultants,, we offer scalable and flexible project staffing. Many of our consultants are Subject Matter Experts (SMEs) who specialize in Public Safety related radio communication systems and issues. Should the need arise for additional professional services, such as those related to site development and site construction, we can supply these services with in-house professionals.

We are confident that, after reviewing our proposal, you will agree that Black & Veatch provides the best team for this important project.

Resumes are located in Appendix B.

Project Approach

Throughout thousands of professional engagements, Black & Veatch has developed a proven project approach and has refined it as we've gained additional experience. We have proposed a scope of work (SOW), described below, that is designed to address the City's Land Mobile Radio (LMR) upgrade project.

This SOW will provide the necessary consulting services so that the City can make an informed decision regarding the upgrade or replacement of its current LMR system. This scope reflects our understanding of the project, but we can customize the scope further to meet any additional requirements requested by the City.

Proposed Scope of Work

Phase 1 - Infrastructure and Needs Assessment

During this portion of the project, Black & Veatch will compile all of the necessary information to evaluate the current system status as it relates to upgrading the existing system or replacing it with a new radio system. We'll perform an assessment that focuses on assessing and identifying the most practical and cost effective enhancement strategy. This effort will assess the current state of the City's Communication Center and radio sites. We'll investigate and document any significant investments and/or upgrades that have been implemented and how they would apply toward a new system.

The City's responses to Black & Veatch questions, along with our research show that the Paso Robles Police Department PD uses a single-channel UHF radio system, and that the San Luis Obispo County Sheriff's Office and most of the other communities in the County have law enforcement on UHF. Obviously, that's very good for interoperability. The Paso Robles Fire Department uses several VHF channels, which similarly is good for interoperability with Cal Fire which provides fire services for San Luis Obispo County. Additional research shows that the Sheriff recently installed an IP-based patch system for interoperability. This type of information, once verified, will be considered and incorporated into the our System Enhancement Recommendation Report.

Black & Veatch will begin by performing a needs assessment that focuses on identifying and assessing the current state of the City's infrastructure. This effort will involve field visits and site surveys of the PSAP communication center, the radio communication sites, other fixed components, as well as mobile, portable, and remote components. In this initial assessment we'll include the identification of the operational needs of the stakeholders and users of the public safety radio communication system, to include the interoperability needs. We'll develop a needs assessment report in collaboration with the City to document the results and will use the assessment report to develop a set of recommendations which will guide the City in its upgrade versus replace decision. We'll develop projected budgets and schedules for each recommended design to assist the City in choosing the best design alternative. We'll present this information to the City in the form of a System Enhancement Recommendation Report.

The specific tasks associated with this effort will be the following:

Task One – Kick-Off

To initiate the project, Black & Veatch will schedule and conduct a kick-off meeting to review the project team members, scope, and deliverables to the City.

Deliverable(s): Kick-Off Meeting and Presentation

Task Two – Current Infrastructure and Needs Assessment

During this portion of the project, Black & Veatch will compile data for the current infrastructure and will develop a functional needs analysis that will identify the requirements for the desired system improvements. We'll compile all of the necessary information to evaluate the current system status. This effort will identify critical points of failure, any system components nearing end of life, priority of replacement, mitigation strategies for components, and service obsolescence. Additionally, we'll gather data from key stakeholders (to be identified by the City) with respect to the systems' performance and requirements including interoperability needs. To gather this data, we'll utilize surveys, telephone interviews, and if necessary, direct meetings. We'll compile, evaluate, and incorporate our findings into a needs assessment report which will be submitted to the City as the deliverable item for this task.

The items that Black & Veatch will address include, but are not limited to the following:

- Current system functional specifications, usage, coverage areas, etc.;
- Additional desired functional and operational requirements if any (system and subscriber terminals);
- Collaboration with key stakeholder's on migration strategy and plans;
- Investments and/or upgrades already implemented toward a digital migration, including;
 - Radios and Accessories
 - Radio Infrastructure including sites, towers and backup generators
 - Dispatch Consoles
 - Logging Recorders
 - Fire Paging and Station Alerting
- Location, condition and capacity of the existing radio facilities;
- All interfaces and interactions with other systems;
- Interoperability needs (local and regional) and current equipment and provisions;
- FCC licensing status;
- Voice channel loading/capacity;
- Required radio propagation coverage areas, including any special in-building or underground requirements;
- Potential new site locations if required to meet coverage requirements;
- Network management capabilities and potential enhancements (over the air programming, reports, and tools);
- Existing communications center and console configurations and requirements;
- Existing microwave/backhaul system paths, including loading, capacity, and available bandwidth;
- Existing paging and fire-alerting systems/equipment;
- Requirements for system reliability and fail-safe modes;
- Current and proposed radio system maintenance and support requirements and arrangements.

Black & Veatch will visit the existing dispatch communications center and existing remote radio sites to ascertain the age, condition, and improvement requirements of these facilities, including:

- Location of existing equipment buildings, antenna support structures, and towers;
- Identification of equipment space availability; and
- Condition and service history of existing equipment and facilities.

In addition, during this process, we'll use our internally developed RF propagation and system-planning tool ComSiteDesign™ to estimate existing coverage based on current system site locations and parameters.

Deliverable(s): *A Needs Assessment which will be included in the System Enhancement Recommendation Report.*

Task Three – Recommendations for a Radio System Migration Plan

Black & Veatch will use the information gathered during Task Two, the Current Infrastructure and Needs Assessment, to develop a recommended migration (i.e. upgrade or replacement) plan. We'll work in a collaborative manner with the City's project staff to review the design alternatives and select a single concept design and migration plan which reflects the best interests of the City. Planning tools, including budget forecasts and estimated project schedules, will be used to assist in this selection process. Black & Veatch will support the City's Project Manager to present and explain the recommendation as required.

The selected design will be used for the development of the needed modifications (i.e. upgrade or replacement) to the current system and will identify potential impacts to current operations. The concept design will address impacts to existing subscriber radios, special requirements for migration/cut-over, facilities space requirements and the planning budget and schedule. Black & Veatch will ensure that these tower sites are required to meet the definition of "Public Safety Grade" as defined by NPSTC and APCO. We'll also recommend solutions for local, regional, state, and Federal interoperability.

During this process, we'll utilize ComSiteDesign™ to evaluate predicted coverage at various operational levels (mobile, portable, in-building) and provide comparison coverage maps to the City.

For each potential alternative/solution identified, we'll evaluate, as necessary, the following items to arrive at a recommended solution:

- Pros and cons of the solution (coverage, capacity, functionality, operational usage and complexity);
- The coverage and site requirements;
- The recommended frequency band and capacity requirements;
- The migration requirements;
- Budgetary cost estimates for the implementation;
- Estimated implementation schedule;

- Ongoing service and maintenance requirements and costs.

Black & Veatch will summarize this information in a draft report which will be delivered to the City for review and comment. We'll be available to discuss the draft report and recommendations and we'll be prepared to incorporate input and feedback received from the City.

The System Enhancement Recommendation Report will include:

- An Executive Summary;
- Recommended public safety communications solution with pros and cons presented;
- A system upgrade versus system replace recommendation;
- Propagation studies, interoperability and functionality description that support the recommendation, along with an implementation schedule and budgetary cost estimate;
- Recommendations for system maintenance;

Black & Veatch will meet with the City project team and executives as applicable to review the draft report, to seek feedback, and to discuss the next steps for the project. Once this feedback has been received and incorporated, Black & Veatch will develop the final report and submit it to the City.

Deliverable(s): *A System Enhancement Recommendation Report and Presentation. Black & Veatch will collaborate with key City stakeholders before finalizing this report.*

Phase 2 – Procurement Support Services (OPTIONAL)

Phase 2 consists of procurement of the system upgrade or replacement. Although not requested by the City, Black & Veatch has included below for information purposes a description of the effort associated with the first of the procurement steps: development of the Technical Specification for inclusion in a request for proposals (RFP).

