TECHNICAL INTERCHANGE MEETING (TIM) #1 MINUTES
CONSTRUCT SCADA SYSTEM AT
CAMP STANLEY STORAGE ACTIVITY, TEXAS
FA8903-04-D-8675/DELIVERY ORDER 0011
PARSONS 744225.01000

Date: Wednesday, 23 February 2005 – 1:00 PM to 5:00 PM
Thursday, 24 February 2005 – 8:00 AM to 12:00 PM
Place: Camp Stanley Storage Activity (CSSA)
Subject: Review of SCADA Implementation Work Plan
Attendees:

Attendee	Organization	Phone
Teri DuPriest	HQ AFCEE/IWA	210-536-4745
Jason Shirley	CSSA Install. Manager	210-295-7416
Brian K. Murphy	CSSA Environmental	210 698-5208 210 336-1166
John Janice	COI	210-669-6904
Juan T. Delos Sanfos[1]	CSSA-Engineering	210-295-7492
Herman Stinson	CSSA-Support Division	210-295-7420
Jeff Aston	USACE	210 336-1270
Eli Wright	CSSA-Facilities Eng	210 336-0077
Chris Beal[2]	Portage	210 336-1171
BrianVanderglas[1]	Parsons-Austin	512 719-6059
John Diedrich	Parsons-Atlanta	678 969-2340
Ryan Lynn	Parsons-Atlanta	678 969-2471
Henry Dress[1]	Parsons-Austin	512 719-6063
Scott Pearson[3]	Parsons-Austin	512 719-6087

[1] Attended only on February 23, 2005.
[2] Attended only on February 24, 2005
[3] Minutes prepared by Scott Pearson, Parsons-Austin.

The agenda, sign-in sheet, and presentation slides for this meeting are presented in Attachment 1.

INTRODUCTIONS

The meeting was opened with brief introductions. The purpose of the meeting was to review the progress of the SCADA design as detailed in the Implementation Work Plan (IWP), which was delivered to CSSA as a draft version on 4 February 2005. The meeting included the AFCEE team chief, project managers and design engineers from Parsons, and CSSA staff and contractors representing the environmental and engineering departments, as well as installation management and support divisions.

OVERVIEW OF THE PROPOSED SCADA SYSTEM

As requested during the kick-off meeting, Parsons prepared the IWP to look at all aspects of SCADA capabilities for potential implementation, in addition to the locations specified in the original statement of work (SOW). Parsons approach was to define two phases of implementation in the IWP. Phase 1 included those items and locations specifically listed in the SOW and some additionally selected priority locations identified during the kick-off meeting, and Phase 2 considered additional monitoring nodes that are not covered under the current TO 0011 funding.

Scott Pearson summarized the elements of each phases using Microsoft PowerPoint slides. A hard copy of that presentation is provided in Attachment 1. Phase 1 of the IWP included considerations for the following elements:

PHASE 1

- Automated Pump Control, Reservoir Level, Chlorination, and Metering for the Potable Water Supply System (CS-1, CS-9, CS-10, and the Reservoir)
- 61 electrical sub metering connections at 49 end-use buildings/locations
- Water metering
    - 8 metering locations associated with potable wells, reservoir, and booster system
    - 26 end-use monitoring points
    - 3 monitoring points at WWTP, Irrigation System and CS-16 GAC
- Natural gas sub metering at 9 end-use buildings/locations
- Waste Water Treatment Plant (WWTP)
    - TPDES-permit monitoring parameters
    - Automated chlorination and flow monitoring
    - Integration of Outfall 001 Irrigation System (TO 006)
- AST Monitoring
    - 2 Tanks at Motor Pool
    - 1 Tank at Building 200A
    - 1 Tank at Emergency Generator
- Meteorological Monitoring at 2 Weather Stations
- Other
    - Monitoring at 3 HVAC units
    - Monitoring of the Emergency Back-up Generator
    - Pump Run Status at 8 locations

PHASE 2

- Assume up to 10 in-line remote monitoring locations on the potable water distribution system
- Monitoring Wells
  - 21 wells at 14 locations have existing In-Situ transducers that can be integrated into the SCADA system with the appropriate telemetry equipment.
  - 6 piezometers at AOC-65 have transducers that will be integrated with AOC-65 Weather Station.
  - An additional 20 monitoring wells at 15 locations are capable of being equipped with transducers and telemetry equipment for SCADA integration.
  - Long-term monitoring optimization (LTMO) will be used to determine what wells are best to observe.

Ryan Lynn gave an overview of the proposed SCADA architecture. The system would comprise of up to 4 work stations (Buildings 1, 36, 38, and 98), with a master station located at either Building 1 or Building 98. CSSA conveyed their concern that the location of the master station is still undecided because the buildings are being re-allocated by department. Because of the facility's Ethernet infrastructure, the master station can easily be relocated to another location should it be required. Until those changes are effected, the plan will place the master station within Building 98. As a cost saving measure, CSSA has 2 existing work stations that are currently unused and can be integrated as SCADA work station nodes within the facility.

The SCADA system will use existing CSSA fiber optic network to the extent possible. The fiber optic system will allow the telemetry to be transmitted via a TCP/IP Ethernet protocol where fiber pairs exist at buildings. In the draft IWP, it was anticipated that 21 Phase 1 locations would implement the wired Ethernet system. Additionally, Phase 1 as outlined in the IWP would require an additional 31 nodes to communicate by wireless radio telemetry. The Phase 2 locations listed in the draft IWP would all require wireless radio telemetry for up to 40 locations.

For those monitoring locations where fiber optic cable is not present, a radio telemetry system will be utilized. Options for radio telemetry include 0.5-watt frequency hopping spread spectrum (FHSS) radio operating in the 900 Megahertz (MHz) frequency band, or 5-watt VHF radios operating on the CSSA-licensed frequency of 138 to 150.8 MHz band (per e-mail transmittal on 2 March 2005). With FHSS radios, security is provided by the frequency-hopping nature of the signal, but typically a line-of-sight trajectory is required between communication points, due to the low power output of the radio which is limited by the FCC. With the 5-watt VHF radios, security encryption is handled by proprietary pre- and post-hardware processors, and because of the higher signal strength and lower operating frequency, the radios are capable of propagating its signal through physical interferences much better than the 900 MHz radios can and the line-of-sight requirement is not as stringent. However, with either of the radio systems a radio survey of the facility is advised prior to bidding.

The SCADA will employ the use of the fire tower east of Building 4 as a radio repeater location. Most SCADA sites are within line-of-sight of the fire tower, and are likely to be within the sphere of either the 900MHz or VHF communication, since there is little interference anticipated. CSSA indicated that they have a Structural Engineers Report for the Fire Tower which can be provided to Parsons for review.

REVIEW OF THE IMPLEMENTATION WORK PLAN

A roundtable discussion regarding the content of the draft IWP ensued. Aside from editorial comments, discussions regarding the subject matter revolved around specifics of SCADA monitoring and locations. Mr. Jason Shirley (Installation Manager) asked if there were cost efficiencies to be realized by monitoring utility branches (water, gas, and electricity) rather than metering at individual buildings. Parsons engineers indicated some cost efficiencies could be realized if utility branches could be monitored by area, as a dependent variable to the layout of a particular system to be monitored. For instance, bulk water metering can be obtained in the residential section rather than individual living quarters. This concept can be applied to gas and electrical metering as well.

It was brought to attention of the group that CSSA owns its entire power grid, including poles, wires, and transformers. The revelation prompted John Janice and John Diedrich to suggest that the primary 4 kilo-volt (kV) lines could be monitored by branch rather than sub metering low voltage usage at individual buildings. The power grid is divided into a north and south legs, and can be independently monitored at the new emergency generator station being constructed. The incoming power from CPS can also be monitored at the incoming switchgear. The electrical system can be monitored by logical branches serving differing parts of the facility (e.g.; residential, warehouses, etc.).

