





## COOPER CITY UTILITIES DEPARTMENT MEMORANDUM

---

DATE: July 2, 2018

TO: Bruce D. Loucks, City Manager

FROM: Michael F. Bailey, P.E., Utilities Director/City Engineer

SUBJECT: Deep Injection Well Mechanical Integrity

---

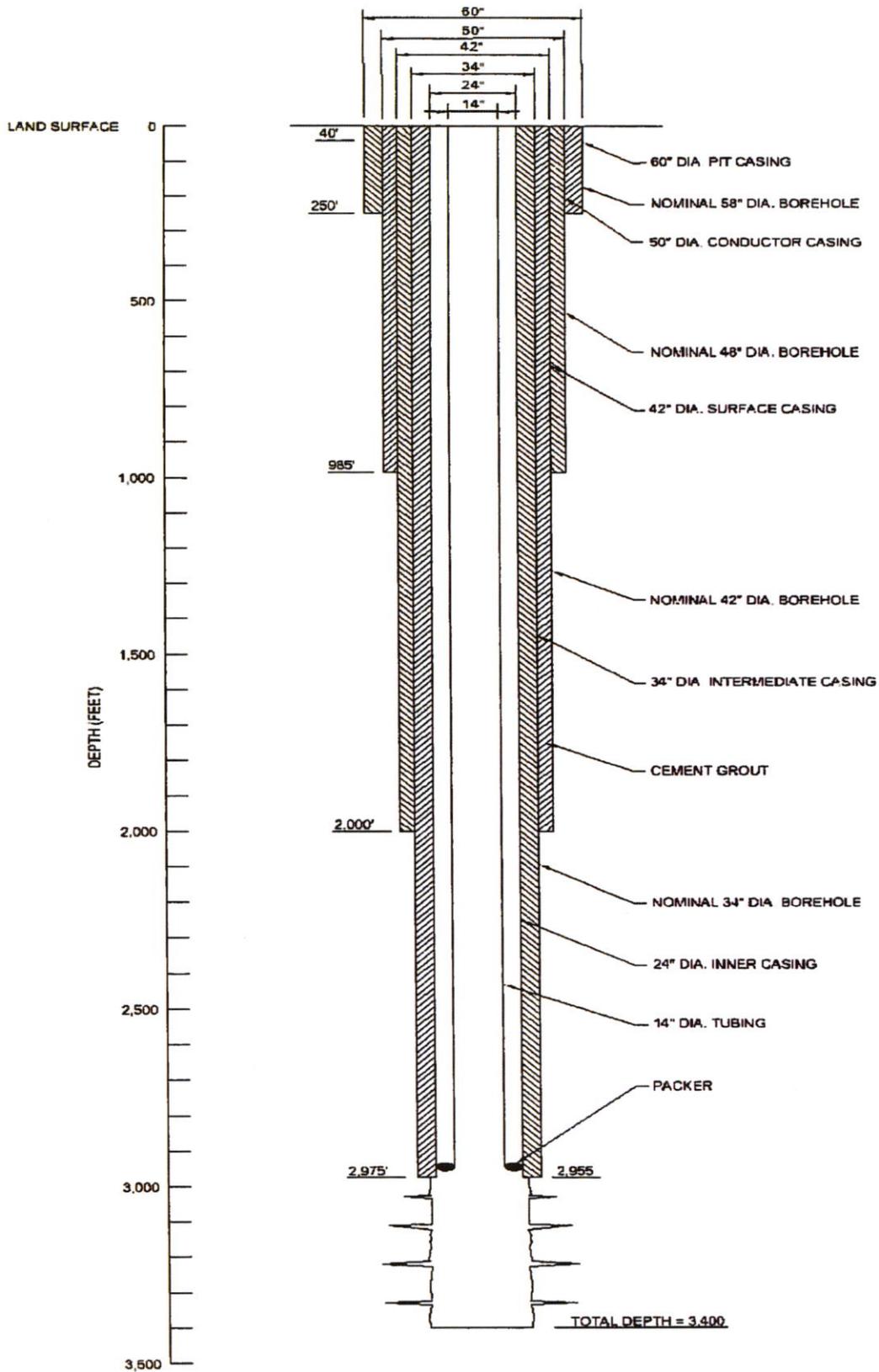
This is a recommendation for Commission approval of Task Order 21 with AECOM Technical Services Inc. to provide engineering services related to the rehabilitation of the City's deep injection well.

