

Aitkin County Board of Commissioners  
Request for County Board Action/Agenda Item Cover Sheet



To: Chairperson, Aitkin County Board of Commissioners      Date: 09/18/13

Via:

From: Sheriff Scott Turner

Title of Item: Local ARMER Enhancement Site

Requested Meeting Date: 09/24/13 Est. Presentation Time: 15 min

Presenter: Sheriff Scott Turner

**Type of Action Requested** (check all that apply)

- For info only, no action requested       Approve under Routine Business
- For discussion only with possible future action       Adopt Ordinance Revision
- Let/Award Bid or Quote (attach copy of basic bid/quote specs or summary of complex specs, each bid/quote received & bid/quote comparison)
- Approve/adopt proposal by motion       Approve/adopt proposal by resolution (attach draft resolution)
- Authorize filling vacant staff position
- Request to schedule public hearing or sale       Other (please list)
- Request by member of the public to be heard
- Item should be addressed in closed session under MN Statute \_\_\_\_\_

**Fiscal Impact** (check all that apply)

- Is this item in the current approved budget?  Yes       No (attach explanation)
- What type of expenditure is this? \_\_\_\_\_ Other (attach explanation)
- Revenue line account # that funds this item is: \_\_\_\_\_
- Expenditure line account # for this item is: 44-6600

**Staffing Impact** (Any yes answer requires a review by Human Resources Manager before going to the board)

- Duties of a department employee(s) may be materially affected.  Yes       No
- Applicable job description(s) may require revision.  Yes       No
- Item may impact a bargaining unit agreement or county work policy.  Yes       No
- Item may change the department's authorized staffing level.  Yes       No



**Supporting Attachment(s)**

- Memorandum Summary of Item
- Copy of applicable county policy and/or ordinance (excerpts acceptable)
- Copy of applicable state/federal statute/regulation (excerpts acceptable)
- Copy of applicable contract and/or agreement
- Original bid spec or quote request (excluding complex construction projects)
- Bids/quotes received (excluding complex construction projects, provide comparison worksheet)
- Bid/quote comparison worksheet
- Draft County Board resolution
- Plat approval check-list and supporting documents
- Copy of previous minutes related to this issue
- Other supporting document(s) (please list) ARMER site plan, ARMER shelter price, GRE 5-Channel Add ASR Site Project, Granite Proposal GRE ARMER Site antennas

**SCOTT A. TURNER**  
**SHERIFF OF AITKIN COUNTY**

217 Second Street NW, Room 185  
Aitkin, MN 56431

218-927-7435 Emergency 911  
Sheriff Fax 218-927-7359 / Dispatch Fax 218-927-6887  
TOLL FREE 1-888-900-2138

**MEMO**

TO: Board of Commissioners

DATE: September 18, 2013

FROM: Sheriff Scott Turner

RE: Aitkin ARMER Enhancement Site

Aitkin County's ARMER project manager has advised that we have now secured the required permissions from both Mille Lacs Energy Cooperative and Great River Energy to co-locate our equipment on their existing tower and to place a tower structure on the ground. With that being said, we must now move forward to get the project done before the onset of winter.

The Aitkin County Board heard from the emergency response community some time ago about the need for the local enhancement site and at that time the direction was to move forward with this project that was originally outlined in our ARMER participation plan from 2009.

Attached is a copy several documents as follows:

1. Aitkin ARMER Site Plan that was dated 6-25-13 that was presented by Project Manager Rey Freeman from GeoComm. This was presented to the Aitkin County Board at that time.
2. Proposals from Motorola and Granite Electronics for the necessary radio equipment and installation of equipment for this site.
3. A picture/proposal of a radio equipment shelter from Telecom Product Profiles.
4. Memo from project manager Rey Freeman outlining project needs.

At the September 24, 2013 Aitkin County Board meeting, I will be asking for the board authorization to enter into agreements with Motorola, Granite Electronics, Telecom Product Profiles for the items listed above. Additionally, we will need the authorization to hire a local contractor for the concrete work for the shelter pad and some minor shelter modifications as well as some electrical work to the shelter. There will also be the need to purchase a generator for back-up power for this site.

