

SECTION 3 – PROJECT PLAN AND APPROACH

RCC understands that Rochester Hills has released this RFP to select an experienced and qualified consultant to provide radio consulting services to include engineering services for the technical design, review, project breakdown, procurement, implementation and a complete radio frequency propagation study of a telemetry system that will be used as a communications backbone for the water and sewerage SCADA network.

Approach: Proposed Work Plan

It is clear from the detail provided in the City's RFP that a licensed 900 MHz point-to-point system is the desired solution to support the City's new SCADA system. RCC has proposed a robust work plan that will allow the City to consider multiple system solutions and ensure that the City ultimately procures and implements the best, most efficient, cost effective system that will meet the City's current and future communication needs.

RCC's proposed work plan begins with a needs assessment and recommended solution report. Once a final system design has been chosen by the City, RCC will perform the required field verifications of the paper design. RCC's primary proposal includes all travel, labor and equipment costs required to test 35 point-to-point paths. If the actual number of paths tested is different, then the price will be modified based on the per-site / per-path cost provided.

As an option to the City's proposed scope of work, RCC recommends that the City consider an approach that begins with a needs analysis, followed by a computer simulated design, and concluded with a proof of concept for a limited number of paths. A proof of concept field test for approximately five of the City's RTU sites will provide adequate data to fine tune a computer model with field data. Additionally, RCC recommends that the City's procurement process place responsibility for system performance on the selected communications equipment vendor.

RCC has also proposed procurement and implementation support of the new system as well.

The following sections define RCC's proposed scope of work:

Detailed Scope of Work

Task 1: Needs Assessment and Recommend Solution

During the project initiation meeting, RCC will work with the City's team to schedule site visits and interview sessions with the participating agencies. To assess and understand the needs and requirements of the City, RCC personnel will work with the City's project team to gather the needed information through an interview and questionnaire process. The interview process is intended to review, update, and obtain current information on specific details that will affect the design, procurement, and implementation of the communications systems. It will identify the coverage, equipment requirements, and other needs of participating agencies through the process of interviewing and gathering background reports, studies, and other pertinent documentation.

The needs assessment will consider the following service areas:



1. Department of Public Services
2. City Hall Facilities
3. Other Agencies Identified by the City of Rochester Hills

RCC will develop survey forms and questionnaires to meet the specific needs of the City and participating agencies. Approximately two weeks prior to the project kickoff meeting, RCC will send a set of data collection documents and a checklist of documentation that the participating departments and agencies should have on hand in order to effectively participate in the survey and interview process. Agency-specific survey documents will be provided at this time for each agency to complete. RCC will assist stakeholders as needed to complete the surveys.

Task 1-1: User Group Meeting and Staff Interviews

RCC will begin the needs assessment with a presentation to the user group that explains the scope of the project and the tasks assigned to RCC by the City, review the user questionnaires, deliverables, and schedule, and answer any additional questions that the users may have. A user group meeting allows system users to discuss their views and communications needs. At the conclusion of the user group meeting, RCC will begin interviews with participating agencies.

The purpose of the interview process is to identify the current, short, and long-term user needs and requirements for the communications systems. RCC will work closely with the City to schedule the interview sessions so that they may be conducted thoroughly and efficiently. The sessions will be conducted at mutually agreeable locations within the City.

The interview schedule will be discussed and reviewed with the City's team prior to the arrival of RCC personnel. RCC will commit to follow up phone interviews as required in order to maximize stakeholder participation.

The interview sessions will provide an opportunity for all participating agencies to provide input on their needs and expectations of the new communications system, and enable RCC personnel to provide an overview of the technology and capabilities that are available from the system vendors. In addition, due to our nationwide experience, RCC personnel will be able to provide insight into the ways that other agencies are solving some of their similar communications problems.

Task 1-2: Develop Concept of Operations

Based on the interviews, and prior to developing design alternatives, it is important to have a detailed understanding of how the operators of the system intend to use it under different operating conditions and various scenarios. Such an understanding, known as a Concept of Operations, describes the functionality of the system from the user perspective. This becomes a key input to determine what technology solutions will meet the needs of the users. RCC's experience has proven that operations should drive technology instead of technology driving operations. Prior to the commencement of evaluating technology alternatives and developing design recommendations, RCC will work with the stakeholders to develop by consensus a Concept of Operations for approval by City.

Task 1-3: Site Visits

The purpose of site visits is to allow RCC personnel to review and document City facilities. RCC staff will document the site's equipment, layout, condition, and other pertinent details at each location.