The City currently operates one deep injection well as a means of disposal for both concentrate water (a byproduct of the water treatment process) and treated wastewater. The well was constructed in 2002 and, despite experiencing a loss of injection capacity over the years (presumably due to fouling of the well and possibly of the geological formation into which it pumps), it has operated sufficiently and passed all mechanical integrity tests (i.e. the well casing is intact and has no leaks). The last mechanical integrity test was in 2016.

On June 4 of this year, treatment plant operations staff determined that the well had lost pressure in the annular space between its innermost steel casings. This is a serious issue, indicating a loss of mechanical integrity, or leak, in the innermost well casing (a diagram of the well is attached). The loss of integrity was reported to the Florida Department of Environmental Protection (FDEP), in accordance with state regulations, and our engineering consultant AECOM is working with FDEP to develop a plan for repair/rehabilitation, as well as continued use of the well until the rehabilitation is complete. In the meantime, the well is offline until FDEP provides guidance and all of our treated wastewater and concentrate is being diverted to the City of Hollywood ocean outfall.

Rehabilitation of the well will involve removal or reaming of the innermost 14" diameter, steel casing (called injection tubing) and insertion of a new, corrosion resistant injection tubing. This was actually studied by AECOM back in 2016 when the City commissioned them to provide options for increasing the capacity of the well due to the aforementioned loss of injection capacity. That study concluded that the existing injection tubing should be reamed out, the well drilled deeper, and a new, 24" diameter plastic tubing be installed, all to increase the capacity of the well to be able to handle 100% of the City's treated wastewater concentrate for the foreseeable future. This project, estimated to cost approximately \$1.6 million, was delayed due to other priorities, but should be re-prioritized now due to the current well failure.

To that end, I have solicited a proposal from AECOM, under their continuous contract with the City, to prepare a plan and specifications, and provide construction management services, for rehabilitation of the well with an increase to its capacity. A copy of their Task Order 21 is attached. We have negotiated a fee of \$171,639 for their services and I recommend Commission approval of this task order. Funds are available the Water & Sewer Fund and the Water & Sewer Renewal & Replacement Fund.



**INJECTION WELL COMPLETION DIAGRAM**  
NTS

**TASK ORDER #21**

June 19, 2018

**FEE PROPOSAL AND SCOPE OF SERVICES  
CITY OF COOPER CITY****DEEP INJECTION WELL SYSTEM - WELL REHABILITATION (Phase 1)**

This Task Order when executed shall be incorporated in and become an integral part of Agreement RFQ 2009-01 for Continuing Professional Services under a non-exclusive professional services agreement between the City of Cooper City (City), Florida and AECOM Technical Services, Inc. (AECOM or Consultant), hereafter referred to as the Agreement.

**A. Introduction**

Cooper City operates a Class I Industrial DIW system located at the George A Haughney, P.E. Utilities Complex. The injection well system was completed in 2003, consists of a tubing and packer designed injection well identified as IW-1, a dual-zone monitoring well labeled as MW-1, surface piping, a surge control system, and instrumentation and controls. This DIW system is used as the primary method for the disposal of concentrate generated by the City's Nanofiltration (NF) Water Treatment Plant (WTP) and treated effluent from the Wastewater Treatment Plant (WWTP). The DIW has a permitted disposal capacity of 5.95 MGD.

The City observed increasing injection pressures and decreasing performance of IW-1 within several months of first use in 2003. A video survey conducted in 2006 and again in 2011 as part of a required 5-year Mechanical Integrity Testing (MIT) protocol, revealed a heavy build-up of scale on the inside of the 14-inch diameter steel well casing and within the upper part of the injection horizon. In 2009, AECOM submitted a Phase I report detailing the City's operational and performance issues, feasibility of gaining additional injection capacity by drilling the injection horizon deeper and water quality compatibility analyses of the injected fluid. From May through June of 2011, well rehabilitation operations were conducted on IW-1. The results of this effort were documented in AECOM's report titled, "*Waste Stream Modifications Well Rehabilitation for Deep Injection Well IW-1*". The report described the waste stream modifications needed as part of the rehabilitation of IW-1. Four treatment processes that could be used to address the problematic injectate constituents (total suspended solids (TSS), iron and pH) were identified.