Task Four – Develop a Technical Specification (OPTIONAL)

Black & Veatch will use the upgrade approach selected by the City as the basis for a Technical Specification for inclusion in the City's RFP. The technical specification will address the following major components:

- Functional Requirements;
- Coverage Requirements;
- Capacity Requirements;
- Interoperability Requirements;
- Radio Site Base/Repeater Station Equipment;
- Frequency Plan and Restrictions Required for Frequency Coordination;

- Site Connectivity (Microwave and/or Fiber);
- Legacy Equipment Interface;
- New Radio Site Candidate Structures and Facilities;
- Antenna Structures;
- Antenna Systems;
- Equipment Shelters;
- Site Development Requirements for City owned or Leased Sites;
- Lightning and Surge Protection Systems;
- Emergency Power Systems;
- Facility HVAC;
- Network Monitoring and Alarm System;
- Installation Requirements and Schedule;
- Acceptance Test Requirements;
- Training Program;
- Warranty and Future Maintenance Plans;
- System Cutover/Startup Plans.

After development of the draft technical specification, we'll deliver the draft and discuss with the City any comments and needed updates. We'll then update the Technical Specification based on the comments received and provide the final technical specification to the City as a deliverable item.

Deliverable(s): *Technical specification document*

What Comes Next

Task Four above is the first step in Phase 2, the Procurement phase. Although not proposed in this document, we feel it would be of use to the City to understand the steps associated with the remainder of the Procurement phase as well as with Phase 3, the Implementation phase. We've included below a list of the steps necessary to complete the Procurement phase from the perspective of the services typically performed by the consultant. These services typically are as follows:

1. Collaborate with the City to create one or more RFP documents;
2. Respond to vendors' technical inquiries;
3. Prepare evaluation criteria, including total cost of ownership;
4. Assist with vendor proposal reviews;
5. Attend and participate in vendor interviews and oral presentations;

6. Participate in vendor selection discussions with key City stakeholders;
7. Prepare and present final evaluation and recommendation; and
8. Assist the City in vendor contract negotiations

Whereas the list above is presented in a high-level manner, we'll be pleased to discuss these steps with the City in detail. This will give the city a very clear idea of what it can anticipate throughout the procurement process for the newer replacement radio system.

Phase 3 - Implementation Oversight and Project Management

Continuing in the "What's Next" mode, we've included below information regarding what the City is likely to encounter during the Implementation phase of its project. During the Implementation phase, Black & Veatch will serve as the City's representative by providing project management support and technical oversight. We'll provide independent verification and validation to ensure that the contractual requirements are fulfilled by the vendor. Black & Veatch's vast experience with project implementations has led to the methodology and tasks called out below.

Implementation Oversight, Monitoring, and Support

With Project Implementation, Black & Veatch provides technical oversight and project management services on behalf of its client to ensure that work is being performed by the contractor appropriately and consistent with the executed contract. The exact scope of this effort cannot be known until after the vendor's formal scope of work and schedule are negotiated, agreed upon, and executed in the system procurement contract. For this reason, Black & Veatch has proposed a list of the potential services that it is capable of providing. The detailed scope of this Phase will be determined by the City prior to the start of the implementation phase.

General project support:

Throughout the project, Black & Veatch will act as the City's representative to ensure accurate and timely implementation of the project. We'll utilize a three-fold project management approach to monitor vendor activity and to help maintain the project schedule. First, we'll periodically review the schedule with the vendor's Project Manager to ensure that all parties agree on the dates for the next several milestones. We'll participate in regular project meetings to review progress, receive reports on project events, and discuss any problems that have arisen or are expected. Finally, our project team will ensure that each scheduled task has been properly completed. In this way, any schedule problems or slippage will be identified so that the project team, vendor, and if necessary, the City's representative can deal with them at once.

Examples of some of the activities that Black & Veatch typically participates in include:

- Review vendor implementation plan & cutover plan;

- Participation in the critical design review (CDR);
- Participation in project schedule development;
- Assistance with finalization of the system frequencies and licensing;
- Equipment inventory and inspection;
- Oversight of factory staging;
- Installation supervision and inspection & optimization supervision;
- Coordination between the vendor and the City;
- Technical documentation review;
- Invoice audit and approval;
- Change order management;
- Project meetings participation;
- Construction supervision;
- Periodic project schedule updating;
- Risk management;
- Punch list development and monitoring.

Assistance with finalization of sites and frequencies

If necessary, Black & Veatch will provide assistance with securing the site locations and frequencies that are required by the accepted design. Black & Veatch can provide the services necessary to review and analyze the following:

- Selected sites can accommodate the equipment required;
- Site interconnection can be achieved by reliable and practical means;
- An acceptable lease can be obtained for the property and/or structure;
- The necessary zoning and permitting approvals can be obtained;
- Perform searches for additional frequencies required by the system;
- Expand the use of frequencies to wide area use as necessary;
- Perform contour analysis, short spacing and/or interference analysis; and
- Prepare license applications and assistance with the licensing and coordination process.

Construction management assistance:

During the construction phase of the project, Black & Veatch will act as the City's representative to ensure that the system vendor stays in compliance with the executed contract and in compliance with industry standards and best practices. Additionally, will participate in, and represent the City's interest during inspection of

each of the facilities as necessary to ensure that they meet the requirements in the following areas:

- Building layout and area specifications;
- Heating, ventilation and air conditioning (HVAC);
- Lighting;
- Cable trays;
- Fire protection and safety;
- Weatherproof antenna ports;
- Alarms/Security;
- Electrical and grounding; and
- Site clean-up and landscaping.

Radio Site Construction Management

Black & Veatch can provide construction management services for any new radio sites which might be required as well as modifications for any existing sites. Construction management services can include site development, tower erection, communication shelter construction, and grounding system installation.

Acceptance Testing oversight and evaluation

One of the most critical elements of the system implementation is acceptance testing. This is when the system vendor is required to prove that the system, as installed, meets or exceeds all the contractual performance requirements. The acceptance tests will utilize the acceptance test procedures previously agreed upon during the contract negotiations process and will address the following areas:

Radio features;

Console/Dispatch features;

Microwave/Interconnect performance and features;

Failure Scenarios;

Coverage performance;

Reliability performance.

We'll participate in and oversee this process, analyze the results, and provide recommendations as appropriate to the City and specific action items to the system vendor if necessary.

Training recommendations and assistance

Black & Veatch will work with the City and the vendor to identify and schedule appropriate training programs to prepare the City and all of the stakeholders for proper system administration and operation prior to system cutover. Specifically for the infrastructure, Black & Veatch will expect the system vendor to address dispatcher training, system management training, and maintenance training.

Black & Veatch also will aid in reviewing course syllabi, identifying personnel profiles and typical City participants for the various training sessions proposed and reviewing overall training plans for approach, staffing considerations, recommended class sizes and customer support requirements, in accordance with the vendor contract requirements.

Cutover plan development and transition assistance

Black & Veatch will work with the City and the system vendor to develop an effective cut-over procedure that will minimize agency disruption and provide a smooth transition from the current radio system to the new system. We'll identify all participating stakeholders and assist with the channel/talkgroup planning and radio template development prior to cut-over.

Black & Veatch, together with the City and the system vendor, will identify a timeline that will identify each participating agency, along with a specific timeframe for their transition. This transition schedule will take into account any interoperability requirements among the stakeholder entities, and develop a strategy to maximize the continuity of operations through the transition.

To maintain the highest levels of operational integrity and quality assurance during the transition phase, we'll ensure the inclusion of a fallback plan within the overall risk mitigation plan. This fallback plan will establish a retreat path and recommended criteria for enacting it should it become necessary.

Project Final Review

Following the testing, and in order to complete the project, Black & Veatch will maintain a list of functional, testing, and installation related deficiencies and will make suggestions to the City on resolution methods for all deficiencies. Black & Veatch will ensure that the new radio system has been tested properly per the acceptance test plans and that it performs according to the specifications. This will include validation of the vendor's installation, system acceptance testing procedures, results, and training of operational and support personnel.