RCC's work plan includes visiting the infrastructure locations identified in Appendix A of the City's RFP document.

Task 2: System Recommendations and Report

Task 2-1: Develop System Solution

RCC understands that the City desires to implement a licensed point-to-point 900 MHz system. RCC will develop two conceptual system solutions to meet the City's requirements as expressed by during the needs assessment.

The systems and issues to review as part of this project include:

- Concept of Operations
- Radio systems
- Backhaul system
- RTUs
- Coverage, including propagation studies
- Frequency band
- Possible interference issues
- Towers and supporting buildings

RCC will consider frequency availability and FCC regulatory requirements in the design of the proposed radio system alternatives. Additionally, RCC will develop budgetary cost estimates for each alternative solution.

Task 2-2: Propagation Studies and Path Analysis

RCC will develop computerized propagation studies of the proposed system solutions and path analyses as required by the proposed designs. RCC's computerized RF study shall consist of two (2) major sections:

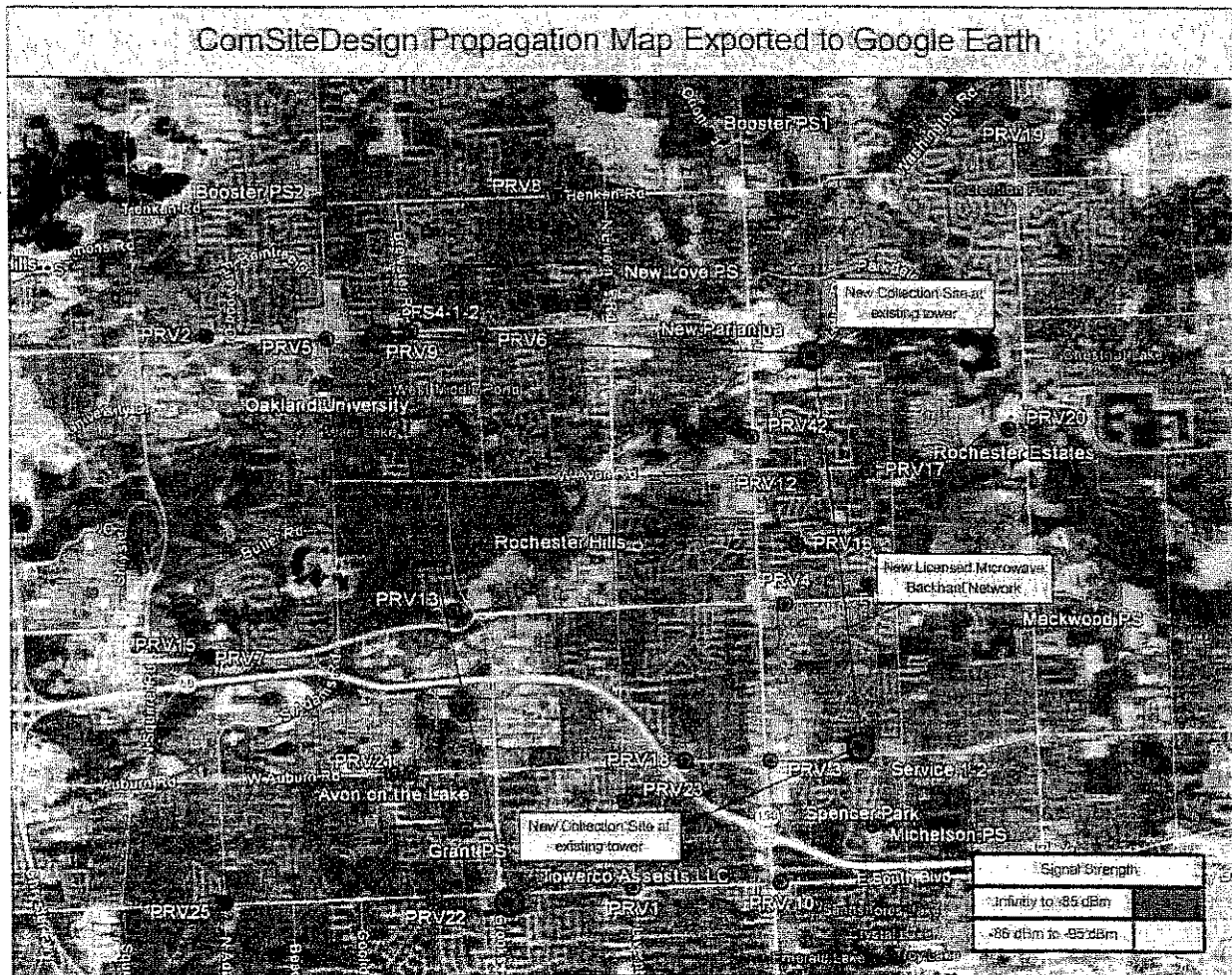
- Fresnel radii topographical analysis in both graphical format and tabular format. The study will employ the latest versions of topographical USGS map data and include any local structures, forest or foliage that would affect signal propagation.
- A signal propagation analysis shall be completed by employing a scientifically proven computer propagation model.