The project estimate that was presented by Mr. Freeman from GeoComm in his June 25, 2013 ARMER Local Enhancement Tower Site Implementation Plan was for \$438,900. Please approve \$380,830 of equipment and installation as outlined on page four of this document.

The initial project cost that was estimated to be \$3,244,950.

Not including this local enhancement site, the project-to-date expenditures for Aitkin County have been \$1,744,295.31.

If you have any questions relative to this project prior to the September 24, 2013 meeting, please do not hesitate to call. Thank you.

# GeoComm

---

**Date:** September 16, 2013

Aitkin County Sheriff's Office  
217 – 2<sup>nd</sup> St NW  
Aitkin, MN 56431

**Attn:** *Sheriff Scott Turner*

**Subject:** Local ARMER Tower Site Equipment Purchase Recommendation

---

Dear Scott:

We have been working to finalize the plan for Aitkin County to add a local 800 MHz tower site for improved ARMER radio system coverage in the city of Aitkin area, and we have now reached a point where the needed approvals have been received, along with pricing for the equipment required for the project. This report finalizes the plan presented in our project outline from back in June of this year.

The following items are needed for the project:

- 800 MHz repeater and control equipment for the tower site
- Antennas, transmission lines, grounding and other miscellaneous items for the tower site
- An equipment shelter to be installed at the site, to house the new radio system equipment
- Local contractor to provide concrete pad foundations for the shelter, generator and propane tank
- Local crane service to offload the shelter onto the foundation
- Emergency generator for Aitkin County radio equipment
- Electrical contractor services for the installation of primary electrical power to the shelter, as well as some minimal rewiring inside the shelter

## **Tower Site Approvals**

Applications for use of the GRE tower site and a master site layout plan were submitted to GRE and MLEC for the county's expanded use of this existing tower site. This was needed because of the county's plan to install a 12-ft x 16-ft radio equipment shelter at the site, along with a 25kw emergency generator and propane tank. Approvals were received from GRE and MLEC on September 13<sup>th</sup>. Aitkin County will be required to execute a no-cost "ground lease" with MLEC to place an equipment shelter at the site, and this is in the process of being completed.

## **Radio System Equipment**

In June 2013 GeoComm outlined the technical requirements for the radio system equipment needed for the project and submitted them to Motorola and Granite Electronics for proposals to Aitkin County.

- A proposal was received from Motorola for the main 800 MHz system equipment needed for the tower site. The equipment and pricing in this proposal meets the State of Minnesota requirements for the ARMER system, and the pricing is based on the existing state contract. Included in the proposal are numerous related items required for a completed and functional 800 radio site.

The proposal from Motorola also includes the installation and programming services needed to ensure the equipment is installed, fully operational, and properly maintained.

The total cost of the Motorola proposal is \$238,813, which includes one year of warranty and maintenance services, and begins after the completion of equipment installation and testing.

- A proposal was received from Granite Electronics for the antennas, transmission lines, and various other items needed to complete the installation of the new 800 MHz radio equipment at the tower site. Their proposal also includes the labor needed to relocate the county's VHF Paging and Microwave radio equipment from the existing GRE equipment shelter into the new Aitkin County shelter.

The Granite Electronics staff will also work with the project's electrical contractors to ensure that the wiring within the equipment shelter meets the Motorola site requirements. The cost of equipment and services from Granite will be \$42,044.63.

A summary of the overall project pricing is provided at the end of this report.

## **Equipment Shelter**

The installation of new 800 MHz repeater system equipment at the GRE tower site requires that Aitkin County provide and install a radio equipment shelter at the site. The county currently has VHF and microwave radio system equipment installed at the site in the GRE shelter, but GRE has indicated that there is no more room available for additional county equipment. They would also prefer that the existing VHF and microwave equipment be relocated from their shelter to the new Aitkin County shelter.