Following the review of the above material and results, we'll publish a document providing our assessment to the City, including a detailed analysis of any non-compliance or test failure, and recommendations for resolution toward acceptance of the system and the radio system project.

Schedule

To assist the City with its understanding of the typical timeline for project such as the City's, we've broken down a typical project schedule by phase below:

Phase	Duration
Phase 1 Needs Assessment	3 months
Phase 2 Procurement Support	5 months
Phase 3 Implementation Oversight	12 months

The preliminary and high-level schedule above is only an estimate at this time and will be refined and detailed following further discussions and clarifications with the City.

Proposed Price

Black & Veatch proposes the following pricing based on Tasks 1 through 3 of Phase 1, and optionally, for Task 4 of Phase 2. The cost breakdown by Phase for the scope of work described is as follows:

Project Price	Pricing
Phase 1 - Infrastructure and Needs Assessment – Tasks 1 through 3	\$33,540.00

As an option, should the City desire Black & Veatch to provide a Technical Specification, the associated pricing is as follows:

Optional Technical Specification Price	Pricing
Phase 2 - Technical Specification – Task 4 (Optional)	\$6,400.00

Pricing Assumptions

- Professional fees are based on the estimated hours for the Scope of Work defined in this Proposal document and are based on the hours quoted for each task. This may be adjusted by agreement of both parties if additional hours are needed and/or the scope of work is modified.
- Progress billings will be submitted monthly based on the actual work performed during that month. Payments are due within 30 days of invoice. Payments not paid within 30 days will be assessed a late fee of 1.5% per month.
- Black & Veatch’s proposal assumes no retainage is being withheld.
- The fees and rates contained herein shall remain valid for 90 days from the date of this proposal.
- Black & Veatch's professional fees do not include frequency coordination fees, structural analyses, soil boring (geo-technical) analyses, environmental impact studies, path analyses, or land survey fees.
- Black & Veatch’s proposal does not include Electrical, mechanical, structural, civil, or other design engineering services unless specifically indicated in this proposal. Services specifically requiring a registered Professional Engineering review, certification, or seal are not proposed unless otherwise explicitly stated in this proposal.
- In order to be more responsive to the City’s needs, Black & Veatch respectfully reserves the right to move professional fees & expenses between project phases and tasks as needed to complete the scope of work, as long as the total amount billed to the City does not exceed the contract amount.
- Additional terms and conditions are subject to Black & Veatch’s Services Agreement.

Pricing Assumptions, Payment Milestones and Terms and Conditions will be finalized during the contracting phase.

Appendix A – References

Development, Procurement, and Implementation of new \$25 Million Shared Four-City, Nine-site P25 simulcast Trunked Radio System

Cities of Garland, TX, Mesquite, TX, Rowlett, TX and Sachse, TX

Client: City of Garland is the contracting city for the project

Business Issue: Black & Veatch personnel have supported the City of Mesquite's needs for reliable land-mobile radio communications for more than 25 years. Starting in 1990, Black & Veatch personnel assisted the City in the development procurement and implementation of a new citywide radio communications system for all city departments and the Mesquite Independent School District. That system has supported the city for 23 years and is now in the process of being replaced with modern P25 system technology.

Black & Veatch Solution: In late 2012, the City of Mesquite again selected Black & Veatch personnel to provide consulting assistance and support for the development, procurement, and implementation of their new citywide land-mobile radio system.

In the first phase of the new project, our personnel evaluated the current system's shortcomings, conducted a thorough needs assessment, and developed system various simulcast system design alternatives for system replacement. At that time, Mesquite's neighbor, the City of Garland, was beginning a radio system upgrade / replacement project of its own. Black & Veatch personnel recommended that the two cities consider the development of a new larger, shared P25 trunked radio system which would eliminate wasteful duplication of effort between the two projects and provide a shared system environment that facilitated better system performance, excellent radio interoperability between the cities, and reduced costs for four participating cities. The City of Garland's system users included the cities of Rowlett, TX and Sachse, TX who were also included in the new project making the new system a four-city shared system.

Phase 2 of the project involved development of a competitive shared-system RFP for the new \$25 million nine-site simulcast P25 system. Phase 2 also included solicitation of competitive vendor proposals, evaluation of vendor proposals for the new four-city system supporting an initial user load of 3,000 radios.

Phase 3 system implementation is currently underway.

Project Elements

- Shared four-city radio system replacement
- Start to finish multi-Phased project
- Needs Assessment
- Alternatives Analysis
- Simulcast System Design Alternatives
- Budgetary Cost Estimates
- System RFP Development
- Vendor Proposal Evaluations
- System Implementation
- System Acceptance Testing

Project Status

Phase III Implementation underway

Land Mobile Radio System Improvements

Weatherford, Texas

Client: City of Weatherford

Business Issue: The City of Weatherford, located 50 miles west of Dallas, is interested implementing a new citywide two-way radio system that will support all of the City departments in the near term and well into the future. The City wants to review and evaluate all of the relevant system options that are available to determine which solution best meets the City's needs. Whether the City should implement its own system that supports all City departments, or partner with an outside entity, the City needed to be able to carefully weigh each of the system options in order to make appropriate and informed system decisions.

Black & Veatch Solution: Black & Veatch met with each of the City departments that utilize the current radio system. During these individual discussions, information was collected regarding how each department utilizes the current radio systems and what capabilities are needed to improve their operations. A thorough evaluation of their current operation, radio systems, and user radio equipment was conducted. Black & Veatch reviewed radio coverage requirements listed by each of the departments realizing that each department had different coverage needs. Radio interoperability was also addressed. City departments listed who they needed to communicate with by radio both inside the City and with those non-city agencies to support mutual aid situations.

Our staff developed solutions that met all of the needs and requirements of the users. In this case, the City had several options available for consideration. Black & Veatch analyzed each of the available options and ranked these in accordance with how well they met the requirements of the City. Each option presented was accompanied with a complete system description, a listing of the advantages and disadvantages, an implementation plan, and a system cost estimate.

Based on the rankings of the different options, Black & Veatch provided a recommended alternative along with a multi-year plan that respects their budgeting process, priorities, and capabilities while proceeding into system procurement and implementation.

Project Elements

- Phase I of three Phases
- Needs Assessment
- Development of conceptual system alternatives, budgetary cost estimates
- Preparation of Phase I Report w/ recommendations for system replacement

Project Status

Phase I Completed

800 MHz SmartNet Trunked Radio System Upgrade/Replacement

Norman, Oklahoma

Client: City of Norman, Oklahoma

Business Issue: In 2000 the City implemented a 2-site radio system that was rapidly reaching end of life and did not provide adequate coverage for the expanding City operations. In 2008, the City worked out an agreement with the State of Oklahoma to become a participant in the State's wide-area 800 MHz SmartZone trunked radio system. Following that change, the City began experiencing radio operability problems including a reported "interference" issue that was disrupting communications. B&V staff identified the problem to which was due to system setting at the State level that allowed radio users to interrupt an ongoing radio conversation, a feature that is normally not present in trunked radio systems. The City needed assistance in analyzing and resolving this and other problems as well as planning support for the upgrading or replacement of their existing system configuration.

Black & Veatch Solution: Black & Veatch personnel worked closely with the City's staff to identify and document system needs and requirements and to examine and evaluate system alternatives to resolve their communication system problems. The conceptual system design preferred by the City included expanding the existing 2-site system to a new more robust 8-site P25 Phase 2 TDMA trunked radio system to meet the City's needs for improved radio coverage and system capacity. The new system configuration was based upon utilizing 700 MHz frequencies to enable the existing and new systems to operate simultaneously during the system cutover and transition period. The City staff and City Council were pleased with the replacement recommendations.

Project Elements

- System Evaluation
- Needs Assessment
- Conceptual Design & Recommendations
- Budgetary Pricing

Project Status

Completed

Appendix B - Resumes

Leslie Paramo, J.D.

