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TEMPE

Jon Fuller, PE, RG, PH, CFM, DWRE
Jeff Despain, PE, CFM
Annette Griffin, AAS
Brian Iserman, PE, CFM
Mike Kellogg, RG, CFM
Ted Lehman, PE
Robert Lyons, PE, CFM
W. Scott Ogden, PE, CFM
Patricia Quinn, PE, RLS, AVS
Tyler Azeltine, BA
Peter Acton, PE
Reed Blochberger, EIT
Richard Waskowsky, PE

TUCSON

John Wallace, PE, CFM
Cyrus Miller, PE, CFM
Chris Rod, PE
Ian Sharp, PE, CFM
Robert Shand, PE
Geoff Harris, PE

FLAGSTAFF

Cory Helton, PE
Joe Loverich, PE, CFM

PHOENIX

Jon Ahern, PE, CFM
Nathan Logan, PE, CFM

PRESCOTT

Nate Vaughan, PE

SILVER CITY

Mary Evans, PE

8400 S Kyrene Road, Ste 201
Tempe Arizona 85284
480.752.2124

40 E Helen Street
Tucson, Arizona 85705
520.623.3112

323 N San Francisco Street
Suite 100
Flagstaff, Arizona 86001
928.214.0887

1 W Deer Valley Road, Ste 101
Phoenix, Arizona 85027
623.889.0166.

1042 Willow Creek Rd.
A101 #415
Prescott, Arizona 85027
623.889.0166

2340 US Hwy 180 East #130
Silver City, NM 88061

June 3rd, 2016

Cochise County Community Development Department
Highway and Floodplain Division
Attn: Joaquin Solis, P.E., Assistant Director
1415 West Melody Lane
Bisbee, AZ 85603

**RE: Cochise County ALERT System Implementation
Year 5 (Through Fiscal Year 2016/2017)**

Dear Joaquin:

Thank you for requesting a scope and fee from JE Fuller/Hydrology and Geomorphology, Inc. (JE Fuller) to continue to develop Cochise County's (County) ALERT flood warning system. The following is a scope of work for the referenced project. The purpose of this phase of the project is to provide installation and integration of additional remote precipitation sensors, as well as scheduled support services for components of the Cochise County ALERT system and the gages previously installed by Arizona Department of Water Resources (ADWR) located within the County.

Scope of Work

General Description

The purpose of this Scope of Work (SOW) is to detail the tasks and fees associated with the sixth calendar year of the Cochise County 5-Year ALERT System Plan implementation expected to occur during Fiscal Year (FY) 2016/17. Although FY 2016/17 is the sixth calendar year following adoption of the Plan, this will represent the third year of Plan implementation.





Upon completion of this SOW, the County will have four (4) additional precipitation gages installed, and will have recommended routine maintenance performed for five (5) County-owned remote sensor/repeater stations and maintenance for eight (8) additional ALERT stations previously-installed by ADWR. The following paragraphs provide an outline of the expected efforts and fees associated with this phase of the project.

Task 1: Design and Installation of Four (4) Remote Sensor Stations

JE Fuller shall design, furnish, install, set up and calibrate four (4) remote ALERT precipitation sensor stations. This work also includes preliminary reconnaissance to the 4 new station locations, preparation of the FCC license applications, as well as coordination with other local, state and federal agencies and private land owners on the proposed location of the stations. Final locations of the proposed new gages will be decided upon following initiation of the contract; the following general locations will be considered for installation:

- Willow Lakes
- South of Sierra Vista
- Fort Grant Road
- Leslie Creek
- Cascabel
- MS4 Area (Outskirts of Sierra Vista)
- West of Fairbank
- Saint David
- Kansas Settlement
- Davis Road
- Gleeson Road

Unless otherwise noted, each remote ALERT sensor station will consist of a High Sierra Electronics (HSE) Model 3424-00 packaged rain gauge station that includes a standpipe assembly, 3306 ALERT data transmitter with 5-watt VHF data radio, 3 dB gain J-pole omni antenna, solar charging system, and lightning protection. Installation includes coaxial cable, connectors, grounding, and sealants. The station housings will be set in concrete approximately 2½ feet into the ground with grounding.



Since the locations for the proposed new stations have not been finalized, coordination and field reconnaissance will be performed to confirm precise placement. JE Fuller will work with County Staff to gain concurrence on and finalize the locations for the new sensor locations, considering the proposed list in the Plan, the existing gage network (County/ADWR), Supervisor District boundaries, proximity to population centers, and Staff input. Refer to the attached table for potential locations listed in the Plan, as well as locations currently under consideration that were not identified in the original Plan.

