Engineering Construction Division Contract Status Report
January 05, 2006

CONTRACT	ESPM ID	MCP NUMBER	EDMS NUMBER
1107		03-01, 03-03, 03-04	2497

PROJECT TITLE: ELKHORN 2975 ZONE RESERVOIR AND 3090 ZONE AND 3205 ZONE PUMPING STATIONS

PROJECT DESCRIPTION:
The project consists of the construction of a 26.6-million gallon below grade reinforced concrete reservoir to provide additional storage for the 2975 Pressure Zone and transfer storage for pressure zone to the west. The two 13.3-million gallon basins will be constructed under this contract, and the other 13.3-million gallon basin will be constructed in the future. The scope also includes the construction of a 3090 Pressure Zone Pumping Station. One 100-horsepower variable speed, and one 100-horsepower constant speed, with 2,275-gallon per minute pumping capacity at a total dynamic head of 130-feet, and one 200 horsepower constant speed, with 4,550-gallon per minute pumping capacity at a total dynamic head of 130-feet will be installed. The scope also includes the construction of a 3205 Zone Pumping Station. Four 200 horsepower constant speed pumps, each with 2,500-gallon per minute pumping capacity at a total dynamic head of 242-feet will be installed. The project site is a 20-acre parcel granted to the District by the BLM.

CONTRACTOR: J. A. Tiberti Construction Co., Inc.
ENGINEERING FIRM: G.C. Wallace, Inc. for Cliffs Edge, LLC
CONSTR. ENGINEER: Richard Wilson
INSP. SUPERVISOR: Charles Bilberry
INSPECTOR: Donald Kelnhofer

PUBLIC WORKS PROJECT NUMBER
CL-2004-153

Bid Opening:	Nov 19, 2004	**Orig Sub Completion Date:**	Apr 17, 2006
Award Date:	Dec 07, 2004	**Orig Fin Completion Date:**	Jun 16, 2006
Notice to Proceed:	Jan 12, 2005		
Original Sum:	$ 21,288,000.00	**Project Funding:**	12100
Unit Adjustments:	$ .00	**Funding Commitment**	$ 22,288,000.00
Misc Adjustments:	$ .00	**Authorized Contingency:**	$ 1,000,000.00
Developer Fundings:	$ .00	**Remaining Contingency:**	$955,264.00

	CO No	Change Order Dollar Amount	Added Days (S)	Added Days (F)	CO Type	CO Category	Approval Date	% Of Original Sum
	1	$0.00	0	0	D		MAY 13, 2005	0.00
	2	-$327.00	31	31	D		JUN 09, 2005	0.00
	3	$15,743.00	0	0	M		JUL 19, 2005	0.07
	4	$28,993.00	0	0	G		JAN 17, 2006	0.14
Totals:	**4**	**$44,409.00**	**31**	**31**				**0.21**

Adjusted Contract Sum:	$21,332,409.00	**Req'd Sub Completion Date:**	May 18, 2006
Value of Work Completed:	$ 15,447,824.90	**Actual Sub Completion Date:**	
Amount Paid to Date:	$ 14,382,653.90	**Req'd Fin Completion Date:**	Jul 17, 2006
Retention Being Withheld:	$ 1,065,171.00	**Actual Fin Completion Date:**	
Liquidated Damages:	$ .00	**Board Acceptance Date:**	
Incentives:	$ .00	**Retention Release Date:**	
		Warranty Expiration:	

Notes:
The project is approximately 75 percent complete. RESERVOIR- The Contractor has been cleaning up interior before caulking. PUMP STATION - Walls and roof have been placed. Work continues on interior. YARD - Installing piping, check valve and bypass piping at Valve Vault 70. Installing overflow outlet header to reservoir center. ADMIN - Submittals are being reviewed. 53 RFI's have been received. Project progress meeting was held Wednesday, December 21, 2005.

Figure 3
Example of ProjectView

Other software tools the LVVWD uses for construction management are off-the-shelf software provided by Microsoft Office®, including Word®, Excel®, and PowerPoint®.

