

**ENVIRONMENTAL LAW DIVISION
REPORT OF C&P LOGBOOK ENTRY**

IN: 11 Apr 94
 S:
 OUT: 21 ~~Apr~~ ~~1994~~ Sep 94
 LOG NUMBER: 9402767
 E-FILE:

→ W-10

ACTION	INFO	ROUTE TO	INITIALS
		COL MCGOWAN	
		MR. NIXON	
✓	✓	LTC GRAHAM	
		MAJ BELL	
		MAJ MILLER	
		MAJ TELLER	
		MARIE	
		CLARA	em
		OPINION FILE	

SUBJECT: *Scope of work for installation of nine observation wells, Ft Huachuca*

INITIATING AGENCY:

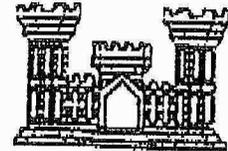
DISPOSITION OF ACTION:

REMARKS:

MEMORANDUM FOR RECORD: *Reviewed + OK'd*



· FACSIMILE TRANSMITTAL HEADER SHEET
Directorate of Engineering and Housing
Fort Huachuca, Arizona 85613-0000



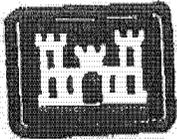
TO: NAME: LTC Mark Graham
COMPANY: US Army ENVR Law Div
FAX NUMBER: 703 696-2940
OFFICE SYMBOL: _____
TELEPHONE NUMBER: AUTOVON: _____
COMMERCIAL: 703 696 1230

NUMBER OF PAGES INCLUDING HEADER: 11

FROM: Commander
U.S. Army Garrison
Directorate of Engineering and Housing
ATTN: ATZS-EH
Fort Huachuca, Arizona 85613-0000
FAX NUMBER: (602) 533-3709 - AUTOVON: 821-3709
OFFICE SYMBOL: ATZS-EH E
TELEPHONE NUMBER: AUTOVON: 821-_____
COMMERCIAL: 602-533-1864/3
RELEASER'S SIGNATURE: Mike Spangnesse

4/11/94

REMARKS: Draft of Statement of Work from Fend KE,
also ~~part~~ ^{sheet} for Dennis Candlish, A PWR; will
use info for next U. San Pedro Tech Com meeting -
presentation to County Board of Supervisors and
Cochise College water working group on 25 Apr 94.
Reyes and I talked w/ B. Sullivan on Friday, he's
considering writing HR to DOT re: proposal.
and a water issues chart plus cover HR to A&E proposal
the rest is working on...



HYDROLOGIC ENGINEERING CENTER
809 Second Street
Davis, California 95616
(916) 756-1104 - Office (916) 756-6250 - Fax

US Army Corps
of Engineers

DATE: 4-8

TO: Mike Shyness

FAX #: (602) 533-3709

OFFICE: Dir. of Eng. & H

PHONE #: (602) 533-1864

FROM: Jim Fink

Number of pages including this one: 2

SUBJECT: Sewer San 9 observation well.

MESSAGE:

Mike,

I will get the USGS maps of Precise well locations in the mail today. Please read through the SOW and let me know if I need to make any changes. I'll also send a copy to AOWA (Curren only), and USGS Tucson for review.

I contacted Mike McQueen (BGM) and he said the installation of these wells is a good idea. The BGM will (hopefully) be constructing a net of monitoring wells in the Charleston cooling area. - In line with wells # 1, 2, 3, 4, 5. He doesn't know of any wells to the immediate north.

He also recommended "Michael Ryor" of BGM at Rec. for drawing. His phone # is (602) 870-2220.
(lets talk next week)

Jim

Draft

7 April 1994

**Subject: Scope of Work for the Installation of Nine Observation Wells,
Fort Huachuca Military Base, Arizona**

I. Background

The Fort Huachuca Military Installation is located in the upper San Pedro River Basin in southeast Arizona approximately 75 miles southeast of Tucson (Figure 1). As a major Information Systems command center of the U.S. Army, base operations include the coordination of communications systems worldwide, military intelligence, and electronics testing. The present noon-time population at the installation is approximately 16,500. The total population of the installation and the adjoining city of Sierra Vista is approximately 40,000.