Ms. Paramo is responsible for business, client management, and project oversight duties for the Western Region of the United States. Her extensive experience in deploying large scale wireless networks, traffic transport and back haul, site construction, and site zoning/permitting execution provides for detailed project planning and execution strategies that result in on-time on-budget project deliveries, effective team management, and reliable client support during all phase of deployment.

PROJECT EXPERIENCE

West Region; Cerritos, California, United States; 2016-In-Progress

Public Safety Director - Black & Veatch. Manages Black & Veatch's Public Safety technical consulting operations in the west region, and provides business and technical expertise to clients in telecommunications system design, wireless voice and data networks, including broadband/LTE. Is responsible for P&L, program management, business development, sales support, service quality and client satisfaction.

AT&T Mexico; Irvine, California, United States; 2015-2016

Latin America Director - Black & Veatch. Oversaw a team of due diligence professionals in pursuit of telecom work in Mexico. Responsible for the strategy and operations in Mexico, including all RFQ submissions.

AT&T Turf; Cerritos, California, United States; 2012-2015

Los Angeles Market Director - Black & Veatch. Responsible for all Project Management on both Services and EPC projects to include total profit and loss responsibility as well as oversight and coordination of design, scheduling, cost, procurement, and construction management. Responsible for managing a cross functional team comprised of 75-115 professionals with six direct reports, 7 Project Managers, 2 Construction Managers, 1 Logistics Manager and 1 Business Manager. Responsible for providing operational guidance and strategy for end to end deployment of all projects. Coordinate and work alongside a regional team that helps to provide support from time to time.

AT&T Turf; Santa Ana, California, United States; 2010-2012

LTE Market Manager - Black & Veatch. Responsible for managing a staff of 44 individuals. Managed all programs in North region of Los Angeles that was comprised of approximately 1400 projects, ranging from new site build, LTE, modifications, microwave, fiber and UMTS carrier projects 1-5. Responsible for all financial aspects of each project, including managing and preparing budgetary reports, approving purchase orders, and invoices related to each project. Directed the day to day execution of each project and supervising the activities of all individuals. Assisted in training of both site development and construction staff. Responsible for managing client expectations as well as provide daily reports on all projects to the client.

PUBLIC SAFETY DIRECTOR

Expertise:

Broadband/LTE; Budget Planning; Business Management; Land Mobile Radio; Process Development; Project Deployment; Project Management

Education

Bachelor of Arts, Criminal Justice, Political Science, California State University at Fullerton, 2010, United States
Juris Doctor, Juris Doctor, Whittier Law School, 2006, United States

Total Years of Experience

12

Black & Veatch Years of Experience

6.1

Language Capabilities

English

Office Location

Cerritos, California, USA: United States

Mark E. Revis

Mark E. Revis is a Engineering Specialist 6 within Black & Veatch's telecommunications business. Mr. Revis is experienced in managing and executing Public Safety telecommunications projects.

Mr. Revis has thirty-eight years experience in planning, implementing, operating, managing and maintaining wireless communications networks. Mr. Revis is also proficient in public safety interoperability, RF propagation modeling, microwave path design, spectrum planning and FCC licensing.

CURRENT PROJECT EXPERIENCE

Project 25 Radio System Upgrade; County of Maricopa, Arizona 2011 - Present

Project Manager. Assist the County in the management of a \$131 million project to upgrade their trunked radio system. Responsibilities include the following:

- Initial project planning and budgeting.
- Manage project budget and schedule.
- Inspect and approve vendor work product.
- Assist Real Estate department with site acquisition activities.
- FCC licensing activities.

PREVIOUS EXPERIENCE

CalSIEC Central Planning Area; City of Fresno, California 2010 - 2011

Director—RCC CONSULTANTS, INC. Provided project management and technical support to seven California counties for a portfolio of projects to improve interoperability for public safety first responders.

Los Angeles Regional Interoperable Communications System (LA-RICS); County of Los Angeles, California 2009 - 2010

Director—RCC CONSULTANTS, INC. Developed technical specifications for a countywide, multi-agency trunked voice, wireless data and microwave communication system with a budget of approximately \$600 million.

Public Safety Enterprise Communications (PSEC); County of Riverside, California 2007 - 2009

Radio Engineer II—COUNTY OF RIVERSIDE, CALIFORNIA Senior radio engineer assigned to the implementation of a \$150 million countywide integrated radio network, consisting of P25 trunked voice, dispatch, mobile data, microwave and broadband data components.

ENGINEERING SPECIALIST 6

Specialization:

Wireless Voice & Data Networks for Public Safety and Utilities; Wireless Facility Site Acquisition and Construction; Project Management; Public Safety Interoperability; Spectrum Planning and FCC Licensing

Education

Union County College, Cranford, NJ, Mathematics, 1986 – 1987

Diablo Valley College, Pleasant Hill, CA, Analog & Digital Electronics, 1975 - 1976

Professional Registration

FCC General Class Radiotelephone Certificate PG-12-34316

Began Career

1978

Joined Black & Veatch

2015

Professional Associations

Association of Public Safety Communications Officers (APCO)

Language Capabilities

English

Selected Presentations & Publications

Please see the end of this document for details.

John Birch

John Birch works with state and local public safety agencies, utilities, school districts and institutions of higher learning on land mobile radio, microwave and SCADA system upgrades and system replacement projects. He performs needs assessments, developed conceptual system designs and budgetary cost estimates for communications systems improvement and replacement. He develops system requirements and specifications for Requests for Proposals. John evaluates proposals and assists clients in vendor contract negotiations for system procurement. He provides system implementation oversight, including site inspections and system performance verification and cutover planning.

PROJECT EXPERIENCE

Cy-Fair Volunteer Fire Department (CFVFD); Project 25 Phase II, 700 MHz Trunked Simulcast Radio System; Houston, Texas, United States; 2011-2015

Project 25 Phase II, 700 MHz Trunked Simulcast Radio System - RCC Consultants, Inc. Managing Consultant – RCC Consultants, Worked with the CFVFD and Emergency Services District (ESD) #9 to complete a Phase 1 Needs Assessment of the existing department radio communications systems. Identified any gaps in the existing radio systems capabilities and helped determine future needs for the department. Developed multiple conceptual system design options and corresponding budgetary cost estimates for a new P25 trunked radio system and subscriber radios. Provided objective recommendations on the best system design approach to meet the department’s current and future needs. Developed the new radio system, dispatch console system, subscriber radios and microwave backhaul system technical and functional specifications for a Request for Proposals (RFP). Worked with CFVFD and ESD #9 to develop vendor proposal evaluation criteria and the evaluation scoring matrix. Released the RFP to vendors and assisted CFVFD in establishing vendor oral presentation requirements. Reviewed vendor proposals with the evaluation committee, provided technical clarification and guidance to the committee as needed and assisted the department with vendor contract negotiations. During Phase III of the project assisted the department with 700 MHz spectrum acquisition and FCC and FAA regulatory requirements. Provided critical design review support, developed systems performance test requirements and attended factory acceptance testing. Provided ongoing construction oversight to insure quality conformance. Verified system functional performance and provided support for Delivered Audio Quality coverage test of the new system. Worked with the vendor and CFVFD in development of the system cutover plan.

MANAGING CONSULTANT

Expertise:

APCO Project 25 Radio Systems; Communication Systems Grounding and Surge Protection; Conventional Radio Systems; Mobile Data Radio Systems; Radio System Design; Radio System Performance Verification; Radio Tower Site Development; RF Interference Analysis & Mitigation; RF Propagation Modeling; Trunked Radio Systems

Education

Total Years of Experience

17.5

Black & Veatch Years of Experience

0.3

Language Capabilities

English

Office Location

Texas, USA: United States

Bobby Jones

Mr. Jones is responsible for providing land mobile communications consulting services for B&V's Public Safety and Critical Network Services clients. His expertise encompasses all aspects of Public Safety and CNS wireless communications systems including needs assessment, feasibility studies, system evaluation, planning, radio propagation analysis, engineering design, specification preparation, procurement support, proposal evaluations project implementation, and acceptance testing. Mr. Jones has 29 years of wireless communications experience in Texas and throughout the country.