Benefits Realized

The LVVWD has achieved significant benefits by self-performing construction management. These benefits include the following:

- Overall cost control
- Improved in-house knowledge
- Faster feedback for better designs
- Rapid design modification during construction phase
- Change order control
- Claim reduction
- Improved record drawings

The most significant benefit is cost control. The LVVWD maintains close monitoring of all costs associated with construction. This starts with contract document preparation that allows for easier contract administration. The LVVWD endeavors to provide biddable and constructable documents and incorporates lessons learned from previous projects. In 2005, the LVVWD bid and awarded 36 projects. The Engineer's estimate for those projects was an aggregate of approximately $187 million and the construction award value was approximately $185 million, which is a difference of less than one percent. The District's overhead cost for managing major construction projects during the last two years was 1.46 percent. This would include inspection and contract administration costs. The Construction Engineer and Inspector are involved in a project from the Scope of Work to the 60 percent and 100 percent reviews in addition to monitoring the construction activities. The LVVWD assists the contractors in preparing monthly progress payments, as well as identifying potential changes to expedite the Request For Information (RFI) and Request For Proposal (RFP) processes.

By having in-house staff perform the construction management function and be held accountability for its performance, the LVVWD has developed an experienced staff that is able to act in the LVVWD's best interest, while still being fair to the contractors. The feedback from the construction team to the design team allows for subsequent projects to benefit from any changes that were required; therefore, streamlining the planning of similar projects. Since the design team and construction team are part of the same Engineering Department, coordination during construction is seamless allowing design modifications to be incorporated in a timely and cost effective manner. The LVVWD has conducted numerous process improvement investigations and adopted recommendations that have resulted in significant operational and maintenance efficiencies and savings.

Another benefit of self-performing construction management has been a low change order rate, See Figure 4. This is indirectly due to the other benefits stated previously. The LVVWD has also experienced a low claim rate for construction projects. This is partly due to the fact that the LVVWD tries to work closely with the contractor to settle claim issues rather than depend on an arbitration process to settle any unresolved claims.

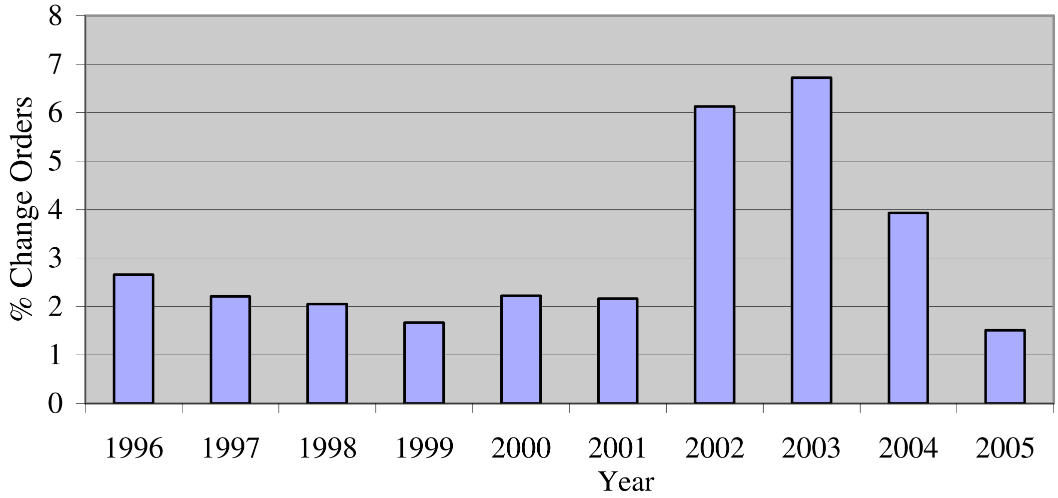

Figure 4
% Change Orders

Lessons Learned

The lessons the LVVWD can accredit to the success of self-performing construction management can be summarized as follows:

- It is possible to self- manage large construction projects
- Cost control is a major benefit of self-performing construction management
- The need for upper management commitment and support is critical

The LVVWD has been self-performing construction management for the better part of the last 15 years. The organization has established a construction management structure that has developed into a cohesive, successful unit and will continue to evolve and improve efficiency while fulfilling the strategic goals of the LVVWD.

The major benefit of self-performing construction management has been overall cost control. This includes better estimating project costs during planning, to cost control management during construction, to claims avoidance at the completion of a project. This results in helping keep water rates low, minimizing the amount of rate-payer dollars spent on construction projects.