As it relates to power monitoring, the bottom line is that CSSA Engineering wants to evaluate peak demands, while the CSSA Environmental department will focus on conservation. CSSA can provide Parsons a recent electrical distribution survey conducted by the Alexander Utility Engineering, Inc. As an action item, Ryan Lynn and Scott Pearson performed a cursory power utility survey immediately after TIM#1 adjourned on February 25 to identify clustering options. Based on that survey, a conceptual electrical clustering schematic is provided in Attachment 2.

In turn, the same approach was considered for natural gas and water. CSSA indicated that it would be interested in measuring the incoming natural gas, and its northern and southern branch segments can be monitored near their junction at monitoring well CS-MW10-LGR. CSSA would also like to retain the 9 individual buildings with active gas usage to be monitored as indicated by Brian Murphy.

The discussion turned to the monitoring of the potable water distribution system. While the SOW specified end-point water consumption monitoring, that is being reconsidered at this time. CSSA is planning on upgrading most, if not all, of the existing water distribution system. At this time it is not clear whether only the force mains will be replaced, or the entire system will be replaced. The general consensus by the group is that these projects should mesh, but duplication of effort should be avoided. The worst case scenario would be that new meters would be installed on old lines, only to be disturbed or replaced in the very new future. CSSA is only at the conceptual phase of the distribution system upgrade, so the details of how that work will progress are unavailable. Parsons recommended water metering should be left out of the current SCADA effort, and the procurement and installation of meters could be included with the installation of the new system. That way, meters could be placed exactly where they needed to be with no duplication of effort. When the meters are installed as part of the distribution system project, it would be easy to come back to those locations and integrate those instruments into the SCADA system with new remote telemetry units (RTUs). At this time, this approach seemed acceptable to all stakeholders present at the meeting.

As a caveat, Brian Murphy conveyed his wish to collect building-specific data at high-usage locations such as Buildings 1, 4, 38, 90 and others for water, electrical, and natural gas. In particular, those buildings that are known to have relatively new water lines could be installed without the specter of being re-worked as part of the water system upgrade. CSSA has already pre-purchased 15 electrical meters, so these items will be used at a minimum for end-point metering at high-priority locations.

Several other comments were received regarding the IWP. With respect to the monitoring wells, the same optimization and prioritization could be applied rather than monitoring every single well. It was noted that monitoring clusters or well pairs resulted in the most efficiencies since one RTU could monitor several wells. Spatial locations would also be a consideration in monitoring the aquifer. Finally, wells that should hold a high priority with alarm notifications would be those wells listed in the drought contingency plan (CS-3, CS-11, CS-16-LGR, and CS-MW2-LGR). Potentially, the drought contingency wells may be modified to include other wells that are better suited for SCADA monitoring.

Other priority locations identified by CSSA for the Final IWP would include the Building 1A Annex currently being constructed and the new Industrial Park. Both will have fiber optic service. CSSA would also like to see a high-level alarm incorporated on the recently-installed lift station near Building 36. An inquiry regarding monitoring a septic system at Building 38 was also made. There is very little to monitor on a septic system except the tank level, which operates on a narrow fluctuation interval. It was generally agreed that the resulting data would probably not justify the expense.

Discussions regarding product warranty were brought up by CSSA. There was a recommendation by Parsons for CSSA to consider procuring much of the instrumentation and provide it to the installation subcontractor as government-furnished equipment (GFE) to avoid incurring associated state sales taxes, any mark-up, and handling fees (approximately 10-12% of equipment cost). John Diedrich noted that when purchased directly from a manufacturer or vendor, the typical 12-month warranty date begins as soon as the product is received. The likelihood that some equipment warranties would expire shortly after the installation of GFE could be a serious consideration for the government. When a vendor/installer provides the equipment, the warranty begins usually after a 30-day operational test. While the government would incur some mark-up on equipment, the warranty issues might justify the additional cost.

John Diedrich explained that 12-month extended warranties are usually available at approximately 2.5% of purchase price. Parsons also recommended that CSSA consider a long-term Operation and Maintenance (O&M) agreement with an instrumentation/integration vendor. CSSA was going to discuss at another time if they would consider providing GFE rather than purchasing the equipment through a Parsons subcontractor. CSSA also indicated that they should check to see if there are any established GSA rate schedules for the equipment described in the IWP.

CSSA expressed interest that if the contractor was allowed to purchase the equipment with associated mark-ups then CSSA could be provided some sort of extended warranty by the contractor. Further negotiations will be required.

CSSA inquired as to whether any buildings would need to be shut down during SCADA installation. Parsons anticipates preparing a schedule that includes weekend work, and would coordinate any necessary shut down with CSSA staff. Parsons will attempt to forecast construction schedules 14 days in advance, and will advise CSSA on a weekly basis of ongoing activities. John Diedrich indicated that most service disruptions would be short, on the order of 2 to 8 hours.

REVIEW OF ENGINEERING COST ESTIMATE

As requested during the Kick-off meeting, the draft IWP included an approximate engineering estimate to procure and install the various SCADA components on a site-by-site basis. The estimate provided with the IWP included total subcontractor costs (instruments and installation only) at a value of nearly \$1.1 million for both Phase 1 and 2. The group was notified during the meeting that a math error had been included with that estimate, and the correct value was closer to \$1.38 million (Phase 1 and 2).

While CSSA was reviewing the draft IWP, Parsons had contacted a potential vendor to independently review the IWP and provide a budgetary estimate based on the same design outlined in the document. The vendor estimate was returned with a total value of \$2.0 million for both Phase 1 and 2 (parts, installation, and integration only). Discussions with the vendor indicated their estimate was biased high because of the unknown construction factors and because they utilized the spreadsheet from our IWP which included unrealistic markup on certain cost items. The actual cost of the entire system as described in the IWP would likely fall between the \$1.6 and \$1.8 million range. Parsons labor for delivery order management, oversight, O&M/Training was not included in that price. The vendor-supplied estimate is included within the Attachment A slides.

The Phase 1 costs are anticipated to range between \$920,000 and \$1,370,000. The Phase 2 costs were estimated between \$457,000 and \$630,000. The full integration of all available monitoring wells accounts for \$300,000 to \$350,000 of the Phase 2 costs. In-line monitoring of the potable distribution system and the additional integration effort would account for the balance of the Phase 2 subcontractor cost.

These engineering estimate values significantly exceed the current approved budget for subcontract costs (integrator and parts) of approximately \$620,000. CSSA indicated that sites should be prioritized and clustering efficiencies described in the previous section should be implemented to reduce costs to the government's budgetary limits. Further discussion of the site-by-site review to prioritize and reduce costs was postponed until the second scheduled day of TIM#1.

BUDGETARY REVIEW

Parsons reviewed the existing approved budget with the group to establish a baseline of current allowable costs. The current contract value is \$981,200, with approximately \$275,200 obligated as Parsons labor. The bulk of the project budget (63%) is tied to the subcontractor purchase, installation, and integration of SCADA components, which was estimated at $619,800 in the proposal. The remainder of the project budget is obligated to other direct costs (ODCs).

Based on the engineering estimates provided above, a Phase 1 shortfall of more than $300,000 is expected for the entire SCADA network described in the draft IWP. Phase 2 costs, which are not currently part of the SOW are estimated at $457,000 to $630,000.

ABOVEGROUND STORAGE TANK (AST) UPGRADES

Henry Dress provided an update on the TO 006 design effort of the AST upgrades located at Building 4. Currently, the fuel supplier uses a top-fill port (diesel only) when re-fueling the depleted ASTs. From a safety standpoint, Parsons has recommended that a Remote Spill Container enclosure with check valves be used for filling the MOGAS AST. The diesel tank will continue to be filled from the top-fill port. A platform will be added to the diesel tank to improve safe access to the fill nozzle. Finally, CSSA will review TCEQ correspondence with Camp Bullis about applicability to Edwards Aquifer Protection Program requirements for the Contributory Zone and determine whether project-specific direction from the TCEQ is necessary for this task.