JE Fuller will purchase, install, test and calibrate the installed equipment, and incorporate the new stations into the County's network. Cochise County shall secure/provide permits, arrange for Blue Stake and provide traffic control during construction (as needed). Two of the proposed stations will be constructed during calendar year 2016, and the remaining two will be constructed during calendar year 2017.

Task 2: Scheduled Maintenance (County-Owned Stations)

Routine scheduled preventative maintenance shall be performed once per year for the duration of this project (twice overall) to each remote sensor station owned and operated by Cochise County, to ensure proper operation of the ALERT system. Scheduled maintenance at remote sensor stations shall take place during the early spring prior to the advent of the summer monsoon and shall include the following tasks:

- Remove battery and replace with freshly-conditioned battery,
- Calibrate and clean tipping bucket,
- Test/check solar panel charging system,
- Clean out funnel,
- Test radio/cable/antenna output/reflection,
- Test/calibrate stream stage sensor,
- Inspect all housing components for damage,
- Inspect grounding system,
- Paint touch up,
- Make minor repairs and/or adjustments such as re-sealing weather-tight connections, tightening loose fitting/fasteners, adjusting top section lock, etc. and
- Test overall data throughput and precision.



Cochise County currently owns and operates 5 ALERT remote stations (4 remote sensor station, 1 repeater station), as well as a base station computer. This scope of work includes maintenance to the 5 ALERT remote stations owned and operated by the County as well as continued operation and maintenance of the ALERT base station located at the offices of JE Fuller (see below).

**ALERT FY16-17 MAINTENANCE
(COUNTY-OWNED STATIONS)**

ALERT Station	ID	Last Maintained
Juniper Flat Repeater	3042	6/25/2013
West Turkey Creek Precipitation	3040	6/24/2013
Bisbee Tunnel Precipitation	3043	5/7/2014 (Installed)
Douglas ADOT Weigh Station Precipitation	3044	5/7/2014 (Installed)
Hunter Canyon Precipitation	3053	10/15/2014 (Installed)

As two of the proposed Task 1 stations will be due for maintenance during the second year of Task 2 maintenance, a total of seven remote stations will be maintained during calendar year 2017.

This work does not include the cost to repair/replace major components but does include minor repairs. The deliverable for this task is a maintenance form for each site maintained and pertinent photo documentation.

JE Fuller recommends that the county purchase a modest amount of spare equipment for replacing damaged or faulty equipment. The recommended equipment includes:

- 1 3306 Transmitter, Tx = 170.250
- 1 J-pole antenna
- 1 Directional antenna
- 1 solar panel kit (including solar panel, regulator, cable, mount etc...)
- 1 power amp
- 1 tipping bucket top section with tipping bucket rain gauge.

The attached detailed fee estimate includes these items under direct costs.





Task 3: Scheduled Maintenance (ADWR Stations)

JE Fuller recommends that the county work with ADWR to formally adopt existing ALERT stations in Cochise County and to continue their required maintenance. It has been the practice by other counties in Arizona (Greenlee County, Pinal County) to perform maintenance on ADWR-owned stations prior to formal adoption in order to assure continuous, reliable operation during the adoption period and to verify that the stations are fully operational at the time the stations are taken over. The attached table shows ALERT stations owned by ADWR located in Cochise County. All ADWR stations are overdue for recommended routine annual maintenance.

ALERT FY16-17 MAINTENANCE (ADWR-OWNED STATIONS)

ALERT Station	ID	Last Maintained
Rucker	3050	6/24/2013
Portal	620	6/25/2013
Dragoon	3060	6/26/2013
Willcox	3070	10/14/2014
Miller/Carr Canyon	3051	6/24/2013
Ash Canyon	3052	6/24/2013
King of Lead Mine	3080	10/14/2014
Long Park	3090	10/14/2014

The deliverable for this task is a maintenance form for each site maintained and pertinent photo documentation for once-per-year maintenance visits for the duration of this project (twice overall).



Fee Estimate

JE Fuller will perform the outlined Tasks providing labor, services, and materials as described above for a lump sum fee of \$78,991. A detailed fee table is attached.

Schedule

JE Fuller will start the work immediately upon receipt of your notice to proceed. JE Fuller will endeavor to complete the first round of maintenance tasks prior to the 2016 summer monsoon. Likewise, the second round of maintenance would be scheduled to be completed before the 2017 monsoon season.

Thank you again for requesting this Scope of Work and fee estimate from JE Fuller. We are excited about continuing to provide services to the County that will advance towards the common goal of improving the County's flood warning capabilities.