The San Pedro River drainage basin encompasses 4,483 square miles from its southern headwaters in the Mexican state of Sonora to its confluence with the Gila River in Winkelman, Arizona. The San Pedro Watershed is located within a typical Basin and Range Hydrogeologic Province. Its wide valley floor consists of older alluvial deposits with younger alluvium near the stream channels. Consolidated rock bounds the valley and forms the floor for the overlying alluvial deposits. The Fort Huachuca military base is comprised of 115 square miles in the southwest portion of the basin extending from 1 mile west of the San Pedro River to the crest of the Huachuca Mountains. Climatically, the San Pedro Basin has generally warm summers and mild winters with average annual precipitation rates varying from 10-15 inches at the valley floor to 26 inches in the western mountains.

The San Pedro River is an intermittent stream with its most consistent flow occurring in the upper watershed area. Because of the unique ecological system afforded by its desert riparian habitat, environmental interests have increasingly been in conflict with developmental interests in litigation over regional water allocations. The diverse range of groups and organizations involved in San Pedro water rights issues include: municipal water districts, individual property owners, agricultural and mining interests, the United States Army, the Gila River Indian Tribe, the United States Forest Service, the Arizona Department of Water Resources, the Bureau of Land Management, and the Nature Conservancy. A significant portion of the stream has been placed in federal protective status as the Bureau of Land Management's San Pedro National Riparian Conservation Area (SPNRCA). Threats to the flow of the river exist due to groundwater pumping in the Sierra Vista/Fort Huachuca area. The San Pedro River is currently undergoing a stream wide adjudication of water rights. The United States has filed claims on behalf of the SPNRCA, Fort Huachuca, and the Gila River Indian Community (US Bureau of Reclamation, 1994).