We have planned for an 11.5-ft x 16-ft shelter size, which will easily house all of Aitkin County's existing and planned radio equipment at the GRE site. The purchase of a new equipment was budgeted at approximately \$40,000. Rather than spend this amount on a new shelter, there are numerous used shelters in good condition available on the market from cellular services that have been required to install larger shelters at their tower sites for expanded "4G" systems. We have located a good used shelter from a surplus dealer. This shelter was manufactured in (about) 2003, and is constructed of concrete, which makes it very weatherproof and secure.

This shelter is located a south-central U.S. state, and will be transported by semi directly to the GRE tower site. The pricing we have received for this shelter is \$13,500, which includes truck transportation from its current location to the GRE tower site. Attached is a photo of the shelter from the dealer.

The installation of these shelters requires a concrete floating-slab foundation, which will be sourced from a local contractor in the Aitkin area. We are preparing the basic requirements for the foundation, along with slabs for the generator and propane tank, and will submit this data to a few contractors in the Aitkin area for proposals, and select a vendor based on their responses.

Because of the concrete construction, this shelter is fairly heavy and will require a crane to unload it from the truck and set it in place on the foundation. We will coordinate with Acorn Crane Service of Brainerd to schedule this work. We worked with Acorn on the delivery of the large radio shelter at the Crosby tower site earlier this year.

### **Other Tower Site Equipment**

- An emergency generator and propane tank will be needed at the site to power the county's radio equipment in the event of a power outage. The county has received a proposal from Ziegler Caterpillar for a 25kw propane-fueled generator, which will be located in a weatherproof outdoor housing, adjacent to the equipment shelter.

The cost of the generator proposal from Ziegler is \$20,500 including delivery to the tower site. This price does not include the cost of electrical connections to the primary service, installation of the transfer switch, or wiring into the shelter's main panel.

- The services of an electrical contractor will be needed for a variety of work at the site, including:
  - Primary electrical service to the shelter from the local utility (there is now a transformer about 75 ft from the tower site compound)
  - Installation of the transfer switch, wiring to main breaker panel, and wiring of a master disconnect within the shelter
  - Wiring from the shelter to the generator
  - Miscellaneous wiring within the shelter to meet Motorola and Granite requirements
  - Grounding of the shelter, generator, and propane tank

The county has done a significant amount of work with Dutch's Electric of Aitkin, including work done earlier this year for the county's main radio system project at the Sheriff's Office. We recommend again working with Dutch's for this work at the tower site. We had budgeted approximately \$10,000 for electrical work, although this cost will vary based on the specifics of the work needed at the site.

**Summary**

We recommend that Aitkin County move forward with the purchase of the radio system equipment from Motorola and Granite Electronics as proposed. Motorola will require signed purchase agreement for their equipment. Granite has indicated that an email or other written approval is all that is needed for them to proceed with their equipment and work for the project.

We will continue to serve as the project coordinator, and work with all vendors to ensure the equipment and work is delivered and properly installed. Shown below is the budget for the project:

<b>Equipment Item</b>	<b>Pricing</b>	<b>Budgeted</b>
Motorola System Equipment	\$152,687	\$170,000
Motorola Installation and Optimization Services	\$ 84,213	\$126,000
MN Sales Tax	\$ 15,985	\$ 15,000
Granite Electronics Equipment and Services*	\$ 42,045	\$ 20,000
Microwave Radio System Updates	\$ 5,000	\$ 5,000
Equipment Shelter, delivered	\$ 13,500	\$ 40,000
25kw generator	\$ 20,500	\$ 20,000
Crane Service (estimated)	\$ 2,500	\$ 2,500
Concrete Work (estimated)	\$ 7,500	\$ 7,500
Electrical Work (estimated)	\$ 15,000	\$ 10,000
FCC Licensing	\$ 1,000	\$ 2,000
5% Contingency	\$ 20,900	\$ 20,900
<b>Grand Total – All Equipment</b>	<b>\$380,830</b>	<b>\$438,900</b>

\* Some of the equipment being provided by Granite was originally to be supplied by Motorola, but it was more cost effective to purchase directly from Granite.