Sincerely,

JE Fuller/Hydrology & Geomorphology, Inc.

Cyrus D. Miller, P.E., CFM
Vice President

Attachments:

ALERT FY16/17 Fee Table
Proposed Remote Sensor Stations Table

Fee Estimate Table
 Cochise County ALERT System
FY 2016/2017 System Design/Installation/Maintenance

Contract Task	BI (\$133.65/Hr)	CM (\$103.95/Hr)	NV (\$108.41/Hr)	PA (\$89.10/Hr)	JB (\$86.13)	TA (\$66.83/Hr)	Totals	
1	Design/Installation of Four (4) Remote Sensor Stations							
	30	95	0	0	0	110	\$21,236	
2	Scheduled Maintenance (5 existing remote locations and 1 existing base station, 2 visits each. 2 Task 1 stations: 1 visit during 2017)							
	4	44	0	0	0	64	\$9,386	
3	Scheduled Maintenance (8 ADWR Stations, 2 visits each)							
	6	70	0	0	0	90	\$14,093	
Subtotal Labor		40	209	0	0	0	264	\$44,715
Direct Costs								
	Tasks 2 & 3 Supplies: 32 batteries x \$30/battery, sealant, tape, misc. cables/connectors, grounding, concrete							\$1,200
	ATV to access King of Lead and Long Park \$350/day							\$350
	Task 1 High Sierra Electronics equipment, including shipping and Arizona & local taxes							\$18,200
	Task 2 High Sierra Electronics spare equipment, including shipping and Arizona & local taxes							\$3,985
	2-year base station operation/web page hosting							\$3,000
	Mileage 3000 miles x \$0.70/mile							\$2,100
	Per Diem \$30 x 12 days x 2 people							\$720
	Hotel - 8 nights x \$120/night							\$960
	Subtotal Direct Costs							\$30,515
	Contingency (5% of labor and direct costs)							\$3,761
	Grand Total							\$78,991

Project: Cochise County/ALERT
 Detail: Stations-Proposed and Installed



Reference: JE Fuller; 5-Year Strategic Plan for Creation of the Cochise County ALERT System, May 2, 2011

Proposed Remote Sensor Stations

PLAN ID	INSTALLED? (Y/N)	APPROXIMATE LOCATION	SPECIFIC LOCATION			Supervisor District
			Latitude	Longitude	Description	
3	N	Willow Lakes	32.057899	-110.345001	West of the intersection of N. Ocotillo Rd. and N. Tres Alamos Rd., within ROW	3
4	N	West of Fairbank	31.692199	-110.251998	In front of PBW #1 Fire Station house, 2235 N. Sanders Rd.	3
6	N	South of Sierra Vista	31.4815	-110.264999	In front of Fry #2 Fire Station house, 4817 S. Apache Ave.	1
7	N	Saint David	31.904499	-110.212997	Within ADOT yard, east of S. Lee St.	3
9	N	Fort Grant Road	32.425399	-109.926002	East of Fort Grant Rd., approx. 210 feet south of County boundary, within ROW	3
14	N	Kansas Settlement	32.063201	-109.763	Within cotton gin complex	3
16	Y	Douglas	31.3838	-109.518	Within County Highway & Floodplain Dept. Operations Division yard, 3665 N. Leslie Canyon Rd. (Installed: Within ADOT Weigh Station Yard)	2
17	Y	Along Turkey Creek Road	31.8631	-109.356	South of E. Turkey Creek Rd. near West Turkey Creek Campground, within Coronado National Forest	3
18	Y	Bisbee	31.4586	-109.943	South of Bisbee #2 Fire Station house, 645 Tombstone Canyon, possibly within ROW (Installed: Above Mule Mountain Tunnel)	2
19	N	Leslie Creek	31.589	-109.508003	Southeast of N. Leslie Canyon Rd., south of ex. USGS gage (09537200), within San Bernardino/Leslie Canyon National Wildlife Refuge	2
N/A	Y	Mule Mountain Repeater	31.4804	-109.959	Juniper Flats Tower Facility	2
NOT IN PLAN	Y	Hunter Canyon Precipitation	31.4047	-110.257	North of Hunter Canyon Road, West of Highway 92	1
	N	Davis Road	TBD	TBD	TBD	2
	N	Gleeson Road	TBD	TBD	TBD	2
	N	MS4 Area (Outskirts of Sierra Vista)	TBD	TBD	TBD	1
	N	Cascabel	TBD	TBD	TBD	3