PROJECT EXPERIENCE

Rockwall County, TX; Shared P25 Phase 2 TDMA Simulcast; Rockwall, TX, Texas, United States; 2014-In-Progress

Lead Engineer / Project Manager - Black & Veatch. Serving as lead engineer and project manager for the planning, development, procurement, and implementation of a new shared 700 MHz P25 Phase 2 TDMA simulcast trunked radio system for the County, and the cities of Rockwall, Heath, Fair, Royse City, and McLendon Chisholm. Mr. Jones is currently the client's project manager overseeing the vendor's implementation of the P25 Phase 2 radio system.

City of Houston, TX; City of Houston Public Safety Radio System Replacement; Houston, Texas, United States; 2006-2013

Engineer - RCC Consultants. RCC's lead engineer for the development, procurement and implementation of the City of Houston's new \$130 million citywide 700 / 800 MHz Project 25 Phase 2 trunked radio system. Mr. Jones was involved in development of system alternatives, cost estimates, the competitive procurement RFP, development of proposal evaluation criteria and methodology, evaluation of vendor proposals, and supported contract negotiations with two system vendors. Mr. Jones also served as the City's lead Project Manager throughout the 5 year implementation of the radio system. The new Houston system consists of 48 repeater sites, 72 microwave hops, and supports 20,000 City radio users.

Region 51 700 MHz Planning Committee; 700 MHz Frequency Plan Re-sort; Houston, Texas, United States; 2008-2009

Engineer - RCC Consultants. Assisted FCC Region 51 in development of its 700 MHz Regional Plan document. Mr. Jones developed a complete re-sort of the CAPRAD frequency database for Region 51 to provide a higher number of 12.5kHz channels in the plan and provided a county by county re-sort to help ensure that each county had an adequate number of channels available.

SENIOR ENGINEERING CONSULTANT

Expertise:

All aspects of Project 25
Radio System Design;
Contract Negotiations;
Microwave and MPLS
Networks; RFP / Specification
production; Vendor
Implementation oversight
and Acceptance Testing

Education

Bachelor of Science, Electrical
Engineering, Communications,
Texas A&M University, 1987,
United States

Total Years of Experience

29

Black & Veatch Years of Experience

.75

Language Capabilities

English

Office Location

Houston, Texas, USA: United States

Appendix C – Additional Black & Veatch Qualifications

Since the dawn of cellular, Black & Veatch has deployed wireless networks for the wireless, utility and government industries. Over the years, we've developed a proven suite of site development services. Tested with success on several national deployments, these services are designed to be scalable - performed at a local, regional or national scale. They're designed to be flexible - delivered ala carte or turnkey with as many resources needed to complete the project. Above all, they're designed to be executed seamlessly with high quality, on-time and on budget.

As your partner, Black & Veatch will share with you our best practices gained from deploying large, thousand-site, multi-region projects for our wireless carrier clients. We've taken our large-scale program and project management processes, and applied it to all our wireless projects, so all of our clients experience the same expertise and services that leading carriers count on us to deliver for their advanced 3G and 4G wireless networks, such as:

- Program Management
- Planning & Consulting
- Site Acquisition
- Engineering
- Procurement
- Site Construction Management and Construction

Black & Veatch has provided site development services for over 100,000 wireless sites. Our project experience includes all types of communications supporting facilities ranging from the simplest pad-based equipment cabinets to thousands of transmit sites spread across the U.S. with mid-sized equipment shelters, all the way up to and including complex manned network central facilities, data centers, POP/switching facilities and control center facilities for utilities and public safety dispatch with enhanced 9-1-1 services.

- Network Consolidation and Expansion
- Greenfield Network Deployment
- Collocations
- Site and Lease Audits
- Site Hardening / Backup Power Services
- Equipment Upgrades
- Backhaul Networks (Fiber, Copper/T1, Microwave)
- Spectrum Rebanding
- Regulatory and Security Compliance Issues
- Workforce Management
- Service Restoration and Reliability
- Alternate energy and off grid solutions

Mission Critical Communications Experience Overview

For more than 1,500 clients around the world, Black & Veatch has provided solutions through wireless and wired voice/data communications and information technologies. Our consultants and engineers are experts in strategic planning and direction, business analysis, system design, procurement, implementation, systems integration, monitoring and maintenance.

Our Technical Expertise

Radio Communications Systems

- All frequency bands HF, VHF, UHF, 700 MHz, 800 MHz, 900 MHz and microwave
- Digital and Analog Systems
- Conventional and Trunked Systems
- Simulcast Systems
- Cellular and Other Roaming Technologies
- Coverage Prediction Modeling
- Interference Control and Analysis
- Coverage Measurement and Verification

Microwave and Fiber Optic Transmission Systems

- Point to Point and Point to Multipoint
- Digital – Ethernet Microwave Radio Design
- Analog/Digital Interface and Conversion
- Alarm and Monitoring Systems
- Microwave Propagation Modeling
- System Optimization
- Power Supplies

Communications/Dispatch Center Planning, Facilities Design and Cost Estimating

- Consolidation/Co-location Studies
- Floor Plan Layout
- Space Planning
- Ergonomic Recommendations
- Environmental Controls
- Dispatch Console Furniture Design
- Console System Radio and Data Interfaces
- Dispatch Center Staffing and Management Operations Studies

Public Safety Emergency Telephone Systems

- E9-1-1 Emergency Telephone Number Systems
- Wireless 9-1-1 Deployment
- Wireless Location Accuracy Testing
- Automatic Call Distributor Systems

Intelligent Transportation Systems

- Traffic Management Systems
- Highway Advisory Radio Systems
- Mass Transit Communications Systems

Telephony Services

- Voice over IP (VoIP) Network Specification/Deployment
- ACD Administration
- Performance and Capacity Management
- Call Accounting Services

Information Technology And Data Systems

- Computer Aided Dispatch (CAD)
- Records Management Systems (RMS)
- Mobile Computing (MDC)
- Automatic Vehicle Location (AVL)
- Geographic Information Systems (GIS)
- Field Based Reporting (FBR)
- Wireless Data Systems – Public and Private

Data Networks

- Local and Wide Area Networks
- Broadband Wireless (WiMax, WiFi, LTE)
- Voice, Data, Video Structured Cabling Systems
- Supervisory Control and Data Acquisition

Fiber Optic Networks

- Campus Networks
- Metropolitan Networks

Communications Site Planning

- Tower Specifications
- Site Development, Planning, Zoning, Acquisition
- Lightning Protection, Grounding, Bonding
- Equipment Shelter and Room Design
- Security and Alarm Systems
- Backup Power and Fuel Systems
- Automatic Fire Suppression Systems
- Surveillance Cameras

Network Services

- Business Case and Strategic Planning
- Network Planning, Engineering and Construction
- Network Optimization and Management

Market Research

- Technology
- Market Segment Research

Our Approach

At the foundation of our relationship with every client is a strategic, disciplined approach to providing long-term solutions. During the past 30 years, we have developed comprehensive engineering and project management practices to create our time-tested approach that ensures success for our clients.

According to Standish Group’s *Chaos 2007 REX: A Standish Research Exchange*, a staggering 39% of projects with budgets exceeding \$10 million failed. Failure is defined as either total abandonment or failure to meet one or more of the key project objectives within the budget and time allocated. Proper project management and planning are vital to ensuring a project’s success.

Black & Veatch has managed more than 4,000 communications and information systems projects for organizations big and small. To ensure the success of each project, we utilize a companywide project approach based on the Project Management Institute (PMI)’s global best practices.

“If You Fail to Plan, You Plan to Fail”

Black & Veatch’s five-step approach to any project starts with project initiation and planning. Through our decades of experience, we have found that proper planning can reduce risk, ensure alignment of objectives, capitalize on efficiencies and ultimately lead to project success.