On May 20, 2013, AECOM submitted a technical memorandum titled "*Cooper City, Deep Well Injection System – Pretreatment Investigation*" Task Order #11,

which provided a data review of the City's monthly operating reports (MORs), waste stream sampling and well rehabilitation sludge sampling from 2011 as part of a MIT. Potential causes for the well fouling issues were identified in this technical memorandum and possible treatment alternatives were given along with economic considerations. AECOM recommended a treatment approach and developed a conceptual design for pilot-scale testing of a selected back-washable strainer system.

On September 24, 2015, a subsequent technical memorandum was submitted as a follow-up to the previous pretreatment investigation after evaluating the findings of the strainer pilot test and life cycle cost analysis. The strainer was determined to be ineffective for the City's DIW injectate and the report recommended that the City rehabilitate their DIW system.

Representing TO #16, the City tasked AECOM to provide a DIW System Option Analysis Technical Memorandum (TM) and recommendation for enhancing long-term management of the DIW system. The recommended alternative consists of well rehabilitation combined with increasing the current injection tubing and borehole diameter and/or injection zone's total depth. These modifications should improve the injection capacity of the DIW reducing the frictional loss in the injection tubing and by increasing the circumference of the borehole and its length, with the potential of intersecting deeper zone(s) of high permeability.

The existing configuration for the membrane concentrate and wastewater effluent deep injection pump station consists of; two (2) operating 125 hp. horizontal split-case centrifugal pumps with a vacuum priming system. The pumps were installed in 2002. Each pump has a rated flow capacity of 1,500 gpm and a rated Total Dynamic Head (TDH) of 180 feet (assuming a 14 impeller) with a runout point at 3,000 gpm and TDH of 105 feet. In theory, if the well borehole is increased and flow rates remain constant, the well head pressure should be expected to decrease. In TO #16, it was concluded that the two existing horizontal split-case pumps may be sufficient to manage increased flow to the DIW. However it was also stated that the injection well pumps will need to be reviewed once new DIW system pressures are tested.

Recently, the City has taken IW-1 out of service due to a loss of mechanical integrity as it relates to the injection well tubing.

Therefore, this Task Order has been prepared to provide services as it relates to implementing the recommended deep injection well alternative. Professional Services consist of:

- DIW bid package preparation,
- FDEP UIC Permitting,
- Bid phase services,
- Construction Oversight and Management

- DIW Engineering Report, and
- Injection well and pump evaluation Technical Memorandum

A second phase would consist of pump and yard piping adjustment (design) once actual system pressures are known subsequent to the DIW pressure tests, if recommended in the injection well pump evaluation Technical Memorandum. That phase would be included under a separate task order.

**B. Scope of Services**

**1.0 Project Management**

1.1 Management

Project Management activities comprise contract administration, coordination of project staff, monitoring of progress and project costs during the Professional Services phase (Tasks 1.0 and 2.0).

1.2 Project Meetings

AECOM will attend meetings with representatives of the City as part of this project, as follows:

- a. Project kick-off meeting
- b. Progress/ review meeting at the 90% completion milestone for the two documents under Tasks 2.1 and 2.2
- c. Meeting with the Florida Department of Environmental Protection to discuss permit after its submission

**2.0 Hydrogeological Professional Services**

2.1 Well Rehabilitation Plan Preparation

The task will consist of the following activities:

- 2.1.1 Prepare and submit a Well Rehabilitation Plan and associated permit application to FDEP.
- 2.1.2 AECOM will provide up to two (2) responses related to FDEP-issued Request for Information on the submitted Well Rehabilitation Plan.

Please note that due to the recent injection well tubing issue, replacement of injection tubing along with well rehabilitation activities will be necessary to make the well UIC compliant.

## 2.2 DIW Bid Package Preparation

The task will consist of the following activities:

- 2.2.1 AECOM will prepare contract documents (specifications and drawings) in concert with the FDEP approved well rehabilitation work plan. These specifications will be part of the overall bid documents used to seek bids/proposals from qualified Contractors licensed in the State of Florida to perform the specified well rehabilitation services.

It is expected that the documents will consist of up to two drawings and three technical specifications as it pertains to the DIW rehabilitation. These documents will be based from previous task orders under this contract.