The equipment and services outlined in this project plan, once completed, will provide Aitkin County public safety and other radio system users with greatly improved radio coverage throughout the City of Aitkin and surrounding areas on the 800 MHz ARMER radio system. It is our intent to have this work completed by the end of 2013.

Sincerely



## **Aitkin County, Minnesota**

### **ARMER Local Enhancement Tower Site Implementation Plan**

---

Since Aitkin County's conversion to the State of Minnesota 800 MHz ARMER in early 2013, it has been documented that the radio system coverage for portable (hand held) radios within the City of Aitkin has been less than required for reliable public safety communications, especially when the radio users are inside of the various building structures. This situation had been predicted in the project planning documents, but Aitkin County had elected to wait until the State's tower sites within Aitkin County were fully constructed and operational before making a commitment and expenditure on the development of a local enhancement tower site in the City of Aitkin area. Unfortunately, the distance from the closest ARMER tower sites to the City of Aitkin area (~10 miles) has resulted in the diminished in-building coverage. Some EMS/First Responder personnel located a mile or two southeast of Aitkin have also reported poor coverage in that general area. As such, Aitkin County has chosen to move forward with the implementation of an 800 MHz ARMER local enhancement tower site near the City of Aitkin to resolve these coverage issues.

This document presents a plan for Aitkin County to move forward with the purchase and installation of the needed equipment for this Local Enhancement site project.

### **Local Enhancement Site Requirements**

---

The development of an ARMER Local Enhancement tower site requires numerous technical and administrative elements to be addressed, as follows:

1. State of Minnesota/MnDot approvals
2. Construction or leasing of local tower structure
3. Equipment shelter to house the radio system equipment; electrical service and emergency power generator
4. Purchase and installation of 800 MHz repeater system and network control/interface equipment
5. Microwave or T-1 connectivity of the site into the ARMER network
6. 800 MHz frequencies and FCC licensing

A review of each of these project elements is provided herein, along with the status of each item. Some work has already commenced on several of these project components, which is documented here. The following topics are also addressed in this plan:

7. Project cost estimates
8. Project schedule



## **I. State of Minnesota and Mn/Dot Approval**

The operation of any local enhancement tower site(s) must be approved by the State of Minnesota and MnDot, through the Operations and Technical Committee (OTC) and State Radio Board (SRB). The original ARMER Participation Plan that was developed for Aitkin County in 2010 and presented to the various State agencies included a new local enhancement tower site in the City of Aitkin area.

However, upon the County's earlier decision not to implement this tower site, a letter was submitted to the OTC and SRB in October 2012 stating the County's revised plans.

Because of that documented change, and the County's now-revised intent to move forward with the new tower site, MnDot, the OTC and SRB must again be notified and approve of the County's plans for the new tower site.

- GeoComm submitted to MnDot on June 12, 2013 a notice of the County's plans to move forward with the new site, along with some basic technical information about the site. MnDot staff notified GeoComm on June 28, 2013 that they have no objection to the new site, and approve of its development.
- GeoComm has prepared a letter to the OTC and SRB, stating the County's revised plans, and will be presenting this to the OTC at their meeting on July 9, 2013. No objections are expected in response to the presentation of this revised tower plan.

## **2. Local Tower Site Structure**

The first and most logical choice for a local tower site is the existing GRE (Great River Energy) structure, which is located 2 miles south of downtown Aitkin. This is a 284-ft guyed tower that was constructed in 2011, and is in excellent condition. Aitkin County is currently a tenant on this tower, and operates both VHF and microwave system equipment. There is no monthly fee or rent that is currently being charged by GRE to Aitkin County for the use of the tower site.