The success of self-performing construction management would not be possible if it were not for the support of upper management. This support is critical as a risk is being borne by the owner. The LVVWD's management has the confidence that applied in-house knowledge and expertise provides maximum benefits with minimal costs in completing projects that are required to keep up with the water demands of the Las Vegas Valley.

Leak Detection in Large Diameter Fiberglass Pipe

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Abstract

In the summer of 2005, Texas Sterling Construction L.P., under contract to the City of Houston, finished the installation of a 30" Fiberglass Collector line. The Fiberglass pipe was provided by Ameron FCPD and was selected by Lockwood, Andrews & Newnam due to its non-metallic nature, rendering it immune to corrosion.

The line failed a series of hydrostatic pressure tests when it was subjected to test pressure. This suggested the presence of high pressure leakage. Attempts were made to locate the leaks utilizing a variety of methods including excavation at ponding areas and other experimental technologies. None of these methods proved universally effective.

In a further attempt to locate the leaks, in August 2005 Texas Sterling Construction L.P. contracted with the Pressure Pipe Inspection Company (PPIC) to inspect this line using the Sahara leak location system. The Sahara system was inserted into the pipeline at two separate locations. Because the pipeline had not been placed in service and there was no water flow in it, pulltape was used to pull the inspection equipment through the testing area. The overall inspected distance was 5,083 feet, and was conducted over a 2-day period.

Analysis of the data obtained during this inspection revealed two leaks within the areas tested. Texas Sterling Construction, L.P. verified the results through excavation and repaired the affected joints. Consequently, this line passed its pressure test and was handed over to the City of Houston.

Background

Bondstrand RTRP Fiberglass Pipe

Bondstrand RTRP is the tradename for large diameter fiberglass piping for pressure pipe application manufactured by Ameron International.

Bondstrand pipe is a filament-wound pipe made by winding continuous fibrous glass strand roving onto the outside of a mandrel. The fiberglass reinforcement roving is saturated with either a liquid resin or a liquid resin/filler matrix. Winding is continued at pre-determined angles and tension to achieve specific mechanical properties. The strength of the pipe is determined by the amount and the orientation of the material wrapped on the mandrel.

The wall thickness of Bondstrand consists of a corrosion liner, structural wall, and a resin-rich exterior coating. The corrosion liner contains an interior surface which consists of a veil surface mat and resin. The remainder of the corrosion liner contains resin saturated chopped strand reinforcement. The structural wall consists of computer controlled helically wound fiberglass rovings and resin, or resin/filler matrix. The exterior resin coating consists of a resin which may include an ultra-violet inhibitor.

Bondstrand RTRP in 30", 42", and 48" diameters uses a double O-ring joint system designed to operate at 150 psi. These pipes are manufactured and hydrotested to 300 psi at Ameron's fiberglass pipe fabrication facility in Burkburnett, Texas. After the pipe is delivered to the project site, the pipe is again hydrotested at 1.5 times the design specification to verify installation integrity. The pipe installation proceeds at between 40 to 50 joints per 10-hour day.

Although Ameron manufactures four types of large-diameter bell and spigot joints for use with Bondstrand RTRP on water transmission lines in addition to flanged or butt and wrap joints. Regardless of the type of joint specified, the integral bell and confined O-ring spigot system provides a reliable, tight, leak free installation.

Texas Sterling Construction

Texas Sterling Construction L.P. is one of the largest pipeline contractors in the United States and installs approximately XX miles of pipe every year. In addition to its established operations in Houston, Texas Sterling operates in Dallas/Fort Worth and San Antonio. Texas Sterling is primarily engaged in working for state, county and municipal agencies.

The Sahara System: Normal Operating Conditions

Sahara pinpoints the location and estimates the magnitude of leaks in water transmission mains. The Sahara system uses a highly sensitive acoustic detector unit, which is inserted into the main at any tap point 2" (50 mm) or greater in diameter while the pipeline remains under pressure between 0.3 and 13.8 bar (3 and 200 psi).

The insertion allows the cable to be inserted into a live main and incorporates a retractable guide which protects the cable from damage as it passes into the pipe. A winch and cable drum control the deployment and retrieval of the umbilical. The winch forces the umbilical into the pipe against water pressure and withdraws the umbilical from the pipe upon completion of the survey.