Once planning is complete, the project moves into the execution phase. This is often where the bulk of the work plan is executed, and depending on the project, tasks can range from developing specifications to designing radio systems to installing tower sites.

A key step in our project management approach is monitoring and control. This is an iterative process, and only after successful acceptance testing can a project be considered closed out.

Throughout a Black & Veatch project’s lifecycle, there is

extensive communication among the project team and with our client. By communicating regularly, all stakeholders are kept informed, promoting collaboration and reducing re-work.

A Companywide, Shared Model

All of our project managers, and many of our engineers, have participated in more than 50 hours of project management training. The training teaches the best practices from PMI, as well as the specific, practical application of those practices for telecommunications engineering projects.



Figure 7. Black & Veatch's Project Management Approach

Black & Veatch utilizes a companywide, shared model, based on PMI's global best practices, to ensure the success of each and every project.

Through our application of a consistent project management methodology, which we employ for all engagements, we ensure consistent and efficient delivery for our clients.

Black & Veatch's Public Safety and Government Practice

Black & Veatch has specialized in communications consulting for public safety and government clients since 1983. A trusted industry advisor, we help domestic and international governments, law enforcement, Fire departments, EMS, dispatch centers and other public safety agencies get the most out of their mission-critical communications systems.

We know that public safety agencies and governments have unique needs. We also know the complexities they face with their communications systems, not only in technology, but also in business planning. That's why we devote an entire practice to supporting the needs of public sector agencies – Black & Veatch's Public Safety and Government practice.

Specialized Services for the Public Sector

Black & Veatch's Public Safety and Government practice helps our clients determine their needs and develop a solution, whether they are upgrading, improving or building new systems. With the right strategic planning, our clients' information and communications systems can deliver the increased efficiency and productivity they need, within their budget. We assist our clients with:

- **Developing strategic plans**, including definition of goals and objectives, and conducting needs assessments, technology evaluations, risk analyses and staffing reviews.
- **Designing systems and facilities using new and emerging technologies** for data, voice and video networks, emergency communications and operations centers.
- **Investigating and developing funding methodologies and financial analyses** to help justify recommended solutions.
- **Identifying and obtaining grants** in support of technology initiatives.
- **Assisting with the regulatory approvals** needed for licensure of wireless systems, antenna sites and other facilities.
- **Conducting radio frequency research** and enabling acquisition.
- **Preparing detailed specifications and procurement documents** for new or upgraded technology.
- **Assisting in negotiating contracts and service level agreements** with vendors.
- **Implementation support and installation oversight** to ensure work is completed according to the specifications, on time and within the established budget.

Technology Expertise for the Public Sector

Our consultants and engineers are experts in planning, designing, procuring and implementing communication systems. To provide the best support to our public sector

clients, we have focused our Public Safety and Government practice on providing customized services in six areas: Wireless Communications, Information Systems, Mobile Data, Communications Centers, Emergency Number Systems, and Business Planning and Management.

Wireless Communications

Governments and public safety agencies are facing rapidly changing economic conditions and high consumer expectations for easy access and quick response. Wireless communications and interoperability among agencies and jurisdictions are critical to meeting those needs. Black & Veatch has helped hundreds of client improve their interoperability and get the most out of their wireless communications systems. We assist public safety agencies and governments with:

- Interoperability Assessment, Planning, Design and Implementation
- RF System Design and Performance Engineering
- Coverage Analysis and Enhancement
- Spectrum Planning and Licensing (VHF,UHF, 700 MHz, 800 MHz, 4.9 GHz)
- Conventional and Trunked Radio
- Public Safety Broadband
- Microwave Networks
- Paging Systems
- 800 MHz Rebanding
- Interference Resolution
- Wireless Data/Voice/Video Networks
- Wireless LANs (802.11x)
- System Integration, Maintenance and Optimization
- Cellular, PCS & LMDS System Design

To enhance radio systems for public safety agencies and governments, we provide the following specialized services:

Microwave Radio Engineering

Our experts conduct microwave path engineering and system design, including point-to-point propagation, multipath fading, diffraction and reflections along path, antenna system configuration and optimization, Fresnel and earth curvature clearance, line of site verifications, and system testing, optimization and implementation.

Radio Propagation and Coverage Analysis

Scope

Black & Veatch designed the microwave backhaul network supporting Pennsylvania's statewide land mobile radio network. It is believed to be the largest private microwave radio network in the U.S.

Black & Veatch's propagation and coverage analysis helps determine the optimum site layout and distribution, as well as radio system coverage and expected system reliability. Our consultants have utilized and tested industry-leading toolsets, such as ComSiteDesign, Signal Pro, Planet and Pathloss to aid in radio propagation and coverage analysis. The portable toolset delivers comprehensive multi-site coverage analysis, interference analysis, multiple point-to-point and point-to-multipoint analyses.

Radio Frequency Interference Analysis

To assist with base station site engineering and frequency compatibility, Black & Veatch uses another powerful software tool. This tool includes a database of more than 3,000 antennas, filters, transmitters and receivers to allow engineers to determine the minimum required isolation and protection from unwanted signal.

Spectrum and Regulatory Services

Proper planning for frequencies, including how many are needed, how they will be used and how to acquire them, is essential when a radio communications system. Black & Veatch's regulatory experts assist public safety clients with frequency planning, searches and licensing applications for VHF, UHF, 700 MHz, 800 MHz and 4.9 GHz frequencies.

Our experts provide support and advice to help our clients identify, manage and control any existing or future regulatory risks. All of our work is performed in accordance with the Federal Communications Commission (FCC) or European Telecommunications Standards Institute (ETSI).

Antenna Site Planning and Engineering

Black & Veatch provides a full range of antenna site design and construction management services to support radio communications systems, including:

Site Plans and Specifications

- Planning board/permit approval process
- Tower specifications
- Antenna specifications
- Equipment shelter specifications

Power and Monitoring Systems

- Emergency generator and fuel supply systems
- Uninterruptible power supply systems
- Rectifier and battery DC power system

Procurement Assistance

- Construction cost estimates
- Final bid documents, including sealed construction drawings
- Option analysis (value engineering)
- Bid review, negotiation and construction contracts

Project Management

- Project scheduling
- Subcontractor coordination
- Review of equipment shop drawings

\$1MM

Black & Veatch's regulatory specialists saved more than \$1 million in licensing fees for four New Jersey towns building a shared emergency communications system.

- Grounding and surge suppression
- Security access control, CCTV systems
- Fire detection and suppression systems
- Tower light monitoring systems
- Change order and cost management
- Start-up and system commissioning
- As-built drawings and documentation

Information Systems

Urgent demands from customers, combined with internal goals and objectives, require that public safety agencies and governments not only make smarter network and systems deployment decisions, but also make them faster. Black & Veatch can help agencies enhance and improve their voice and data infrastructure, and update and optimize mission-critical systems. Black & Veatch provides expert consulting services in:

- VoIP Systems and Networks
- TCP/IP network design
- LAN/WAN
- Records Management Systems (RMS)
- Utility Management systems
- Criminal Justice and Jail Management Systems
- Geographic Information Systems (GIS)
- Voice and Data Recording Systems
- Fleet Management
- Document Management/Imaging
- Computer Aided Dispatch (CAD)
- Mobile Data Computing
- Automated Field Reporting
- Automatic Vehicle Location
- Enterprise Resource Planning
- Field Force Management and Reporting

Mobile Data

Black & Veatch has been at the forefront of the mobile computing industry since the early 1980s. Our engineers designed, built and optimized the first nationwide public mobile data network in the United States, which now includes more than 2,000 base station sites.

We have continued to build on that expertise, assisting hundreds of public safety agencies plan, design, procure and implement mobile computing systems on both public and private platforms. Our engineers are experienced in the latest technologies and policies, and are frequently invited to participate on panels and regulatory committees regarding mobile data standards.