The propagation analysis will use location data gathered by a global positioning system or from a reliable source such as a land surveyor. The propagation analysis report shall be completed based on a successful communications probability of 99.9% with a minimum RSSI -85dBm



RCC utilizes ComSiteDesign™, its in-house wireless design toolset, for radio coverage predictions, and PathLoss 4 for path analysis. Coverage predictions help to determine the recommended number and location of transmit/receive (base stations or repeater) sites needed to meet City requirements. In turn, the number of sites has a significant impact on the budgetary cost estimates developed as part of the project. RCC will conduct a series of radio coverage analyses for the purposes of configuring the system solutions.

The propagation map presented below is an example of what one of the alternative solutions may look like. The system depicts the City's current RTU sites plus two new main collection points located on existing towers. These two sites coupled with the City's existing sites Service 1 and FS4 would provide area wide coverage of all RTUs. RCC has also shown a proposed licensed Microwave backhaul network that would bring all data back to the Service 1 site.



Task 2-2: Develop Report

Once the system solutions, cost estimates, and recommendations for improvement have been developed, RCC will prepare a draft version of the Needs Assessment and Alternative Solutions Report. The report will include an overview of the work completed to date, a high-level description of the City's various systems currently in place, an assessment of physical and strategic deficiencies, and recommendations for resolving the deficiencies. The report will also include additional infrastructure requirements, placement of additional infrastructure, and budgetary cost estimates.

The draft report will be submitted to the City's project team for review. After a short review period, RCC will meet with the City's project team to discuss the report. Finally, RCC will incorporate City feedback in the report and provide a final document to the City.

The deliverable for this task is the Needs Assessment/Alternative Solutions Report for improving the City's SCADA telemetry system.

Tasks 3 and 3A: Radio Frequency Propagation Field Verification and Report

Task 3-1: Radio Frequency Propagation Field Verification

The field verification of the radio frequency propagation study will be based upon the proposed final design of the new system. The final design of the system will affect the frequency, equipment, and number of locations that will need to be tested.

RCC's field radio path study will conform to the following:

1. The field radio path study will be performed to verify that the locations, antenna heights and other results of the computerized path study are valid.
2. Field verifies the antenna placement and expected signal strength for each path noted. Record a minimum of four (4) readings that include the optimum height at multiple locations if needed. Digitally photograph the test location and the recommended installation location.
3. RCC will schedule and coordinate the visit to each site with the City and its engineer. RCC will provide all necessary safety apparatus for our staff or subcontractor to climb facilities where needed. RCC understands that the City's engineer may be present at the time of the testing at some or all of the sites. RCC will provide all necessary equipment required to adequately complete the field verification study, including but not limited to aerial lift, bucket truck or other equipment necessary to elevate the test transmitter(s) to meet the minimum requirements of the computerized path study.
4. RCC will make a best effort to perform the test when full foliage is available. However, if this is not possible, then RCC may include an attenuation adjustment factor to represent foliage for the field test.

Task 3-2: Radio Frequency Propagation Field Verification Report

RCC's will provide a written report including the following:

- A written statement clearly identifying any deviations from these specifications.
- A written statement describing all assumptions associated with the study.
- A written statement clearly identifying any clarifications specific to the proposed sites (i.e., new towers, revised or new repeater sites, new antenna heights, etc.).
- A written description of the proposed testing and validation process, inclusive of a complete description of the type(s) of equipment being used to facilitate the field verification of the RF Path Study.
- Description of the test equipment configuration at each site, such as radio used, antenna used, length and type of cable, installed height, RF power setting.
- Signal strength values received at each site to the prospective repeater locations and the respective antenna heights.
- General observations about the path conditions and any nearby obstructions for each site.
- Suggested antenna mounting method at each site and the associated structural support.
- Photo of the general site, proposed mounting location and horizon view toward the destination.
- Antenna orientation.
- Latitude and longitude coordinates at each site.
- Basic sketch of the site with north direction depicted

The deliverable for these tasks will be six (6) color copies of each final report, each in a three ring binder as well as an electronic version. RCC will also provide a digital copy of all source data files for the report on CD-ROM.