- 2.2.2 An Engineer's estimate of probable costs will be prepared. The estimate will be based on Price Index adjusts since bids received in 2016.

### *Quality Control*

As part of our ISO 9001:2008 certification, AECOM will be conducting internal QA/QC reviews at major completion milestones for the project to enhance value to the City. Results will be incorporated into the deliverables.

### **Task 2 Deliverables**

AECOM will provide the following deliverables in hard and electronic format:

- Well Rehabilitation Plan
- Response of FDEP Requests for Information related to rehabilitation plan
- Contract Documents (as part of overall documents)
- Conformed Contract Documents (as part of overall electronic documents)

## **3.0 Bidding Services**

In this task, AECOM will provide assistance to the City during the bidding and award of the project to a single contractor for all DIW work. The following tasks are anticipated:

**By the City of Cooper City:**

1. Bid advertisement and solicitation
2. Provide for reproduction and distribution of contract documents to prospective bidders and will maintain a planholders list

**By AECOM:**

1. Provide the city with electronic copies of the final contract documents
2. Conduct pre-bid meeting
3. Prepare pre-bid meeting notes
4. Respond to prospective bidders' written inquiries on subject matters effecting our work
5. Develop and prepare Addenda
6. Assist City in evaluation of bids, and
7. Provide written recommendation

**4.0 Services During Construction**

AECOM will provide construction and management services outlined below for the duration of the project through Final Completion. Services are described as follows:

**4.1 Management**

Project Management activities comprise AECOM contract administration, coordination of our project staff, monitoring of progress and AECOM project costs during this project phase.

**4.2 Project Meetings**

AECOM will attend meetings with representatives of the City as part of this project, as follows:

- a. Pre-construction meeting
- b. Progress meetings. Key members of the AECOM team will attend as required for project certification. Up to four meetings have been budgeted.

**4.3 Professional Services**

In support of the project, AECOM will provide:

1. Resident services will be performed by staff experienced in the construction and testing of Class I injection wells (60 hours per week for 8 weeks)
2. Contractor management support to the City

3. Review and processing of shop drawings submitted by the Well Contractor
4. Request for Information submitted by the Well Contractor
5. Review of Contractor's payment applications with recommendations to City for payment, and recommendation for final acceptance by City.
6. Document well rehabilitation activities and performance test results in a technical report submitted to the City and FDEP UIC Department within 90 days upon completion of Well Rehabilitation Services
7. Conduct final walk through for substantial completion including preparation of a punch list

#### 4.4 Injection Pumps Technical Memorandum

Once actual injection well pressures are known, the two existing horizontal split-case pumps will be reviewed and a Technical Memorandum (TM) will be prepared. The TM's objective is to determine if the pumps are sufficient to manage increased flow to the DIW and if the existing injection system piping is adequate for the flows and pressures contemplated.

A Florida Professional Engineer and Geologist certification will be provided with the Engineering Report and TM.

#### **Task 4 Deliverables**

AECOM will provide the following deliverables in electronic format:

- Shop drawing and RFI responses
- Well rehabilitation engineering/completion report to the City and FDEP
- Injection Well Pumping System Technical Memorandum

#### **Project Team**

The project team will be led by Jim Penkosky, P.E. who will act as project manager. Mike Bennett, P.G. will assist as the technical leader. The use of subcontractors is not anticipated at this time.

**C. Basic Assumptions**

1. The Consultant will make a reasonable effort to work with the FDEP to provide authorization to perform the proposed well rehabilitation activities. However, the Consultant cannot guarantee that the FDEP will grant authorization to conduct well rehabilitation operations.
2. Electrical requirements will not be reviewed.
3. City will pay for all permit fees.
4. Public hearings will not be required.
5. The City will provide front end (bidding) documents in Word format.
6. A single bid effort is assumed for award to a single contractor.
7. The City will conduct all meetings and AECOM will prepare meeting summaries.
8. Compensation for engineering work in this proposal will be based on a lump sum method of payment. This estimate is based on an overall project budget level of effort for the fees proposed.