Our expertise to help our clients with their critical mobile communications includes:

- Commercial Networks
- 2G, 2.5G, 2.75G and 3G Technologies (TDMA, CDMA, GSM, GPRS, EDGE, WCDMA, CDPD, iDEN, UMTS)
- Wireless Application Protocol (WAP)
- Wireless LANs (802.11x)
- Multimedia Messaging Service (MMS)
- SMS Text Messaging
- IP Media Subsystem (IMS)
- Push-to-Talk over Cellular (PoC)
- VoIP and Location Based Services
- Base-stations and Backhaul Networks
- Broadcasting and Multicasting to Handheld Devices
- Audio Visual Coding Technologies (Sound/Video/Multimedia Data Compression)
- Field Force Management and Reporting
- Tactical Map Display Systems
- Message Switching
- User Equipment Selection and Configuration
- Interference Resolution
- Automatic Vehicle Location

Emergency Number Systems

More than 25 countries around the world operate universal emergency number systems, providing citizens with rapid access to emergency services. Since Britain introduced the

first system, “999,” in 1937, there have been many sophisticated advances, including automated caller number identification and caller location information.

Black & Veatch helps public safety agencies and governments take advantage of these opportunities, and plan for future advances. Our team of Emergency Number Professionals and experienced engineers has consulted on systems for a wide range of clients – from the country’s largest cities, including New York and Los Angeles, to smaller, rural counties.

We have extensive experience with major manufacturers of customer premise equipment, automatic call distributors, statewide switch networks and related technologies. Our engineers offer the expertise to:

- Identify emergency services boundaries and configuration
- Identify telephone service requirements and features
- Plan the proper telephone line capacity and number of lines
- Specify and procure call answering and transfer equipment
- Plan personnel, equipment and operational needs
- Verify wireless emergency number location information

Our broad array of consulting and engineering services can be customized to fit individual needs, and includes specific expertise in the following areas:

Traffic Engineering

- Busy Hour Call Volume Per Shift
- Call-Taker Obligated Time
- Emergency Call Process Analysis

Performance Requirement Definition

- Call-Taker Grade of Service
- Telephone Grade of Service
- Staffing Levels

Communications Network Features

- Answering Point Location
- Dispatch Center Locations
- Central Office Service Areas
- Types of Telephone Lines
- Terminal Equipment
- Optional Service Features

Personnel Planning

- Call Takers

Operational Methods

- Direct Dispatch, Transfer, Relay
- Single State or Multi Stage
Emergency Call Handling
Equipment
- Incoming Emergency Lines
- Outgoing Private Lines
- Non-Published Number Lines
- Administrative Lines
- Terminal Equipment

Other Equipment Requirements

- Logging Devices
- Instant Playback Devices
- Intercom Systems
- Automated Call Distributors
- Automated Attendant Systems
- Emergency & Standby Power

- Dispatchers
- Supervisory
- Support
- Systems
- Lightning Protection Systems
- CCTV and Surveillance Systems
- Access Control

Wireless 9-1-1 Location Testing and Verification

Black & Veatch is the exclusive partner with the National Emergency Number Association (NENA) to provide testing and certification recommendation of wireless 9-1-1 location technology installations. This service provides assurance to the public safety answering point and to wireless carriers that the location of an emergency caller is properly routed and received. The benefits to wireless 9-1-1 location testing include:

- Greater public confidence in 9-1-1 systems
- Improved service to public
- Independent review and verification

Business Planning and Management

Now, more than ever, Public Safety and Government agencies are expected to do more with less. To ensure you get the most out of the money you spend, it is critical to work with a strategic partner who can provide planning, assistance, oversight and management to ensure you get the most from your investment.

Black & Veatch offers a wide array of business planning and management consulting services that can be tailored to meet a client's unique needs:

- Strategic Planning
- Business and Business Case Planning/Analysis
- Public / Private Partnership Planning
- Grant Writing
- Disaster Management Planning
- Project Financing
- Business Process Reengineering
- Needs Analysis
- System Design
- Evaluation and Vendor Negotiation
- Implementation Assistance
- Operations and Maintenance Management



- Cutover Support

Antenna Sites

Black & Veatch and our team members can provide turn- key antenna site deployments and build-to-suit projects. Our antenna site services include:

- RF planning
- Site acquisition
- Site planning and zoning support
- Design
- FAA and FCC filings
- Construction management
- Acceptance testing and inspection
- Lease and site valuation
- Business plans
- Ongoing management, operations and maintenance support.

Shown above right is a collocation antenna site maintained by Black & Veatch Facilities Group.

Distributed Antenna Systems (DAS)

As wireless services replace traditional wired telecommunications technologies, demand for reliable in-building coverage in both commercial and residential structures increases. Provision of in-building coverage from outside of the structures is often impractical due to the construction or content of the buildings, or, in the case of residential structures, due to antenna siting restrictions in the area.



Black & Veatch provides full DAS design and construction services. Black & Veatch experience includes provision of these services in high-rise structures, convention centers, tunnels, transportation facilities, and large residential structures.

Shown at left is the Jacobs Javits Convention Center – New York City –DAS Design by Black & Veatch.

Site Acquisition Services

For private or public sector clients, Black & Veatch will locate antenna sites that meet the coverage and capacity requirements of the wireless system. Site acquisition includes identification of existing structures such as towers, buildings, or water tanks, or “greenfield” sites where raw land is available for construction of a new facility.

Black & Veatch provides research into site availability for lease or purchase from a list of candidate sites located within a geographic search ring centered on the area in which coverage is needed.

Black & Veatch researches planning and zoning for the area and will recommend sites with the highest probability of success of approval.

Black & Veatch contacts site owners or managers and determines their interest in leasing space or selling property or structures. Business terms and conditions are discussed with the owner or manager and are used in a comparison of other site alternatives. Candidate sites are ranked in conjunction with the client team and lease negotiation with the representative of the highest rank site commences.

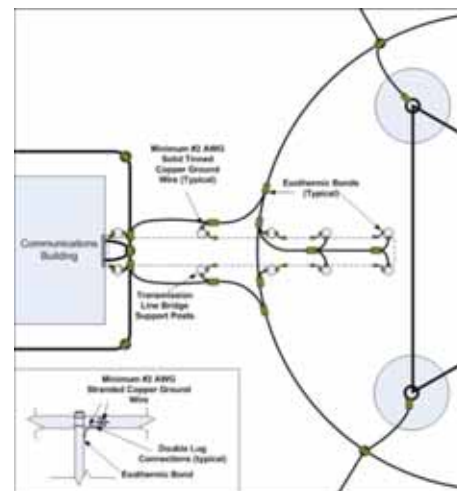
Black & Veatch provides planning and zoning support in conjunction with its site acquisition activity, working with client legal counsel or outside attorneys to move applications through the planning process.

Black & Veatch provides services such as photo-simulation, balloon tests, community outreach, and concealment plans. Other experts such as environmental engineers are retained as needed to meet local requirements.

Specification and Design

Black & Veatch prepares site development specifications and designs for competitive procurement of towers, shelters, site construction, grounding, lightning protection, security, and standby power systems.

Black & Veatch has complete hundreds of site designs in varying conditions throughout the United States and in international markets.



Procurement Assistance

Services provided in support of procurements include:

- Requests for Bids or Proposals
- Pre-proposal process management
- Proposal review
- Bid tabulation and analysis

- Negotiation support
- Technical exhibit preparation for contracts

Vendor recommendations and competitive analysis of proposals are value-added services to the purchaser of antenna sites or components.

Construction Management

On-site construction management by Black & Veatch staff ensures compliance with plans, specifications, permits, licenses, environmental and safety regulations. Empowered construction managers stop work when contractors fail to comply with the terms and conditions under which site work is to be performed.

Quality assurance and inspections provide confidence to the owners that the antenna site has been installed properly. Progress payment management is an important function performed by Black & Veatch to ensure that deficiencies are corrected before contractors are paid.



Shown above is an Black & Veatch project for the construction management of a monopole foundation.