The discussion was relevant to the SCADA system since the ASTs are scheduled to be monitored under TO 0011. The TO 006 budget has an ODC allowance of $10,000 dollars to provide monitoring equipment that is capable of reporting status to an RTU. It is anticipated that the TO 0011 budget will include the costs to provide an RTU for Building 4, and integrate the ASTs with the SCADA system. The current AST system is equipped with a Tank Sentinel® TS-504 system that logs the status and provides alarms with the current configuration. After the meeting, Parsons inspected the existing Tank Sentinel® system, and anticipates that it can be wired into the RTU to provide telemetry data to the SCADA system. The exact model will be researched further for integration compatibility.

This concluded the first day of TIM#1, and the site-by –site review was resumed at 8:00 am on February 24, 3005.

SITE-BY-SITE REVIEW

On the second day of TIM#1, the meeting resumed to perform a roundtable site prioritization in an effort to better match available funding with the government's higher priority SCADA locations. Parsons prepared a Microsoft Excel cost spreadsheet that listed each site and those components that were associated with the monitoring at a specific location. The individual costs were rolled up by location, and summed as total project cost. With this set-up, individual locations could be easily added, deleted, or modified and provide an instant cost impact to the bottom line. The cost spreadsheet was projected overhead so that all attendees could monitor and make suggestions. Sites were prioritized by overall importance by the CSSA staff. The final list of Phase 1 sites are provided in Attachment 3.

The basis of Phase 1 will be to control and automate the potable well field and reservoir as well as the WWTP. Incoming electrical and gas utilities will be monitored, and the main north and south branches of each utility will be metered. Each one of those utilities will be further broken down into clusters to monitor a logical sub-group, such as warehouses or residential areas. As given in the draft IWP, full location monitoring (gas, water, and electric) will be performed at selected sites prioritized by CSSA. These generally include Building 1/1A, 4, 36, 38, 90, and 100. Remote telemetry will also be provided from select wells, including clusters CS-MW1, CS-MW6, CS-MW9, CS-W10, CS-MW12, CS-MW16, and CS-MWH. Ancillary sites will include the GAC Shack, Outfall 001 Irrigation System, lift station, and cluster monitoring of the new Industrial Park. Upon review and acceptance of these meeting minutes, these locations will be finalized as the Phase 1 locations in the final IWP version.

Starting with the estimated $2.0 million cost (which is considered to be more comprehensive than the IWP estimate), the subcontractor equipment and installation costs were reduced to approximately $1.1 million, as shown in Attachment 3. The basis for this cost is that CSSA intends to fund an additional $500,000 to TO 0011 above the $620,000 installation cost already authorized. Teri DuPriest requested that rough estimate costs for the additional $500,000 be forwarded to Julie Roberts within the next two weeks so that AFCEE can prepare a SOW modification to TO 0011.

OTHER

Confidential and secure information was discussed. CSSA requested that no details regarding the fiber optic or natural gas layouts are to be included within subcontractor bid packages. Only end-point monitoring locations can be provided. The subcontractor to whom the work is awarded will be provided with limited additional data to assist in their implementation of the SCADA system. CSSA did not have an objection to using actual building numbers in any bidding packages.

At the end of the meeting, alarm messaging was discussed. Parsons prepared a list of alarm notifications (Attachment 4) that can be considered with the SCADA system. Most alarms will deal with high or low level status, the fault status of pumps and motors, or outlying operational parameters. It is anticipated that many more type alarm notifications will present themselves, and will be tailored and integrated to meet the needs of CSSA.

Brian Murphy, Jeff Aston, and Scott Pearson had a discussion regarding electrical codes on Friday, 25 February 2005. The vendor that had been contacted by Parsons to review the IWP had expressed concerns regarding the performance of electrical work on existing systems that did not meet code. Their experience with older facilities was that many electrical systems have not been upgraded to current standards, and licensed electrical contractors are reluctant, or refuse, to make modifications/additions to circuits that are not to code specifications. To do otherwise puts their professional licensing at risk. Brian Murphy advised that not all code standards are applicable to federal facilities, and perhaps a waiver could be conveyed to provide assurances to the electrical subcontractor. Whether such a waiver is acceptable is not known at this time. Since CSSA is an older facility, the specter that outdated electrical systems are present is likely and such issues may arrive during the construction phase.

ATTACHMENT 1

MEETING AGENGA, SIGN-IN SHEETS, AND PRESENTATION SLIDES

DEPARTMENT OF THE ARMY
CAMP STANLEY STORAGE ACTIVITY, RRAD
25800 RALPH FAIR ROAD, BOERNE, TX 78015-4800

Agenda for Technical Interchange Meeting (TIM) #1
Construction of Supervisory Control and Data Acquisition (SCADA) System at Camp Stanley Storage Activity – Boerne, Texas
AFCEE WERC, Task Order 0011

Time: Wednesday, February 23, 2005; 1:00 pm to 5:00 pm
Thursday, February 24, 2005, 8:00 am to 12:00 pm

Place: Camp Stanley Storage Activity, Boerne, Texas, Conference Room

Proposed Order of Discussion

Date & Time	Topic
Wednesday, February 23, 2005	
1:00 pm– 2:00 pm	***Overview of SCADA System (Lynn/Diedrich)*** • *Introduction* • *System Architecture* • *Phase 1 Locations (Gas, Electric, Water, WWTP, Weather Stations)* • *Phase 2 Locations (Monitoring Wells, Potable Water Distribution System)*
2:00 pm – 3:00 pm	***Review of Implementation Work Plan (Roundtable Discussion)*** • *CSSA Comments and Suggestions*
3:00 pm – 4:00 pm	***Review of Engineering Cost Estimate (Lynn/Diedrich)*** • *Engineering Estimate* • *Subcontractor Budgetary Estimate* • *Alternatives*
4:00 pm – 5:00 pm	***Budgetary Review (Pearson/Lynn/Diedrich)*** • *Current Funding* • *Phase 1 Costs* • *Phase 2 Costs*
Thursday, February 24, 2005	
8:00 am – 11:00 am	***Finalize Implementation Work plan Content (Roundtable Discussion)*** • *Site-by-Site Review (Add/Delete/Modify)* • *Meshing with TO 06 SCADA Tasks (ASTs and Irrigation)* • *Cost Implications*
11:00 am – 12:00 pm	***Miscellaneous (Roundtable Discussion)*** • *Schedule* • *Phase 2 Funding*
1:00 pm – 5:00 pm	***Site Visits (Lynn/Diedrich)***

Name	Affiliation	Location	Phone Number	E-mail
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February 2005 TO II SCADA DAY

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Technical Interchange Meeting (TIM) #1

Construction of Supervisory Control and Data Acquisition (SCADA) System at Camp Stanley Storage Activity – Boerne, Texas

February 23 -24, 2005

Camp Stanley Storage Activity

AFCEE WERC FA8903-04-D-8674

Task Order 0011

PARSONS

Meeting Agenda

Wednesday, February 23, 2005

1:00 pm– 2:00 pm ***Overview of SCADA System***

- *Introduction*
- *System Architecture*
- *Phase 1 Locations (Gas, Electric, Water, WWTP, Weather Stations)*
- *Phase 2 Locations (Monitoring Wells, Potable Water Distribution System)*

2:00 pm – 3:00 pm ***Review of Implementation Work Plan***

- *CSSA Comments and Suggestions*

3:00 pm – 4:00 pm ***Review of Engineering Cost Estimate***

- *IWP Engineering Estimate*
- *Vendor Budgetary Estimate*

4:00 pm – 5:00 pm ***Budgetary Review***

- *Current Funding*
- *Phase 1 Costs*
- *Phase 2 Costs*

Meeting Agenda (cont.)