GeoComm first contacted the GRE tower site management staff (Dennis Olson) on May 21, and he provided verbal approval for Aitkin County to utilize their Aitkin tower site for the installation of 800 MHz radio system equipment. He stated that the unused antenna mounts now on the tower at the 230 ft level, where Aitkin County currently has a VHF paging antenna installed, should be available for the installation of two 800 MHz antennas (one for transmitting, one for receiving). He directed us to submit a revised tower site lease/usage application to them with the proposed equipment configuration.

The 800 MHz RF coverage maps prepared by GeoComm and provided to Aitkin County, utilizing the GRE tower site, show excellent coverage throughout the city and surrounding areas.

- This revised tower site lease application was prepared and submitted to GRE on June 12, 2013. No further response has been received from GRE at the time this plan is being prepared.

The GRE staff advised that the tower structure was designed for additional antenna loading, and no structural analysis of the tower should be needed for the installation of the new Aitkin County antennas. However, Mr. Olson did state that their radio equipment shelter is relatively full, and that Aitkin County will be required to supply and install separate radio equipment shelter at the tower site for the County's radio system equipment.

### **3. Radio Equipment Shelter, Emergency Generator and Electrical Service**

As GRE has advised that their existing radio equipment shelter is full, and there is no room for the additional Aitkin County equipment, the county will be required to supply a shelter at the site for the new 800 MHz equipment. There are typically a few options for this, including the construction of a building on-site with local contractors, or the purchase and installation of a prefabricated shelter, which would be delivered to the site and installed complete. The prefabricated shelter is usually the preferred option, as the buildings are delivered prewired, with all electrical cabling, overhead cable ladders, HVAC equipment, antenna cable ports, and other items needed for a complete installation. The State of Minnesota has chosen to use this approach at most of their new tower sites established for the ARMER system.

We assume that in addition to the new 800 MHz equipment, the existing VHF and microwave radio equipment now in the GRE shelter would be relocated to the new Aitkin County shelter. Based on this information, we assume a shelter of 12 ft x 18 ft would be appropriate size, depending on the generator situation (refer to the next paragraphs).

Another factor that will need to be determined is whether Aitkin County will need to supply and install a propane-powered emergency electrical generator. GRE stated that it may be possible to connect the new Aitkin County shelter and equipment to GRE's existing generator, but it will depend on the total radio electrical power requirements. We are in the process of determining what the power load will be for all of the Aitkin County equipment, including the new 800 MHz stations, VHF paging station, and microwave radios.

If the calculated load exceeds what GRE is capable of providing, then the county will need to supply a generator. The typical size of generator used for these radio sites is 20kw or 25kw. The other decision to be made is whether to purchase an equipment shelter with a separate room to house the generator (to protect it from weather and animals) as has been done with the GRE shelter, or to install the generator outdoors in a weather-and-critter-proof housing.

The primary vendor for the radio equipment shelters being used by the State of MN is Thermobond, located near Sioux City, Iowa. We have contacted Thermobond to see what options are available, and how quickly a shelter could be supplied. All of their shelters are custom built to customer requirements, and as such they do not have any shelters on hand to be sold immediately. Their typical delivery time is 60 to 90 days.

Some electrical work will be needed to supply power to the new shelter. If the calculated electrical load allows connection the GRE building, this will be simplified. If not, then new electrical service from the local power utility would be needed for the new shelter.

#### **4. 800 MHz Radio System Equipment**

The main 800 MHz repeater and network interface equipment needed for the new tower site will be purchased directly from Motorola. GeoComm initially contacted the Motorola staff and presented them with a brief overview of the new site on May 23, 2013. Motorola advised that the preferred approach would be for GeoComm to submit the site's technical requirements to Motorola via their "Statement of Requirements" (SOR) document.

- GeoComm prepared the required SOR and submitted it to Motorola on June 24, 2013. Staff Engineer Bre Krech has been assigned to this project; she had worked with Aitkin County on the original system implementation project.