In operation, the neutrally buoyant probe and data cable are disinfected before they enter the pipe. Normally, the system is then carried along the pipe by the flow of water (the flow rate must be greater than 1ft/sec). As the system travels through the pipe, the detector head continuously "listens" for the distinctive noise of a leak that is generated by the escape of under-pressure water. Leaks as small as 0.25 gallons/hr are identified in real time by a processor at the insertion point.

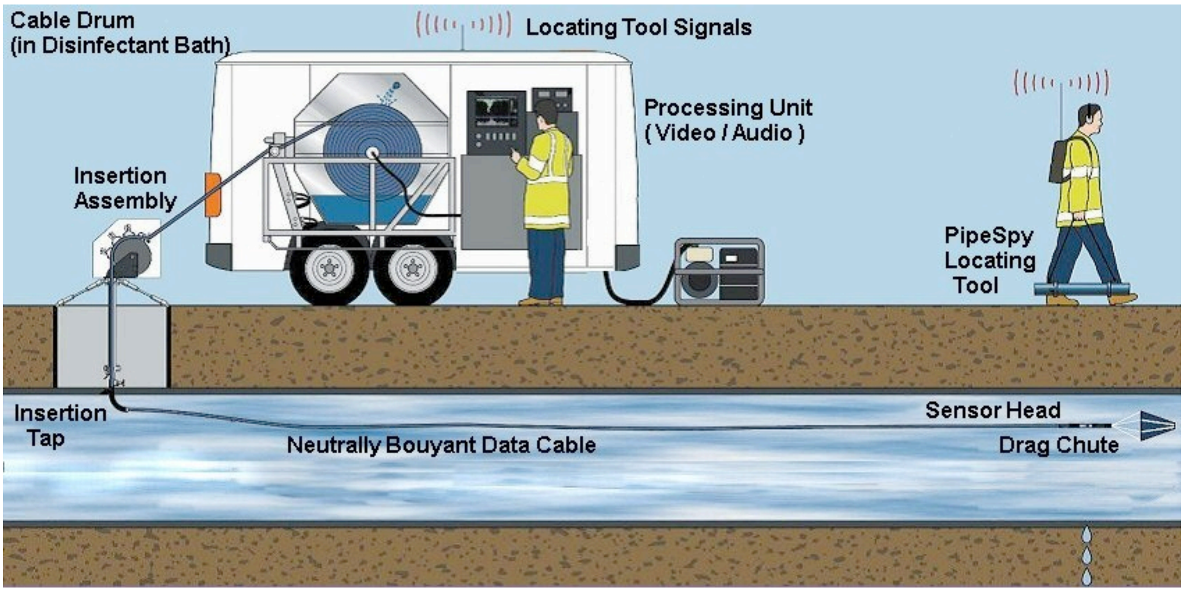

Figure 1 Schematic representation of Sahara system in normal operations

Once a leak has been detected, the sensor head can be stopped at the precise position of the leak. The magnitude of the leak is then estimated by the operator through quantification of the acoustic signal recorded by the sensor. The location of the leak within the main is surface located using TUE's PipeSpy2000™ precision locator unit and accurately marked for subsequent excavation and repair.

Sahara System Modifications and Setup

Initially, the pipeline to be surveyed must be dewatered to allow for manned entry and the installation of "pulltape" inside the pipe. "Pulltape" is a ½ inch wide flat woven Kevlar material with a very high tensile strength. It is available in 5,000-foot spools in North America and is normally used to pull data cable through conduit in the fiber optic and electrical industries.

A number of operational and physical modifications are required in order to insert the Sahara system into the pipe. A minimum 2 inch inside diameter clear bore is required on the 12 o'clock position of the pipe for each insertion and pull-site location. A 2 inch ball valve is preferred over other types of valves because the ball can be closed on the pulltape without severing the tape.

Pull-site

Each pull-site location requires the installation of a guide tube, which is used to protect the pulltape from severing against the inner weir of the pipe and/or flange. The guide tube consists of a 1 inch poly water service tubing cut at a length that ensures a minimum penetration into the pipe of 12 inch from the inner most weir of the pipe. The guide tube/sealing gland component is assembled by attaching to one end of the poly tubing, a 1 inch compression x 1 inch MIP NPT threaded brass coupling. The 1 inch poly tubing is inserted through the ball valve into the pipe with the brass coupling sitting on top of the 2 inch ball valve the coupling is large enough so that it will not pass through into the pipe.