Thursday, February 24, 2005

8:00 am – 11:00 am ***Finalize Implementation Work plan Content***

- *Site-by-Site Review (Add/Delete/Modify)*
- *Meshing with TO 06 SCADA Tasks (ASTs and Irrigation)*
- *Cost Implications*

11:00 am – 12:00 pm ***Miscellaneous Items***

- *Schedule*
- *Funding*

1:00 pm – 5:00 pm ***Site Visits***

System Overview

- Phase 1
  - Potable Water Supply (CS-1, CS-9, CS-10, CS-11)
    - Automated Pump Control, Reservoir Level, Chlorination, and Metering
  - Electrical Submetering
    - 61 Connections at 49 Buildings/Locations
  - Water Metering
    - 8 metering locations associated with potable wells, reservoir, and booster system
    - 26 End-use monitoring points
    - 3 monitoring points at WWTP, Irrigation System and CS-16 GAC
  - Natural Gas Submetering
    - 9 end-use monitoring points
  - WWTP
    - TPDES-permit monitoring parameters
    - Automated chlorination and flow monitoring
    - Integration of Outfall 001 Irrigation System (TO 006)

System Overview

Phase 1 (cont.)

- AST Monitoring
  - 2 Tanks at Motor Pool
  - 1 Tank at Building 200A
  - 1 Tank at Emergency Generator
- Weather Stations (North and South)
- Other
  - HVAC (3)
  - Generator (1)
  - Pump Status (8)
- System Architecture
  - 32 Wireless Nodes
  - 21 Wired Ethernet Nodes

Phase 1 - Instrumentation

Building Number	*Physical Description*	*SCADA Node*	*Wireless*	*Wired*	*Water*	*Gas*	*Electrical*	*HVAC*	*Chlorination*	*Chlorine Gas Detector*	*pH*	*Pressure*	*Temperature*	*AST Monitoring*	*Water Level*	*Conductivity*	*Humidity Monitor*	*Humidity Regulate*	*Generator*	*Pump Status*	*Solar Power*	*Monitoring Well Probes*
Phase 1																						
1	Office Building	1		1	1	1	1															
2	Office Building		1		1	1	2															
4	Garage			1	1		1							2								
5	Utility Building		1		1		1															
11	Residence		1		1		1															
19	Pool		1		1		1		1	1	1											
20	Water Booster Pumps		1		1		1					1										
21	Residence		1		1		1															
22	Residence		1		1		1															
23	Residence		1		1		1															
24	Garage																					
28	Locomotive		1			1	1															
30	Pest control		1		1		1															
36	Security hq.	1		1	1		1															
37	Utility Building		1				1															
38	office building	1		1	1	1	1															
44	Ammo building			1	1		1															
45	Ammo building			1	1		2															
47	Utility Building																					
48	Ammo Storage Building																					
52	Fire tower #1																					
53	Fire tower #2		1				1															
54	Chlorine Dosing Station		1		1		1		1	1												
57	WELL 9		1				1				1		1		1	1				1		
58	WELL 10		1				1				1		1		1	1				1		
59	WELL 11		1				1				1		1		1	1				1		
73	Water lab		1				2															
74	Booster Pump Station		1				1															

Phase 1 – Instrumentation (cont.)

Building Number	Physical Description	SCADA Node	Wireless	Wired	Water	Gas	Electrical	HVAC	Chlorination	Chlorine Gas Detector	pH	Pressure	Temperature	AST Monitoring	Water Level	Conductivity	Humidity Monitor	Humidity Regulate	Generator	Pump Status	Solar Power	Monitoring Well Probes
76	Reservior		1		2										1							
78	Welding Shop		1				1															
89	Steam Generation Building			1	1	1	1															
90	Weapon rehab/SVE/Vats			1	1	1	2	3							4					1		
91	Warehouse			1	1		3										1	1				
92	Warehouse			1			1															
93	Warehouse / Office Space			1	1		3															
94	Warehouse			1	1		1															
96	Warehouse			1	1		1															
98	Office Building	2		1	1	1	2															
99	Utility Building		1				3							1					1			
100	A100			1	1	1	1															
101	A101			1			1															
102	A102			1			1															
103	A103			1			1															
201	Utility Building			1	1	1	1							1								
289	STD MAG (I-289)			1			1															
293	WWTP		1		1		1		1	1	1									1		
300	Thompson			1			1															
700	East Pasture		1		1		2															
A	Residence Q-A		1		1		1															
B-3	SVE #2		1				1													1		
B	Residence Q-B		1		1		1															
C	Residence Q-C		1		1		1															
GAC	GAC Shack		1		1		1				1	1	1								1	
CS-1	Bulls Groundwater Well		1		1		1		1	1	1		1		1	1				1	1	
IRR	Irrigation System		1		1															1		
MW16-WTHR	Weather Monitoring		1																		1	
AOC-65-WTHR	Weather Monitoring		1																		1	
Phase 1 Totals		**5**	**32**	**21**	**35**	**9**	**61**	**3**	**4**	**4**	**7**	**2**	**5**	**4**	**9**	**4**	**1**	**1**	**1**	**8**	**4**	**0**

System Overview

Phase 2

- Potable Water Distribution System
  - Assume up to 10 in-line distribution remote monitoring locations
  - Bi-directional meters with wireless RTU system connection
  - Meters should be installed in conjunction with distribution system replacement
- Monitoring Wells
  - 21 wells at 14 locations have existing In-Situ transducers
  - 6 piezometers have transducers connected to the AOC-65 Weather Station
  - An additional 20 monitoring wells at 15 locations are capable of being equipped with transducers
  - Except were power is available (e.g. production wells), groundwater monitoring will require solar/battery power
- Other