**D. Obligations of the City**

1. The City shall provide AECOM no later than two weeks after issuance of the NTP, all requested and available record data and information (in the required format) related to the project as necessary for the performance of the services specified herein.
2. The City shall review all documents presented by AECOM, obtain advice of an attorney, insurance counselor, independent party, and/or others as the City deems appropriate for such review and render decisions pertaining thereto within reasonable time so as to not delay the services of the AECOM team.
3. Designate a Project Representative, as City's representative and primary contact for AECOM. AECOM will rely on the City's designated Project representative for instructions and approval of AECOM's services.
4. Provide to AECOM historical WTP and WWTP Monthly Operating Reports (MORs) including the DOW MORs.

**E. Compensation**

AECOM proposes to perform the tasks outlined above for a lump sum amount of **\$171,639** for the project. The individual task level fees are for budgetary purposes only. Billing shall be monthly on a percent complete basis as estimated by AECOM.

**Attachment 1** contains a cost estimate presenting a breakdown of fees and hours per task.

**F. Project Schedule**

The following project schedule has been developed:

<b><u>Schedule</u></b> <b><u>Task</u></b>	<b><u>Time Elapsed to</u></b> <b><u>Task Completion</u></b>
Notice to Proceed	0 weeks
Task 1 – Engineering Design Services Project Management	Continuous
Task 2 – Hydrogeological Services Project Management	Continuous
Well Rehab Plan	8 weeks
FDEP Review & Acceptance	16 weeks
Contract Document Preparation	16 weeks
City Review	18 weeks
Bid Ready Documents	20 weeks
Task 3 – Bid Phase	6 weeks after city advertisement
Task 4 – Construction Services	(after Contractor NTP)
Deep Injection Well Rehab	12 weeks
DIW Technical Report	22 weeks
Injection Well Pumps' TM Prep	20 weeks
City Review	24 weeks
Final Injection Well Pumps' TM	26 weeks



**City Authorization to Proceed with Task Order #21:**

For the City of Cooper City, dated this \_\_\_\_ day of \_\_\_\_\_, 2018,

By \_\_\_\_\_  
Michael F. Bailey, P.E.  
Utilities Director/City Engineer

For the Consultant, AECOM Technical Services, Inc., dated this 19th day of  
June, 2018,

*C. Scott Lee, PE*  
By \_\_\_\_\_  
C. Scott Lee, P.E.  
Vice President  
Water Business Line

ATTACHMENT 1

Fee Analysis

**CITY OF COOPER CITY**  
**Deep Injection Well System - Well Rehabilitation (Phase 1)**  
**Task Order #21**

**ATTACHMENT 1**

LABOR CATEGORY	HOURLY RATE	TASK Designations										TOTAL HOURS	TOTAL FEES
		1.1		1.2		2.1		2.2		3.0			
		Hours	Rt x Hrs	Hours	Rt x Hrs	Hours	Rt x Hrs	Hours	Rt x Hrs	Hours	Rt x Hrs		
<b>Consulting/Engineering:</b>													
Proj. Dir., Principal	\$220	2	\$440		\$0	1	\$220	1	\$220		\$0	4	\$880
Technical Leader (QA/QC)	\$198		\$0		\$0		\$0	8	\$1,584		\$0	8	\$1,584
Senior Project Manager	\$198	16	\$3,168	8	\$1,584	2	\$396	6	\$1,188	6	\$1,188	38	\$7,524
Technical Leader (Hydrogeologist)	\$198		\$0	12	\$2,376	38	\$7,524	30	\$5,940	16	\$3,168	96	\$19,008
Senior Technical Specialist III	\$168		\$0		\$0		\$0		\$0		\$0	0	\$0
Senior Technical Specialist I	\$143		\$0		\$0		\$0		\$0		\$0	0	\$0
Engineer III	\$123		\$0		\$0		\$0		\$0		\$0	0	\$0
Technical Specialist II	\$123		\$0		\$0		\$0		\$0		\$0	0	\$0
Project Engineer I	\$123	2	\$246		\$0	6	\$738		\$0		\$0	8	\$984
Technical Specialist I	\$105		\$0	4	\$420	12	\$1,260		\$0		\$0	16	\$1,680
Engineer I/II	\$105		\$0		\$0		\$0		\$0		\$0	0	\$0
Scientist I/II	\$86		\$0		\$0		\$0		\$0		\$0	0	\$0
<b>Technical Services:</b>													
Designer III	\$109		\$0		\$0		\$0		\$0		\$0	0	\$0
Designer II	\$99		\$0		\$0		\$0		\$0		\$0	0	\$0
<b>Project Support Services:</b>													
Administrative Assistant II	\$69	4	\$276	4	\$276		\$0	4	\$276	4	\$276	16	\$1,104
<b>TOTAL PERSONNEL</b>		<b>24</b>	<b>\$4,130</b>	<b>28</b>	<b>\$4,656</b>	<b>59</b>	<b>\$10,138</b>	<b>49</b>	<b>\$9,208</b>	<b>26</b>	<b>\$4,632</b>	<b>186</b>	<b>\$32,764</b>
<b>Direct Costs:</b>													
Subcontractor (none)	cost		\$0		\$0		\$0		\$0		\$0		\$0
ODCs	cost		\$100		\$100		\$250		\$150		\$50		\$650
10% markup (subs)	10%		\$0		\$0		\$0		\$0		\$0		\$0
<b>TOTAL DIRECT COSTS</b>			<b>\$100</b>		<b>\$100</b>		<b>\$250</b>		<b>\$150</b>		<b>\$50</b>		<b>\$650</b>
<b>SUB TOTAL</b>			<b>\$4,230</b>		<b>\$4,756</b>		<b>\$10,388</b>		<b>\$9,358</b>		<b>\$4,682</b>		<b>\$33,414</b>