Testing and Acceptance

Verification of performance of antenna site subsystems, such as grounding, installation, electrical distribution, standby power systems, security devices, tower lighting, HVAC systems, and other components is a valuable service that provides protection to the site owner.

Radio Frequency Interference Analysis and Control

Collocation of radio frequency transmitters and receivers without harmful interference is a challenge as antenna space is heavily used on existing towers and structures. Black & Veatch performs interference analyses to identify and cure sources of interference that result from intermodulation and receiver desensitization.

Black & Veatch uses sophisticated software tools which calculates the thousands of intermodulation products that can occur on a heavily loaded site. Black & Veatch engineers use this data, along with equipment performance parameters and inventory of existing installations to both provide solutions to interference problems as well as to prevent problems from occurring.

Appendix D - Black & Veatch Legal Form

TECHNICAL SERVICES AGREEMENT

This Agreement, effective _____, is between _____ (Owner) and Black & Veatch Corporation (Engineer). Engineer shall perform professional engineering services as set forth in a written Request for Services signed by Owner and Engineer (Services). Each Request for Services shall be in the form of the attached Exhibit A. Requests for Services shall be governed by the terms of this Agreement and shall describe the scope of Services, schedule, and compensation terms. Any additional or conflicting terms and conditions contained in Requests for Services shall take precedence over the terms and conditions in this Agreement only for the applicable Request.

1. Engineer warrants that it shall perform the Services in accordance with the standards of care and diligence normally practiced by recognized engineering firms in performing services of a similar nature. If, during the six month period following the earlier of completion or termination of the Services under the applicable Request for Service, it is shown there is an error in the Services caused solely by Engineer's failure to meet such standards, and Owner has promptly notified Engineer in writing of any such error within that period, Engineer shall perform, at Engineer's cost, such corrective engineering services within the original Request for Service as may be necessary to remedy such error.
2. If the Services include providing equipment or material specifications or other procurement services, Engineer shall not be liable for any defects in the equipment or material procured on Owner's behalf. If the Services involve a technical review of work performed by Owner's contractor's or consultants, Owner agrees that its exclusive remedy for defective work reviewed by Engineer shall be from Owner's contractors and consultants who performed the work. Owner agrees to indemnify, defend and hold harmless the Engineer from and against all liability and claims arising out of or resulting from any defect in the work that Engineer reviews.
3. Engineer shall maintain in force, during the period that Services are performed, workers' compensation insurance in accordance with the laws of the states having jurisdiction over Engineer's employees who are engaged in the Services and employer's liability insurance with a limit of \$1,000,000 each occurrence and in the aggregate. Engineer also shall maintain commercial general liability insurance with a limit of \$1,000,000 per occurrence and in the aggregate; automobile liability insurance with combined single limit of \$1,000,000; and professional liability insurance with per claim and aggregate limits of \$1,000,000.
4. Engineer shall indemnify Owner against any and all claims, demands and causes of action for bodily injury to or death of persons or for damage to or destruction of property (other than property of Owner or construction work in progress, for which Owner shall have responsibility) resulting solely from any and all negligent physical acts of Engineer while at Owner's facility. The parties hereby waive all claims for damage to their respective property and shall require their insurers to waive subrogation rights against the other party under any applicable policy of property insurance.
5. In performance of the Services, it is understood that Engineer may be supplied with certain information and/or data by Owner and/or others, and that Engineer will rely on

- such information. It is agreed that the accuracy of such information is not within Engineer's control and Engineer shall not be liable for its accuracy, nor for its verification.
6. Owner may, with or without cause, terminate the Services at any time upon 10 working days written notice to Engineer. In such case, Engineer shall be paid costs incurred and fees earned to the date of termination and through demobilization and neither party shall be entitled to any other compensation or damages from the other. Engineer may suspend performance or terminate this Agreement if Owner fails to pay undisputed invoices.
 7. At all times, each party shall retain all of its rights in its drawing details, designs, specifications, databases, computer software, copyrights, trade and service marks, patents, trade secrets, and any other proprietary property. Owner shall not use, or distribute to others, any Engineer statement or opinion for the purposes of a prospectus, other investment memorandum or financing decision, except with Engineer's prior written consent, which shall not be unreasonably withheld.
 8. Owner may audit and inspect Engineer's records and accounts covering reimbursable direct costs for a period of six months following the completion of Engineer's Services. The purpose of any such audit shall be only for verification of such costs. Engineer shall not be required to keep records of or provide access to those of its costs expressed as fixed rates, a lump sum, or as a percentage of other costs.
 9. Neither party shall be liable to the other party for loss of profits or revenue; loss of use; loss of opportunity; loss of goodwill; cost of substitute facilities, goods or services; cost of capital; cost of replacement power; governmental and regulatory sanctions; and claims of customers for such damages; or for any special, consequential, incidental, indirect or exemplary damages. Except for an obligation to make payments, neither party shall be in default to the extent any nonperformance is caused by a circumstance beyond such party's reasonable control. The warranties, obligations, liabilities and remedies of the parties, as provided herein, are exclusive and in lieu of any others available at law or in equity. Engineer's total aggregate liability under this Agreement shall not exceed the compensation received by Engineer under the applicable Request for Services, and Owner agrees to release, defend, indemnify, and hold Engineer harmless from and against any and all further liability arising in any manner from the Services. To the fullest extent allowed by law, releases from, and limitations of liability shall apply notwithstanding the breach of contract, tort including negligence, strict liability or other theory of legal liability of the party released or whose liability is limited. Engineer may subcontract portions of the Services to its related entities.
 10. In the event of any controversy, claim or dispute between the parties arising out of or relating to this Agreement, including its enforcement, such controversy, claim or dispute shall be governed by the laws of the state of Missouri, excluding provisions which would apply the laws of another jurisdiction; provided however, it is not the intent of the parties to render any provision of this Agreement void or unenforceable by the selection of the governing law.

(Owner)

Black & Veatch

(Engineer)

By: _____

By: _____

Title: _____

Title: _____

EXHIBIT A

REQUEST FOR SERVICES

TECHNICAL SERVICES AGREEMENT

Between

And

Black & Veatch Corporation

Pursuant to the terms and conditions of the Technical Services Agreement executed and made effective as of _____, by and between _____ (Owner) and Black & Veatch Corporation (Engineer), Owner hereby requests, and Engineer agrees to perform the following Services for the compensation indicated below:

A. Scope of Services:

B. Schedule:

C. Compensation:

D. Monthly Billing: Commencing on or about the first day of the calendar month following execution of this Agreement, and monthly thereafter, Engineer shall furnish Owner with an invoice covering the Compensation incurred during the previous month and any interest due under this Agreement. Payments are due upon receipt of invoice.

E. Method of Payment: Payments to be made to Engineer under this Agreement shall be electronically transferred either by ACH, specifically in CCD+ or CTX format, or wire transfer to the bank account and in accordance with the bank instructions identified in Engineer's most recent invoice in immediately available funds no later than the payment due date.

Invoice number and project name shall be referenced in the bank wire reference fields or the ACH addenda information.

F. Invoice Disputes: In the event Owner disputes any invoice item, Owner shall give Engineer written notice of such disputed item within 10 days after receipt of such invoice and shall pay to Engineer the undisputed portion of the invoice according to the provisions hereof. If Owner fails to pay any invoiced amounts when due, interest will accrue on each unpaid amount at the rate of twelve percent per annum, or the maximum amount allowed by law if less, from the date due until paid according to the provisions of this Agreement. Interest shall not be charged on any disputed invoice item which is finally resolved in Owner's favor. Payment of interest shall not excuse or cure any default or delay in payment of amounts due.

This Request for Services and the above-referenced Agreement constitute the complete understanding of the parties with respect to the Services specified herein. Any contrary terms and conditions contained in purchase orders, work orders, or other documents issued by Owner with respect to the Services shall be of no force and effect.

IN WITNESS WHEREOF, the parties have executed this Request for Services on the date(s) indicated below.

Owner

Engineer

By: _____

By: _____

Title: _____

Title: _____

Date: _____

Date: _____