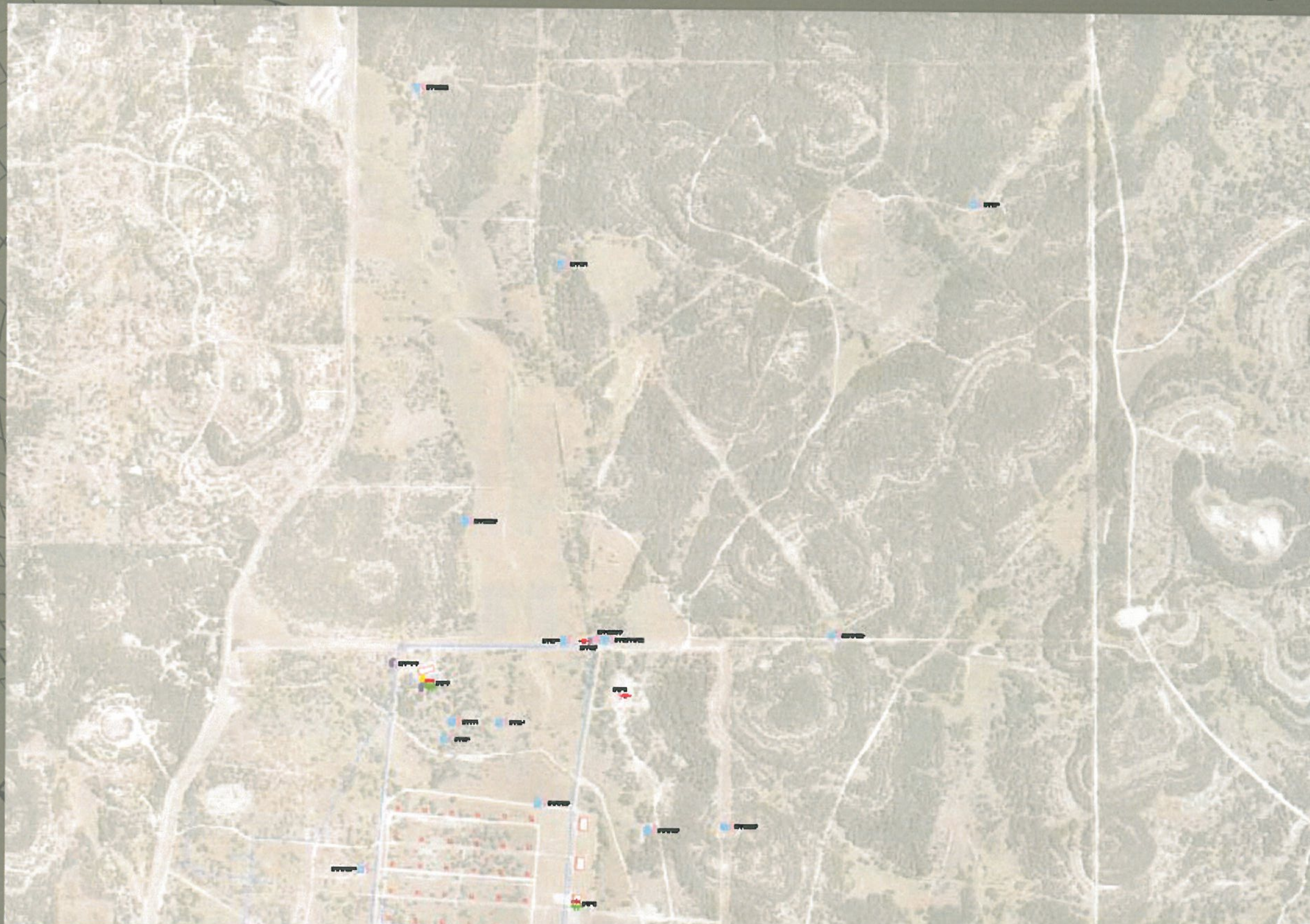
Phase 2 - Instrumentation

Building Number	Physical Description	SCADA Node	Wireless	Wired	Water	Gas	Electrical	HVAC	Chlorination	Chlorine Gas Detector	pH	Pressure	Temperature	AST Monitoring	Water Level	Conductivity	Humidity Monitor	Humidity Regulate	Generator	Pump Status	Solar Power	Monitoring Well Probes
Phase 2																						
DIST-1	Distribution Line Monitoring		1		1																1	
DIST-2	Distribution Line Monitoring		1		1																1	
DIST-3	Distribution Line Monitoring		1		1																1	
DIST-4	Distribution Line Monitoring		1		1																1	
DIST-5	Distribution Line Monitoring		1		1																1	
DIST-6	Distribution Line Monitoring		1		1																1	
DIST-7	Distribution Line Monitoring		1		1																1	
DIST-8	Distribution Line Monitoring		1		1																1	
DIST-9	Distribution Line Monitoring		1		1																1	
DIST-10	Distribution Line Monitoring		1		1																1	
CS-MW1	3 Monitoring Wells		1																		3	1
CS-MW2	2 Monitoring Wells		1																		2	
CS-MW3	Monitoring Well		1																		1	1
CS-MW4	Monitoring Well		1																		1	
CS-MW5	Monitoring Well		1																		1	1
CS-MW6	3 Monitoring Wells		1																		3	3
CS-MW7	2 Monitoring Wells		1																		2	2
CS-MW8	2 Monitoring Wells		1																		2	2
CS-MW9	3 Monitoring Wells		1																		3	
CS-MW10	2 Monitoring Wells		1																		2	2
CS-MW11	2 Monitoring Wells		1																		2	
CS-MW12	3 Monitoring Wells		1																		3	1
CS-MW16	2 Monitoring Wells		1																		2	
CS-MW17	Monitoring Well		1																		1	
CS-MW18	Monitoring Well		1																		1	
CS-MW19	Monitoring Well		1																		1	
CS-MWI1	Monitoring Well		1																		1	1
CS-2	Monitoring Well		1																		1	1
CS-3	Monitoring Well		1																		1	1

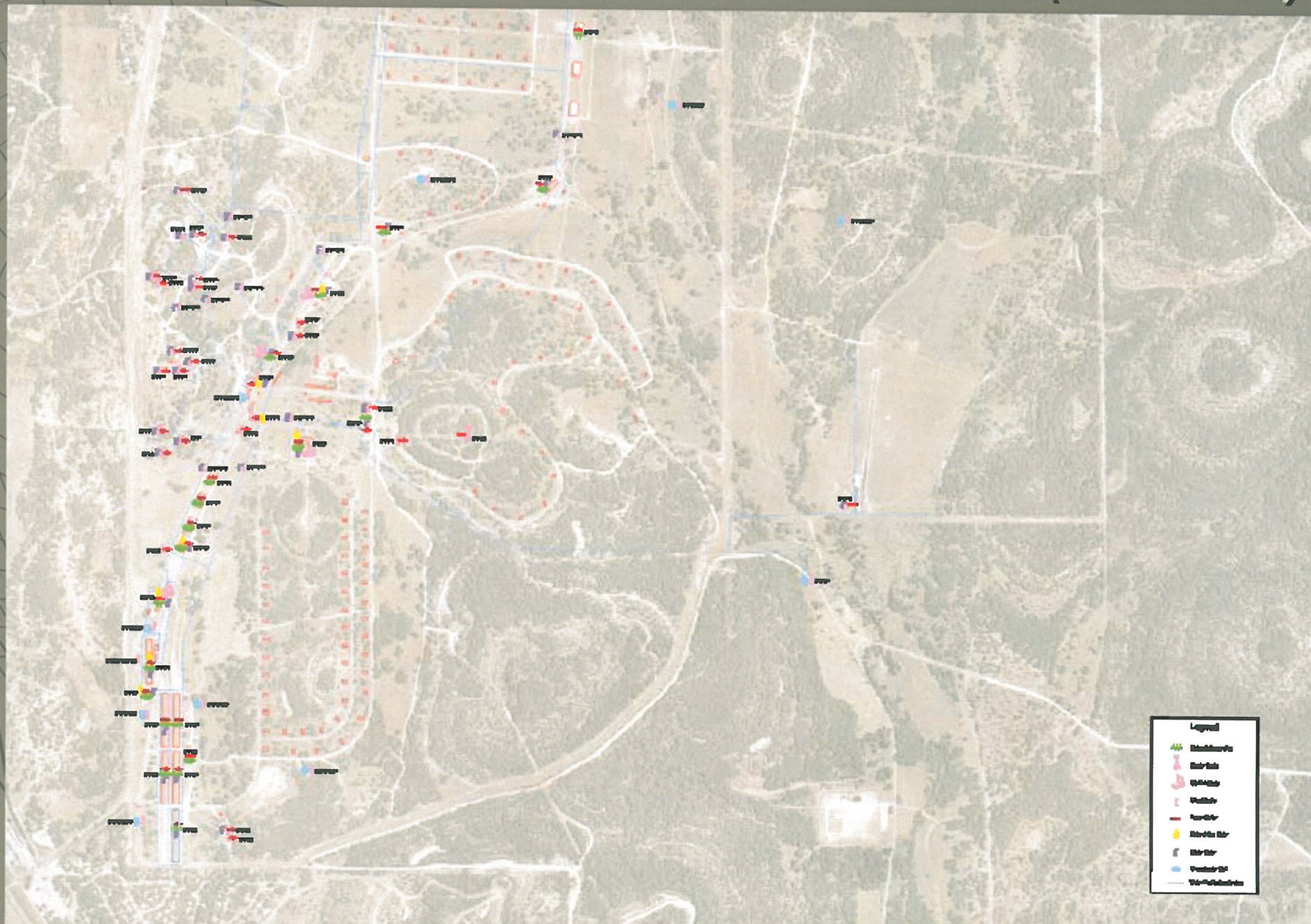
Phase 2 – Instrumentation (cont.)