Task 4: Develop Procurement Documents, Proposal Review and Contract Negotiations

Task 4-1: Development Procurement Document

RCC will work with the City's project team to finalize the overall system design and develop an appropriate procurement document for the procurement of a City-wide telemetry system.

The finalized design will be developed to ensure that all requirements of all stakeholders are met. This design will include predicted radio system coverage, path profiles and reliability analyses, and budgetary system costs.

The procurement document will build upon the Recommendations Report and the preliminary design work. Performance and functional requirements for systems will be established and the procurement document will be structured to enable each vendor to submit its most appropriate technology and system configuration. The requirements specified in the procurement document

will be the basis upon which each vendor's proposal will be evaluated. Each vendor will be required to respond to all sections of the procurement document and include, where applicable, any features and capabilities that are optional, and their associated costs. A detailed compliance matrix will be included in the procurement document to allow reviewers to easily determine which proposals meet the specified requirements.

The City may consider requiring vendors to submit their cost information separately to enable the project team to evaluate the technical responsiveness apart from the proposed costs. This approach may improve the objectivity during the vendor evaluations. Additionally, the City may wish to require the vendors to propose continuing maintenance over the expected life of the system and to use this information as part of the cost evaluation.

The procurement document will address specific technical and procedural areas, as well as support areas such as training and maintenance. RCC has listed several examples of specific items that will be addressed in the procurement documents:

- Standard, optional, and vendor proprietary features such as over-the-air programming
- Security and encryption requirements
- System overall throughput
- Installation standards requirements, grounding and bonding, surge suppression
- System equipment specifications
- Minimum signal levels
- RTU antenna configurations
- Base station antenna configurations
- Backhaul configuration (i.e. loop or spur configuration or both)
- Path reliability (i.e. 99.999% path availability minimum) and redundancy
- Optimal transmit and receive antenna systems
- Warranty requirements
- Backup system hardware redundancy requirements
- Failure modes and scenarios

Expandability of the proposed systems to accommodate future growth

- Add users or agencies
- Expand radio channels
- Expand tower sites
- Expand RTU sites
- Expand to encompass AMI
- Network expansion, microwave, fiber, other LAN

Continuing maintenance options and local support

- 8AM to 5PM, 5 days per week service response
- 24 hr, 7 days per week service response
- Response time requirements
- Self-maintained with depot support
- Vendor authorized service shop
- Software maintenance

System/vendor information and qualifications

- Years of experience in implementing large telemetry networks
- Direct client references for comparable systems that have been implemented and operational systems presently in service
- Experience with site development, tower construction, microwave systems, backup power systems
- Technical and product support systems, factory depot service, local factory authorized service centers
- Direct factory technical and product support

System installation and acceptance testing requirements

- Installation mechanical and electrical standards requirements, grounding and bonding, surge suppression
- Installation inspections, equipment specification testing, functional and coverage acceptance testing
- 30-day reliability and final acceptance

Training requirements

- Onsite or training at the manufacturer's facility
- System management training for system alarm and management functions
- Software training for radio programming
- Technical training if self-maintained

RCC will prepare a draft procurement document and submit it to the City's project team for review and discussion. A single cycle of feedback and suggestions from the project team will be incorporated into the preparation of the final document. RCC will finalize the procurement document and deliver it to the City for issuance to the vendor community. RCC will identify a list of qualified vendors that could potentially respond to the bid opportunity.

Within a reasonable time frame after the solicitation for proposals has been released, a pre-proposal conference shall be conducted to ensure that potential proposers understand and can respond to the specifications. RCC will assist the City with the scheduling of the pre-proposal

conference and participate in the pre-proposal conference to assist the City in responding to vendor questions. In addition, RCC will assist in the response to written vendor questions and the issuance of amendments following the proposers' conference.

The deliverable for this task will be a vendor neutral procurement document.

Task 4-2: Proposal Review

In order to ensure that the proposals that best meet the City's requirements are selected, and to minimize potential protests by unsuccessful vendors, a structured approach must be employed for evaluating proposals received by the City. RCC will facilitate a structured evaluation process by developing a set of minimum response criteria and a detailed evaluation matrix that will be used to evaluate each vendor's proposal. The two matrixes will permit the City evaluation team and RCC personnel to evaluate the proposals on an objective basis.