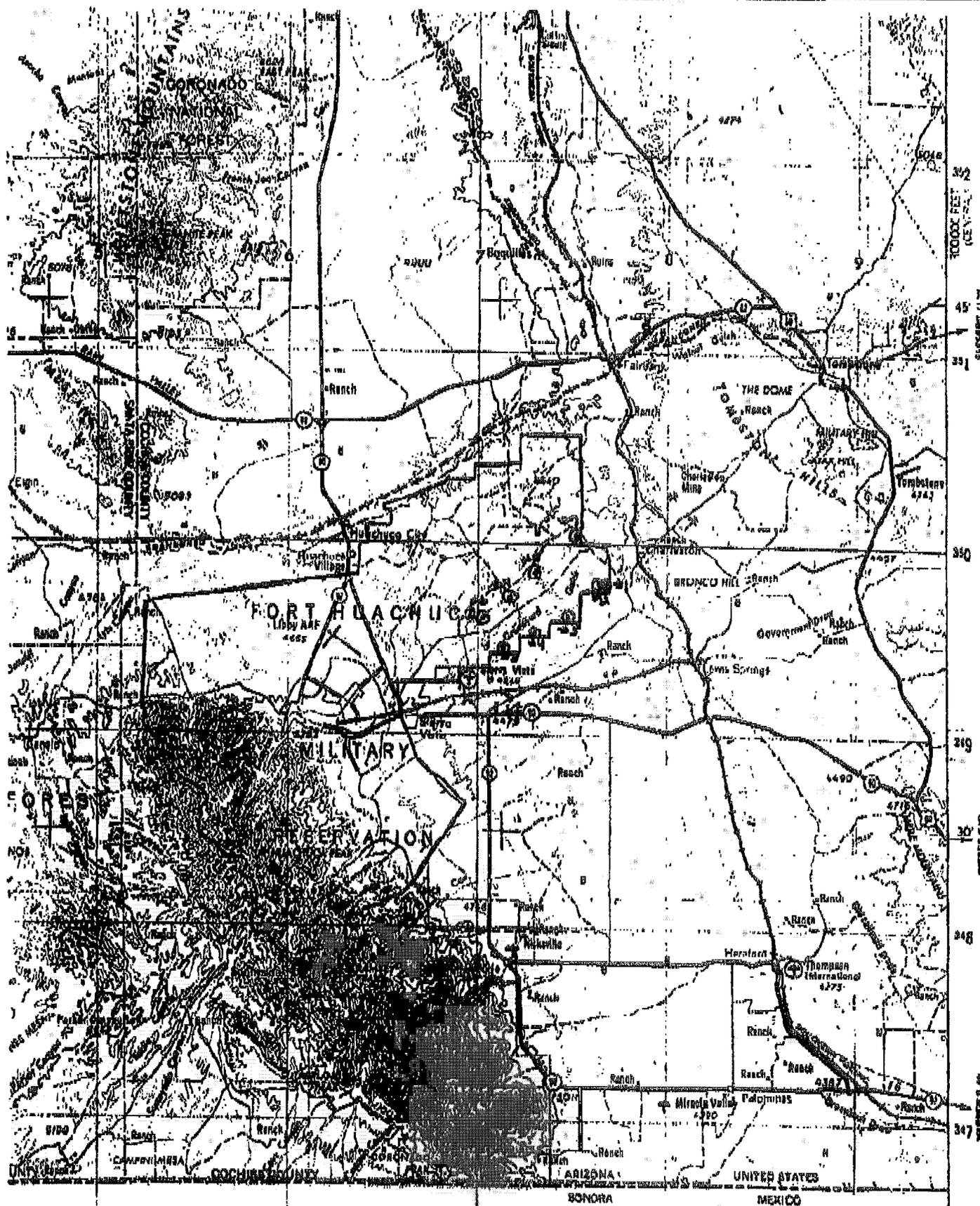


Figure 1 Location Map

II. Problem

Groundwater levels are dropping in the Fort Huachuca/Sierra Vista area due to aquifer pumping. Over time, this potentially can have an appreciable effect on groundwater discharge to the San Pedro River. A number of computer models which have been developed to better describe groundwater/surface water interrelationships in the upper San Pedro River Basin. However, the validity of these models has been limited by the lack of water level data extending from the cone of depression in the Fort Huachuca/Sierra Vista area to the San Pedro River.

III. Objective

Better quantify the impact of Fort Huachuca/Sierra Vista groundwater pumping on baseflow discharge to the San Pedro River over time. Provide a better understanding of the local groundwater flow regime.

IV. Approach

The quantity of groundwater discharging to the San Pedro River is directly related to two transient factors: the relative elevation of the water table adjacent to the river, and the hydraulic gradient of the water table adjacent to the river. Potential vertical flow from deeper confined aquifers also provides a possible source of groundwater discharge to the river. The installation of nine observation wells at key locations will provide real field data to quantify impacts of pumping from the Sierra Vista/Fort Huachuca area on water table elevations and flow gradients adjacent to the San Pedro over time. Additionally, one deep well will be located at the easternmost point of the Fort Huachuca boundary to investigate potential vertical gradients from deeper confined aquifers. These wells will be located on USGS maps by the Hydrologic Engineering Center (HEC), and precisely staked in the field by HEC and Fort Huachuca personnel. Surveying of well locations and casing elevations will be performed by Fort Huachuca.

V. Tasks

As referenced in Figure 1, nine wells will be constructed at predefined locations at Fort Huachuca. These wells will be constructed under the following specifications, and are listed in order of priority.

Observation Well #1 -

Drilling Method: mud rotary

Borehole Diameter: 6 inches

Approximate Depth: 450 ft

Approximate Depth to Water: 50 ft

Geophysical Logs: full suite (ER, SP, natural gamma, gamma-gamma, electric, neutron)

Casing Size: 2 in. diameter

Casing Material: stainless steel (type 304)

Approximate Screened Interval: 30 ft in deeper more permeable zones, approx. 420-450 ft below surface;

Slot Size: so as to retain 80% of the filter pack;

Filter Pack: no. 3 Monterrey Sand (or equivalent); wells should be drilled deep enough to allow placement of the bottom of the screen 350-400 ft below the water table, with 1-2 ft of filter pack sand below the bottom of the screen, filter pack should extend 10-15 ft above the top screen after settling;

Bentonite: a minimum of 3 ft thick bentonite seal should be placed directly above the filter pack;

Backfill Material: clean/washed sand to 20 ft below surface;

Cement Grout: top 20 ft of hole;

note: volcanics or other consolidated rocks may exist in this area; if consolidated rock is encountered, drilling operations will continue for 150 ft to a maximum depth of 450 ft.