Building Number	Physical Description	SCADA Node	Wireless	Wired	Water	Gas	Electrical	HVAC	Chlorination	Chlorine Gas Detector	pH	Pressure	Temperature	AST Monitoring	Water Level	Conductivity	Humidity Monitor	Humidity Regulate	Generator	Pump Status	Solar Power	Monitoring Well Probes
CS-4	Monitoring Well		1																		1	1
CS-D	Monitoring Well		1																		1	1
CS-G	Monitoring Well		1																		1	1
CS-I	Monitoring Well		1																		1	1
Phase 2 Totals		0	33	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	20

SCADA System Overview (North)



SCADA System Overview (South)



Review of Implementation Work Plan (IWP)

Roundtable Discussion

Review of Engineering Cost Estimate

- 2 Sources for Phase 1 and 2 Installation Costs
  - Parsons Engineering Estimate in IWP - $1.38M
    - Phase 1 ~$920K
    - Phase 2 ~$457K
      - Monitoring Wells ~$297K
      - Distribution System ~$161K
  - Vendor Estimate based on IWP – $2.0M
    - Phase 1 ~$1.32M
    - Phase 2 ~$580K
      - Monitoring Wells ~$350K
      - Distribution System ~$230K
    - Integration Line Item ~$100K

Engineering Estimate - Revised

No.	Phase 1 / 2	RTU ID	Building No:	Description	Number of Items	Total Cost
1	1	RTU-001	1	Office Building	10	$ 16,283
2	1	RTU-002	2	Office Building	9	$ 11,720
3	1	RTU-004	4	Garage / ASTs	20	$ 52,420
4	1	RTU-005	5	Utility Building	14	$ 19,483
5	1	RTU-011	11	Residence	14	$ 21,973
6	1	RTU-019	19	Pool	19	$ 24,619
7	1	RTU-020	20	Water Booster Pumps	13	$ 21,598
8	1	RTU-021	21	Residence	11	$ 17,098
9	1	RTU-022	22	Residence	11	$ 16,940
10	1	RTU-023	23	Residence	11	$ 17,098
11	1	RTU-028	28	Locomotive	13	$ 27,680
12	1	RTU-030	30	Pest control	12	$ 19,180
13	1	RTU-036	36	Security hq.	11	$ 15,473
14	1	RTU-037	37	Utility Building	7	$ 10,095
15	1	RTU-038	38	office building	9	$ 23,483
16	1	RTU-044	44	Ammo building	9	$ 16,848
17	1	RTU-045	45	Ammo building	11	$ 19,723
18	1	RTU-053	53	Fire tower #2	13	$ 38,693
19	1	RTU-054	54	Chlorine Dosing Station	17	$ 37,808
20	1	RTU-057	57	WELL 9	16	$ 28,773
21	1	RTU-058	58	WELL 10	16	$ 28,835
22	1	RTU-059	59	WELL 11	14	$ 28,335
23	1	RTU-073	73	Water lab	15	$ 22,213
24	1	RTU-074	74	Water Booster Pump Station	13	$ 22,588
25	1	RTU-076	76	Reservior	6	$ 7,220
26	1	RTU-078	78	Welding Shop	7	$ 10,095
27	1	RTU-089	89	Steam Generation Building	10	$ 25,900
28	1	RTU-090	90	Weapon rehab / SVE / Tank Levels	24	$ 45,125
29	1	RTU-091	91	Warehouse	16	$ 42,298
30	1	RTU-092	92	Warehouse	5	$ 7,480
31	1	RTU-093	93	Warehouse / Office Space	15	$ 29,895
32	1	RTU-094	94	Warehouse	9	$ 17,400
33	1	RTU-096	96	Warehouse	9	$ 17,400
34	1	RTU-098	98	Office Building	10	$ 12,725
35	1	RTU-099	99	Generator / AST	22	$ 21,588
36	1	RTU-100	100	A100	10	$ 25,348
37	1	RTU-101	101	A101	5	$ 5,441

Engineering Estimate – Revised (cont.)

No.	Phase 1 / 2	RTU ID	Building No:	Description	Number of Items	Total Cost
38	1	RTU-102	102	A102	5	$ 5,441
39	1	RTU-103	103	A103	5	$ 5,441
40	1	RTU-201	201	Utility Building Servicing Bldg 200 / AST	12	$ 29,193
41	1	RTU-289	289	STD MAG (I-289)	5	$ 5,441
42	1	RTU-293	293	WWTP	26	$ 51,215
43	1	RTU-300	300	Thompson	5	$ 5,441
44	1	RTU-700	700	East Pasture	14	$ 21,265
45	1	Other Equip	various	non-RTU equipment	20	$ 211,300
46	1	RTU-B-3	B-3	SVE #2	11	$ 12,138
47	1	RTU-A	A	Residence Q-A	13	$ 19,338
48	1	RTU-B	B	Residence Q-B	12	$ 19,098
49	1	RTU-C	C	Residence Q-C	12	$ 19,098
50	1	RTU-CS-1	CS-1	Groundwater Well (located on Camp Bullis prop	21	$ 47,213
51	2	RTU-DIST-1	DIST-1	Distribution Line Flowmeter	11	$ 23,390
52	2	RTU-DIST-2	DIST-2	Distribution Line Flowmeter	11	$ 23,390
53	2	RTU-DIST-3	DIST-3	Distribution Line Flowmeter	11	$ 23,390
54	2	RTU-DIST-4	DIST-4	Distribution Line Flowmeter	11	$ 23,390
55	2	RTU-DIST-5	DIST-5	Distribution Line Flowmeter	11	$ 23,390
56	2	RTU-DIST-6	DIST-6	Distribution Line Flowmeter	10	$ 22,515
57	2	RTU-DIST-7	DIST-7	Distribution Line Flowmeter	10	$ 22,515
58	2	RTU-DIST-8	DIST-8	Distribution Line Flowmeter	10	$ 22,515
59	2	RTU-DIST-9	DIST-9	Distribution Line Flowmeter	10	$ 22,515
60	2	RTU-DIST-10	DIST-10	Distribution Line Flowmeter	10	$ 22,515
61	1	RTU-MW16-WTHR	MW16-WTHR	Weather Monitor	7	$ 7,994
62	1	RTU-AOC-65-WTHR	AOC-65-WTHR	Weather Monitor	7	$ 7,994
63	1	RTU-IRR	IRR	Irrigation System	10	$ 11,043
64	1	RTU-GAC	GAC	GAC Shack	16	$ 19,088
65	2	RTU-CS-MW1	CS-MW1	3 Monitoring Wells	12	$ 20,313
66	2	RTU-CS-MW2	CS-MW2	2 Monitoring Wells	9	$ 11,060
67	2	RTU-CS-MW3	CS-MW3	Monitoring Well	7	$ 14,056
68	2	RTU-CS-MW4	CS-MW4	Monitoring Well	6	$ 7,306
69	2	RTU-CS-MW5	CS-MW5	Monitoring Well	7	$ 14,056
70	2	RTU-CS-MW6	CS-MW6	3 Monitoring Wells	14	$ 33,813
71	2	RTU-CS-MW7	CS-MW7	2 Monitoring Wells	11	$ 24,560
72	2	RTU-CS-MW8	CS-MW8	2 Monitoring Wells	11	$ 24,560
73	2	RTU-CS-MW9	CS-MW9	3 Monitoring Wells	11	$ 13,563
74	2	RTU-CS-MW10	CS-MW10	2 Monitoring Wells	11	$ 24,560

Engineering Estimate – Revised (cont.)