LABOR CATEGORY	HOURLY RATE	TASK Designations								TOTAL HOURS	TOTAL FEES
		4.1		4.2		4.3		4.4			
		Hours	Rt x Hrs	Hours	Rt x Hrs	Hours	Rt x Hrs	Hours	Rt x Hrs		
<b>Consulting/Engineering:</b>											
Proj. Dir., Principal	\$220	2	\$440	0	\$0		\$0	1	\$220	3	\$660
Technical Leader (QA/QC)	\$198		\$0		\$0	2	\$396	4	\$792	6	\$1,188
Senior Project Manager	\$198	24	\$4,752	8	\$1,584	11	\$2,178	14	\$2,772	57	\$11,286
Technical Leader (Hydrogeologist)	\$198	48	\$9,504	12	\$2,376	120	\$23,760	4	\$792	184	\$36,432
Senior Technical Specialist III	\$168		\$0		\$0		\$0		\$0	0	\$0
Senior Technical Specialist I	\$143		\$0		\$0		\$0		\$0	0	\$0
Engineer III	\$123		\$0		\$0		\$0		\$0	0	\$0
Technical Specialist II	\$123		\$0		\$0		\$0		\$0	0	\$0
Project Engineer I	\$123		\$0		\$0	8	\$984	120	\$14,760	128	\$15,744
Technical Specialist I	\$105		\$0	4	\$420	580	\$60,900		\$0	584	\$61,320
Engineer I/II	\$105		\$0		\$0		\$0		\$0	0	\$0
Scientist I/II	\$86		\$0		\$0		\$0		\$0	0	\$0
<b>Technical Services:</b>											
Designer III	\$109		\$0		\$0	20	\$2,180	8	\$872	28	\$3,052
Designer II	\$99		\$0		\$0		\$0		\$0	0	\$0
<b>Project Support Services:</b>											
Administrative Assistant II	\$69	4	\$276		\$0	41	\$2,829	2	\$138	47	\$3,243
<b>TOTAL PERSONNEL</b>		<b>78</b>	<b>\$14,972</b>	<b>24</b>	<b>\$4,380</b>	<b>782</b>	<b>\$93,227</b>	<b>153</b>	<b>\$20,346</b>	<b>1037</b>	<b>\$132,925</b>
<b>Direct Costs:</b>											
Subcontractor (none)	cost		\$0		\$0		\$0		\$0		\$0
ODCs	cost		\$200		\$500		\$4,500		\$100		\$5,300
10% markup (subs)	10%		\$0		\$0		\$0		\$0		\$0
<b>TOTAL DIRECT COSTS</b>			<b>\$200</b>		<b>\$500</b>		<b>\$4,500</b>		<b>\$100</b>		<b>\$5,300</b>
<b>SUB TOTAL</b>			<b>\$15,172</b>		<b>\$4,880</b>		<b>\$97,727</b>		<b>\$20,446</b>		<b>\$138,225</b>

**Grand Total \$171,639**