Observation Wells #2-9 -**Drilling Method: air rotary****Borehole Diameter: 6 inches****Approximate Depths:**

well no. 2- 85 ft
well no. 3- 235 ft
well no. 4- 135 ft
well no. 5- 115 ft
well no. 6- 235 ft
well no. 7- 135 ft
well no. 8- 115 ft
well no. 9- 85 ft

Approximate Depths to Water:

well no. 2- 50 ft
well no. 3- 200 ft
well no. 4- 100 ft
well no. 5- 50 ft
well no. 6- 200 ft
well no. 7- 100 ft
well no. 8- 50 ft
well no. 9- 50 ft

Geophysical Logs: none**Casing Size: 2 in. diameter****Casing Material: stainless steel (type 308)****Approximate Screened Interval: 30 ft, with top of screened interval 1-10 ft below water table;****Slot Size: so as to retain 90% of filter pack;****Filter Pack: No. 3 Monterrey Sand (or equivalent); wells should be drilled deep enough to allow placement of the bottom of the screen 30-40 ft below the water table, with 1-2 ft of filter pack sand below the bottom of the screen, filter pack should extend 10-15 ft above the top screen after settling;**

Observation Wells #2-9 (cont'd) -

Bentonite: a minimum of 3 ft thick bentonite seal should be placed directly above the filter pack;

Backfill Material: clean/washed sand to 20 ft below surface;

Cement Grout: top 20 ft of hole;

Total completion depth of wells (nos.1-9), and the lengths of casing to be installed, will be based on the position of the water table as penetrated by each well. Because limited information on water levels exist in this area, indicated water levels are approximate. Thus, estimates of depths are subject to correction during drilling. Geologic logging will be performed by the driller and analyzed by a geologist on site. Samples should be collected every 5 ft interval and at every discernible change in formation. The logging record should address: soil type, particle size, color, hardness, lithologic changes, and depth to water. Wells should be adequately developed to ensure the free flow of water into casing.

Well coupling threads must be lubricated using dry Teflon tape, with no tape visible on the inside of the pipe after full thread engagement and tightening. The final well coupling should be at ground surface. Riser casing should extend 2 ft. The riser should have a screw cap on top and contain a vent hole.

Wells should be completed with a 4 ft x 4 ft x 6 in. thick concrete pad with four 8 in. diameter 4 ft long guard posts set in concrete adjacent to, and separate from, the concrete pad. The outer protective casing should be 10 in. diameter schedule 40 carbon steel pipe. This casing should have a welded and drilled steel tab aligned with the hasp on the end cap, suitable for locking. A lock for each well should be provided. The outer casing should be painted in bright red with rust resistant paint. Wells should be clearly identified by number.

VI. Schedule

Well construction should be completed no later than August of 1995. Specific drilling times should be coordinated with Mike Shaughnessy of Fort Huachuca Department of Engineering and Housing, and Jon Fenske of the Hydrologic Engineering Center.

VII. References

U.S. Bureau of Reclamation, 1994, Draft- Working Concept Paper for Resolution of Federal Water Rights Issues, Upper San Pedro River Subbasin, 27 p.

Apr 94

FACT SHEET
FORT HUACHUCA, ARIZONA

1. The following projects are occurring at Fort Huachuca in an effort to further the information base on riparian habitats and groundwater pumping.

a. Garden Canyon Watershed Study. The purpose of the four year study is to determine the impact of the ecological processes and interactions on the many rare and sensitive plant species found in Garden Canyon that are dependent upon the riparian habitat found in the canyon. A USGS stream gauge, installed in the 1960s, was reestablished as a data collection point. In addition, over the next year, tensionometers will be installed near the stream to gather information on soil saturation at various distances from the stream. The data gathered in this project will be used to prepare a report that will recommend management and restoration strategies for not only this canyon, but other riparian areas both on and off the fort.

b. Groundwater Observation Wells. The purpose of the observation wells is to gather information on the change in water gradients and to determine if the vertical flow from the deeper aquifer is significant to the discharge to the river flow. This information will be made available for those agencies currently working on hydrologic models. The installation of nine wells is planned for late 1994 or early 1995. The alignment of the wells will approximate a line between the Charleston gauge to the main gate of the post. Five wells, one deep well with one shallow well and the other three located between the eastern boundary of the east range and stopping just north of the Rancho Carmela subdivision. A second alignment will parallel the first alignment approximately 1 and 1/4 miles to the north and consist of 4 shallow wells. The second alignment will provide a three-dimensional view of the groundwater gradient.

2. Point of contact is the undersigned, Directorate of Engineering and Housing, Fort Huachuca, Arizona 85613-6000; (602) 533-1864/1863.