No.	Phase 1 / 2	RTU ID	Building No:	Description	Number of Items	Total Cost
75	2	RTU-CS-MW11	CS-MW11	2 Monitoring Wells	9	$ 11,060
76	2	RTU-CS-MW12	CS-MW12	3 Monitoring Wells	12	$ 20,313
77	2	RTU-CS-MW16	CS-MW16	2 Monitoring Wells	9	$ 11,060
78	2	RTU-CS-MW17	CS-MW17	Monitoring Well	6	$ 7,306
79	2	RTU-CS-MW18	CS-MW18	Monitoring Well	6	$ 7,306
80	2	RTU-CS-MW19	CS-MW19	Monitoring Well	6	$ 7,306
81	2	RTU-CS-MWH	CS-MWH	Monitoring Well	7	$ 14,056
82	2	RTU-CS-2	CS-2	Monitoring Well	7	$ 14,056
83	2	RTU-CS-3	CS-3	Monitoring Well	7	$ 14,056
84	2	RTU-CS-4	CS-4	Monitoring Well	7	$ 14,056
85	2	RTU-CS-D	CS-D	Monitoring Well	7	$ 14,056
86	2	RTU-CS-G	CS-G	Monitoring Well	7	$ 14,056
87	2	RTU-CS-I	CS-I	Monitoring Well	7	$ 14,056
				Phase 1 Total	657	$ 1,324,601
				Phase 2 Total	301	$ 580,112
				Overall Project Total	958	$ 1,904,713

Budgetary Review

- Currently $619K Budgeted for Equipment, Installation, and Integration

Project Totals

	% of Total Cost	Labor Cost	% Labor	ODCs	% ODCs	Fixed Fee (5.5%)
01000 - Meetings	2.8%	$ 23,107.97	*8.4%*	$ 3,356.98	*0.5%*	$ 1,455.57
02000- Work Plans	5.5%	$ 45,520.63	*16.5%*	$ 5,267.14	*0.8%*	$ 2,793.33
03000 - SCADA Install	80.2%	$ 105,153.57	*38.2%*	**$ 640,786.87**	*97.9%*	$ 41,026.72
04000 - O&M and Training	6.2%	$ 53,358.69	*19.4%*	$ 4,619.14	*0.7%*	$ 3,188.78
90000 - TO Management	5.3%	$ 48,351.97	*17.6%*	$ 513.03	*0.1%*	$ 2,687.58
Subtotals	*100%*	**$ 275,492.84**	*100%*	**$ 654,543.16**	*100%*	**$ 51,151.98**
Project Total (CPFF)		**$ 981,187.98**				

SCADA Equipment and Subcontracting Costs

WBS 03000 Installation Breakdown	ODC Cost	% ODC
SCADA Equipment	$ 381,894.79	*61.6%*
Equipment Installation Contractor Costs	$ 168,224.47	*27.1%*
Master Station Setup and Programming	$ 69,700.00	*11.2%*
	$ 619,819.25	*100.0%*

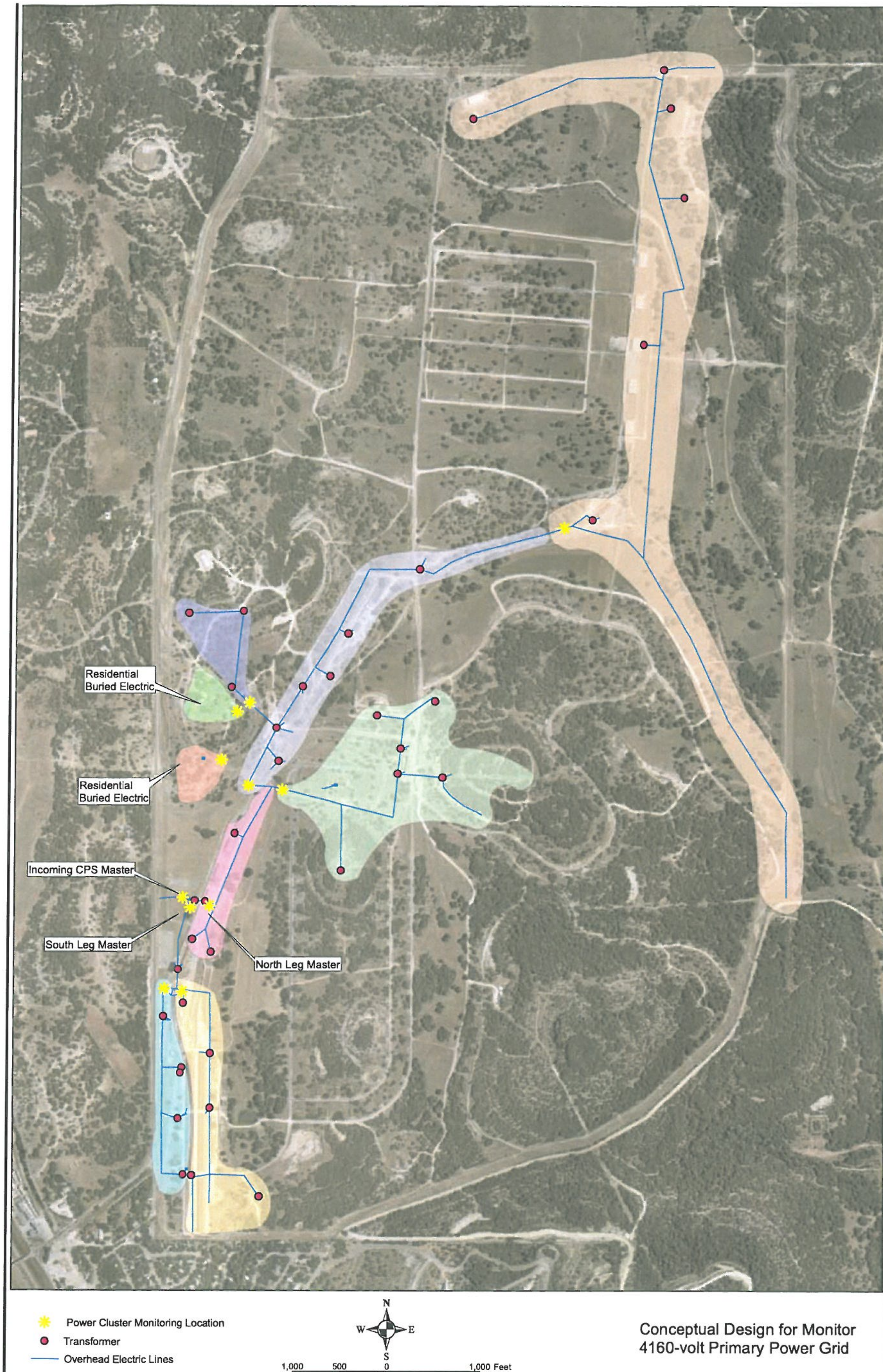
Budgetary Review

- Parsons IWP Engineering Estimate - $1.38M
  - Current Integration Funding ~$619K
  - Phase 1 Additional Funding ~$261K
  - Phase 2 Additional Funding ~$500K
- Vendor Estimate based on IWP – $2.0M
  - Current Integration Funding ~$619K
  - Phase 1 Additional Funding ~$780K
  - Phase 2 Additional Funding ~$605K

ATTACHMENT 2

CONCEPTUAL ELECTRICAL UTILITY CLUSTERING APPROACH

(BASED ON 25 FEBRUARY 2005 UTILITY SURVEY)