When the proposals are received, the City's evaluation team will make a first pass review looking for gross errors and omissions. RCC has proposed to perform a detailed evaluation of three vendor proposals and to develop a list of questions in preparation for vendor oral presentations. The City evaluation committee will provide RCC with the short listed proposals for detailed evaluation.

RCC personnel will utilize the formal proposal evaluation matrix constructed from the procurement document for the final evaluation of proposals. The evaluation matrix will be designed to indicate the degree of conformance or nonconformance of each proposer's submittal.

The result of the City/RCC evaluation is a Recommendation Report (deliverable) that may include questions for the vendors, a ranking of each evaluated vendor's proposal and a tentative set of recommendations, with justifications, that will be refined as the evaluation process proceeds. A draft will be followed up by a final, which will be the primary source of questions and discussion points for the oral presentations.

Subtask 4-2A: Attend Vendor Oral Presentations

RCC personnel will attend the vendor oral presentations to assist the City's project team in understanding each vendor's offering. RCC will prepare a list of questions as required to clarify certain issues not fully explained in the proposals.

RCC will prepare the final evaluation results including findings and recommendations for the City evaluation team's review and approval. RCC personnel will schedule a teleconference with the City team to discuss the findings and recommendations.

The deliverable for this task will be a vendor selection recommendation report.

Task 4-3: Contract Negotiations

RCC will assist the City in direct contract negotiations with the selected vendor. A negotiating team comprised of the City project team and other officials designated by the City will work with RCC during negotiations.



RCC has participated in many communications system procurements, and therefore has access to a large database of vendor pricing. This database of information allows RCC to negotiate aggressively with radio system vendors to minimize the total system cost to the City. We have saved many of our clients much more than the total of RCC's services during contract negotiations. In addition to savings achieved from contract negotiations, our in-depth knowledge of radio vendor's system design can lead to additional savings by helping to eliminate unneeded equipment or functionality.

As part of RCC's contract negotiations effort, we will help ensure that the City receives favorable contract business and operational terms that will help foster a timely and responsive completion of the installation and system acceptance processes. RCC does not provide legal representation, therefore the City's attorney should also review proposed contract documents.

Finally, as part of contract negotiations, RCC will work with the City team to develop a stringent acceptance testing program prior to execution of a contract. System providers are more likely to agree to such performance requirements before a contract is executed. The negotiation of testing requirements and pass/fail criteria becomes much more difficult after the contract is executed.

Task 5: Implementation Support and System Acceptance Testing

Task 5-1: Monitor Vendor Progress, Issues and Project Status Reports

RCC will assist the City in monitoring the work performance of the selected vendor and will prepare monthly project status reports reflecting the progress and any issues that have arisen during the past month. Recommendations for problem resolution will be provided on a case-by-case basis. RCC will work with the City team and vendor to monitor, track, and help resolve integration issues that may arise during system implementation. RCC estimates this project will have a 6 - 8 month implementation schedule and have provided labor and travel accordingly.

Task 5-2: Assist the City in Acceptance Testing of the New Systems

RCC personnel will work closely with the City's project team to help ensure that the new systems and equipment are appropriately tested prior to system acceptance. Additionally, RCC personnel will assist with the final development of acceptance plans for all systems. The detailed acceptance test plans that were developed during the contract negotiations will serve as the foundation for the acceptance testing process. Each of the systems will be individually tested to ensure that they meet the performance criteria stated in the procurement documents.

Each subsystem is independent of the operation of other system components and as such, requires a separate acceptance testing procedure to determine compliance with the City's procurement document.

RCC personnel have a vast amount of wireless communication system testing experience and will assist with the development of the acceptance test plans and participate in all system specification and reliability testing.

RCC personnel will guide and participate in the radio coverage verification testing to ensure that the level of radio coverage specified in the City's procurement document has actually been

delivered. The radio coverage testing is the most complex and most important testing phase of system acceptance.

Typically, prior to final acceptance, a 30-day reliability period for live system operation is required for final system acceptance. The reliability testing requires the successful operation of the system for 30 days without a major system failure. The reliability testing ensures that the new systems are stable and ready for acceptance by the City. RCC onsite participation is typically not required for the reliability testing, however RCC will monitor the test via teleconferences with the vendor and City personnel.

The acceptance testing process will yield a punch list of various deficiencies that must be corrected prior to final systems acceptance by the City. RCC personnel will maintain and monitor the punch list for the City. The punch list should be completely clear prior to system acceptance including items such as training and final system documentation. RCC personnel will assist the City to ensure that all items required for final acceptance and payment are complete and in accordance with the vendor/City contract prior to recommending final system acceptance.