Bre has responded with a few basic technical questions, and GeoComm provided responses to those questions. We are now waiting for a response from Chris Meier, the Motorola sales account rep, with information regarding how soon a proposal will be received from Motorola. Chris has indicated that a proposal should be ready before the end of July.

Once the proposal has been received and reviewed, a contract will be established between Aitkin County and Motorola for the equipment and services.

#### **5. Microwave/T-1 Connectivity**

Connectivity from the GRE tower site to the State's Master Site in Duluth will be needed for operation of the new 800 MHz local enhancement tower site. Aitkin County currently has microwave equipment located at the GRE site which is linked to the Glen ARMER tower site; we have notified Granite Electronics of the need for this circuit, and they have advised that there is a "spare" T-1 available in the county's existing microwave path to meet this need.

- GeoComm contacted the State of MN/MnDot staff on June 12 regarding the need for a T-1 circuit "mapped out" from the Glen ARMER tower site to the Duluth MSO for operation of the new GRE tower site. MnDot staff advised on June 28 that a T-1 circuit has been allocated from the Glen site to Duluth for operation of the new site, and this circuit should be ready for the county's use by the time the site equipment has been installed.

## 6. 800 MHz Frequencies and FCC Licensing

A set of five (5) 800 MHz repeater channels will be needed for the operation of the new tower site. The State of Minnesota/Region 22 NPSPAC channel plan, which was established many years ago, had allocated a group of five repeater channels for use by Aitkin County for this purpose.

- GeoComm is in the process of preparing an FCC license application for the use of these 800 MHz channels for the new GRE tower site. This application will first be submitted to the State of MN/Region 22 NPSPAC committee for approval, and then forwarded to APCO for processing, approval, and submission to the FCC. Aitkin County will be responsible for the payment of the application fees associated with this license.

## 7. Project Cost Estimates

GeoComm has developed the following cost estimates for the Aitkin County ARMER local tower site project:

Item No.	Item	Est Cost	Vendor
1.1	800 MHz Site Repeater and Network Equipment	\$178,000	Motorola
1.2	Implementation Services for new Site Equipment (Motorola)	\$133,000	Motorola
2.0	Antennas, transmission line, grounding and installation services	\$20,000	Granite
3.0	Microwave System Updates	\$5,000	Granite
4.0	Equipment Shelter with Generator (new, installed)	\$70,000	TBD
5.0	Misc. Electrical Work	\$10,000	TBD
6.0	FCC Licensing	\$2,000	GeoComm
7.0	5% Contingency	\$20,900	NA
	<b>Total Estimated Cost</b>	<b>\$438,900</b>	

The costs of the Motorola equipment are based on recent ARMER system equipment purchases made by other neighboring counties. The cost of the equipment shelter will vary depending on the size of the building, and the emergency generator options.

## 8. Project Schedule

The following estimated schedule has been established for this tower site project:

June 24	SOR submitted to Motorola
June 28	Approval received from State of MN
July 10	Present revised plan to State OTC
July 12	Submit FCC licensing application to Region 22 and APCO
July 16	Determine options for new equipment shelter
July 22	Proposals received from Motorola and Granite Electronics
August 7	Contract finalized with Motorola and Granite Electronics
August 9	Order/purchase equipment shelter
August 19	Finalize tower site lease agreement with GRE
September 2013	Delivery of equipment from Motorola and Granite
Sept/Oct 2013	Delivery and installation of equipment shelter
Sept/Oct 2013	Installation of antennas and transmission
October 2013	Installation of equipment from Motorola and Granite
Oct/Nov 2013	Optimize site equipment; site becomes operational

# Used 11.5' x 16' Concrete Shelters

**\$9950 ea. ( new \$47,700 )**



- Quantities available
- Price includes loading on a truck
- Drawings available
- Price Includes loading on a truck
- Many shelter extras included
- VFP, Cellexion, and Fiberbond
- More pics available
- Super shelters for the price !!

## Telecom Product Profiles

**765-427-5827**

**[sales@telepp.com](mailto:sales@telepp.com)**