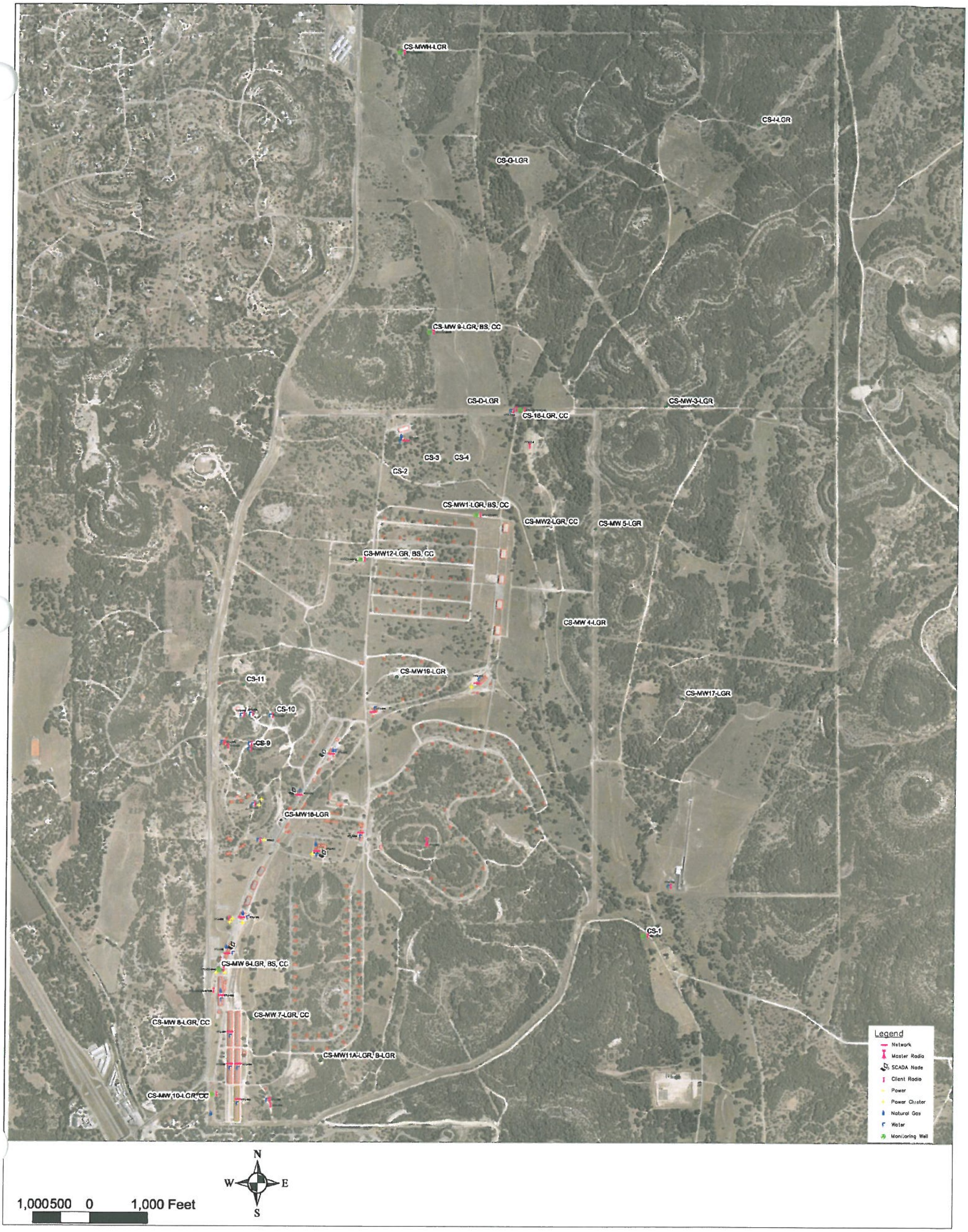
Conceptual Design for Monitor
4160-volt Primary Power Grid

ATTACHMENT 3

REVISED PHASE 1 SITES AND SCADA MONITORING PARAMETERS

System Equipment Table
Revised from TIM #1 Proceedings

Building Number	Physical Description	SCADA Node	Wireless	Wired	Water	Gas	Electrical	HVAC	Chlorination	Chlorine Gas Detector	pH	Pressure	Temperature	AST Monitoring	Water Level	Conductivity	Humidity Monitor	Humidity Regulate	Generator	Pump Status	Solar Power	Monitoring Well Probes
1	Office Building	1		1	1	1	1															
4	Garage			1	1									2								
19	Pool		1		1				1	1	1											
20	Water Booster Pumps		1		1							1										
21	Residence		1		1		2															
36	Security hq.	1		1	1																	
38	office building	1		1	1	1																
44	Ammo building			1	1																	
45	Ammo building			1	1		1															
53	Fire tower #2		1																			
54	Chlorine Dosing Station		1		1				1	1												
57	WELL 9		1								1		1		1	1				1		
58	WELL 10		1								1		1		1	1				1		
74	Water Booster Pump Station		1																	1		
76	Reservior		1		2										1							
90	Weapon rehab			1	1	1		3							4					1		
91	Warehouse			1	1												1	1				
93	Warehouse / Office Space			1	1																	
94	Warehouse			1	1																	
96	Warehouse			1	1																	
98	Office Building	2		1	1	1																
99	Utility Building		1				2							1					1			
100	A100			1	1	1	1															
201	Utility Building			1	1																	
293	WWTP		1		1				1	1	1									1		
700	East Pasture		1		1																	
B-3	SVE #2		1																	1		
B	Residence Q-B		1		1		1															
GAC	GAC Shack		1		1						1	1	1								1	
CS-1	Bullis Groundwater Well		1		1				1	1	1		1		1	1				1	1	
IRR	Irrigation System		1		1															1		
MW16-WTHR	Weather Monitoring		1																		1	
AOC-65-WTHR	Weather Monitoring		1																		1	
CS-MW1	3 Monitoring Wells		1																		3	1
CS-MW6	3 Monitoring Wells		1				2														3	3
CS-MW9	3 Monitoring Wells		1																		3	
CS-MW10	2 Monitoring Wells		1																		2	2
CS-MW12	3 Monitoring Wells		1																		3	1
CS-MW16	2 Monitoring Wells		1																		2	
CS-MWH	Monitoring Well		1																		1	1
	Totals	**5**	**26**	**14**	**26**	**5**	**10**	**3**	**4**	**4**	**6**	**2**	**4**	**3**	**8**	**3**	**1**	**1**	**1**	**8**	**21**	**8**



CS-MWH-LGR
CS-I-LGR
CS-G-LGR
CS-MW 9-LGR, BS, CC
CS-D-LGR
CS-MW-3-LGR
CS-16-LGR, CC
CS-3
CS-4
CS-2
CS-MW1-LGR, BS, CC
CS-MW2-LGR, CC
CS-MW 5-LGR
CS-MW12-LGR, BS, CC
CS-MW 4-LGR
CS-MW19-LGR
CS-11
CS-10
CS-9
CS-MW17-LGR
CS-MW18-LGR
CS-1
CS-MW 6-LGR, BS, CC
CS-MW 7-LGR, CC
CS-MW 8-LGR, CC
CS-MW11A-LGR, B-LGR
CS-MW 10-LGR, CC
Legend
Network
Master Radio
SCADA Node
Client Radio
Power
Power Cluster
Natural Gas
Water
Monitoring Well
N
W
E
S
1,000500 0 1,000 Feet

ATTACHMENT 4

ALARM NOTIFICATIONS

Examples of Alarm Notificaitons

Alarm Description	How?
Power Usage High	Usage Setpoint Input by user, SCADA monitors to see if setpoint is overrun
Water Usage High	Usage Setpoint Input by user, SCADA monitors to see if setpoint is overrun
Gas Usage High	Usage Setpoint Input by user, SCADA monitors to see if setpoint is overrun
Pump Station Level High	High Level Float in Pump Station
WWTP Turbidity High	Monitoring of Turbidity Meter in WWTP for permitted level
WWTP pH High	Monitoring of pH Meter in WWTP for permitted level
WWTP pH Low	Monitoring of pH Meter in WWTP for permitted level
WWTP Chlorine Residual High	Monitoring of Chlorine Residual Meter in WWTP for permitted level
WWTP Chlorine Residual Low	Monitoring of Chlorine Residual Meter in WWTP for permitted level
WWTP Flow High	Monitoring of Flow Meter in WWTP for permitted Level
Communications Failure	Failure of communication link between resources on fiber or radio network
Monitoring Well Parameter Alarms	Monitoring of Transducer for Level (e.g., Stage 1 Drought, conductivity)
Generator Running	Motor Status of Generator
Utility Power Loss	
Chlorine Feed System Switched Gas Cannister	Monitoring of Chlorine Feed Equipment to notifiy personnel when an empty cannister has been detected and the new cannister is engaged
HVAC Filter Dirty	Monitoring of HVAC Filter Pressure Sensor
Water Well Pump Failed to Run	Water Well Pump Failed to Run when called for
Reservoir Level Low	Usage Setpoint Input by user, SCADA monitors to see if setpoint is overrun
Reservoir Level High	Usage Setpoint Input by user, SCADA monitors to see if setpoint is overrun