MICHAEL M. SHAUGHNESSY
Installation Water Coordinator

WATER ISSUES YEAR 1994

MONTHS

ACTIVITIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
11. Local Adjudication Meetings												X
10. Quarterly Water Issues Update		X	X		X							
9. Monthly Water Issues Update		X	X		X							
8. CG's Open Forum												X
7. Local Settlement Negotiations												
6. Observation Wells Project (Year-end funding)												
5. Cochise College Working Group Meetings (Monthly - Sierra Vista)												
4. Federal Working Group Meetings (Monthly - Phoenix)												
3. Upper San Pedro Technical Committee Meetings (Monthly - Tucson and Sierra Vista)												
2. Issue Numbers 4 and 5*												
1. Issue Number 2^												

NOTE: 'X' indicates activity in that particular month has either occurred or is expected to occur.

*Issue #4: Is nonappropriable groundwater subject to federal reserved rights? Issue #5: Do federal reserved water rights holders enjoy greater protection from groundwater pumping than holders of state law rights?

^ Issue #2: Did the trail court err in adopting its 50%/90-day test for determining whether underground water is appropriable under A.R.S. Section 45-141? The court has determined that the trail court did err and is currently deliberating on what standard will be established to legally distinguish between groundwater and subflow.



30 YEARS
PROFESSIONAL PRACTICE
1963-1993

2960 N. CAMPBELL AVENUE, SUITE 130 TUCSON, ARIZONA 85719 602/681-4546 FAX 788-1822

DAVID C. BRIDBY, AIA
JOHN B. LYNCH, PE, RLS
ROGER S. HARWELL, PE
WILLIAM I. NELSON, PE

April 7, 1994

U.S. ARMY INTELLIGENCE CENTER AND FORT HUACHUCA
DIRECTORATE OF ENGINEERING AND HOUSING
Master Planning Section
Fort Huachuca, AZ 85613-6000

Attention: John Hill
Master Planning

Reference: Treated Effluent Reuse and Disposal Systems
Fort Huachuca

Dear John:

Attached is a draft scope of work for a proposed study to evaluate the potential to expend the treated effluent reuse systems on the post and to evaluate the potential for recharging the effluent into the aquifer. In preparing this draft SOW, we elected to incorporate a short narrative of the tasks rather than make general statements that the consultant shall do X, Y, and Z. As a result, the text is a little lengthier than anticipated, however, I believe that it provides a good start for further discussion.

In regard to the expansion of the reuse system, the SOW is an early "cut and dry" version which incorporates the items discussed during our meeting. There may be a few tasks that you would prefer that the base complete, or upon reconsideration there may be additional aspects you may want to be incorporated. The only deviation from what was discussed during our meeting is the option for recycling at the vehicle wash-down areas. Rather than extend the reuse system to these locations, it may be economical to install a recycling system which would achieve the same goal of water conservation.

The scope of work for the recharge study is fairly complex and will require considerable field investigation and expenditures to complete. While we understand that funding and time constraints could likely require a refinement and/or phasing of the SOW, we attempted to present you with a full picture of the investigations required to develop a recharge system. The major items, in terms of time and expenditures are the investigation of hydrogeologic conditions, the evaluation of the required effluent quality requirements, and the investigation

U.S. ARMY INTELLIGENCE CENTER AND FORT HUACHUCA

John Hill

April 7, 1994

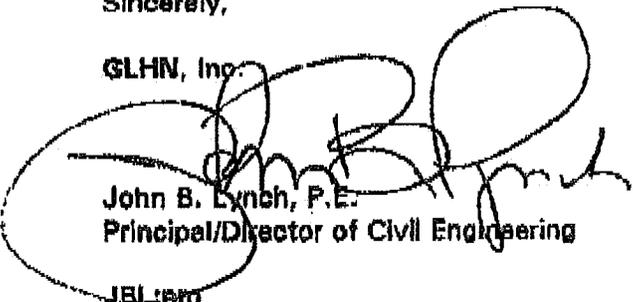
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of the inflow and infiltration into the sewer collection system. Since a reduction in the scope of work proposed would lead to more conservative estimates, we would suggest that we meet with you and the representatives of the Fort to discuss the issues and wrap up the SOW so that it conforms to your funding and time constraints, but still provides the technical information required to support the Base's position in future planning.

We appreciate your cooperation and look forward to your response.

Sincerely,

GLHN, Inc.



John B. Lynch, P.E.
Principal/Director of Civil Engineering

JBL:am

Enclosures