Threaded onto the ball valve over the brass coupling is a galvanized nipple, a 2 inch galvanized coupling is then installed on the nipple, a bushing is installed on the coupling and then a special electrical connector with a rubber grommet cut in half is installed on the bushing. The bushing and electrical connector are the components that make up the pulltape sealing gland, the rubber grommet seals the pulltape and will withstand pressures up to 300 psi, this allows the pipeline to be filled and pressurized.

Insertion Site

Each insertion site does not require a guide tube because the insertion tube has an internal "trapper hose" that is inserted into the pipe during the insertion process. This acts as a guide tube to protect the umbilical. However, a pulltape sealing gland does need to be installed on top of the 2 inch ball valve at the insertion site. The pressure in the line must be reduced to approximately 35 psi or line pressure whichever is achievable, which is dependant on elevation, in order to manage the disassembly of the pulltape sealing gland and the installation of the insertion mechanism's.

Once the pipeline is depressurized and the pulltape sealing gland is removed, the pulltape is pulled through the insertion tube and tied onto the sensor head. At a predetermined distance away from the insertion point (Pull-site), the other end of the pulltape is attached to a cable retrieval assembly (capstan support equipment). At the insertion location, the insertion tube with the pre-loaded sensor head and cable is installed onto the ball valve with the pulltape slack pulled at the pull-site.

Installation of the hydraulic winch, encoder cable, hydraulic hoses and support legs completes the assembly of the insertion components at the insertion location. At this time the operator powers up the computer and prepares for the deployment of the sensor head. At the pull-site, a hydraulic capstan, spooler, pit rollers, generator and hydraulic power pack are employed to pull the Sahara system through the pipe. Once the equipment set-up is complete, the Sahara operator (at the insertion location) then instructs the capstan operator (at the pull-site) to pull the pulltape thus deploying the sensor head through the section of pipe to be inspected. Once the deployment is underway the Sahara operator instructs the host utility/contractor to pressurize the pipeline to test pressure.

Locating Leaks

When the sensor head reaches the pull-site the Sahara staff standby until the pipeline reaches test pressure. Once test pressure is achieved the Sahara operator instructs the capstan operator to re-configure for retrieval. The cable is then retrieved by the hydraulic winch at the insertion location. The Sahara operator in conjunction with the capstan operator stops the retrieval at 5m intervals to listen for leaks, this continues until the sensor head reaches the insertion location. This process requires synchronization between the Sahara operator and the capstan operator to keep the sensor head taut.

Once a leak, or anomaly, is found, the PipeSpy operator is dispatched to locate and mark the area on the surface. The precise location is triangulated by the PipeSpy tool detecting signal strengths between the sensor head and the tool. The location is tied to permanent reference points and also recorded using GPS technology. Logs are kept throughout the process to document all findings and events.

Upon completion and conclusion of the retrieval and inspection of the pipeline section the Sahara operator instructs the utility/contractor to de-pressurize the pipeline back down to 2.5 bar (35 psi) or line pressure whichever is less in order to safely remove the insertion equipment. The pulltape, upon completion of each section, is pulled out of the pipe by the capstan equipment at the pull-site and is re-spooled.

The Project

In the summer of 2005, Texas Sterling Construction, (TSC) under contract to the City of Houston, finished the installation of a 30" Fiberglass Collector line. The Fiberglass pipe was provided by Ameron FCPD and was selected by the consulting engineer, Lockwood, Andrews & Newnam due to its non-metallic nature, rendering it immune to corrosion.

The line failed a series of hydrostatic pressure tests when its test pressure was increased above the required test psi. This suggested the presence of high pressure leakage. Attempts were made to locate the leaks utilizing a variety of methods, including excavation at ponding areas and use of other experimental technologies. None of these methods proved effective.

In a further attempt to locate the leaks, in August 2005 Texas Sterling Construction L.P. contracted with the Pressure Pipe Inspection Company (PPIC) to inspect this line using the Sahara leak location system.

On August 8th & 9th, 2005, the Pressure Pipe Inspection Company inspected the 30" Fiberglass Collector line using its patented Sahara Leak Detection Technology. The Sahara inspection was conducted in 4 different areas on the pipeline by inserting the Sahara equipment at 2 separate locations. Because the pipeline had not been placed in service and there was no water flow in it; a mule-tape rope was used to pull the inspection equipment through each testing area. The overall inspected distance was 5,083 feet, and was conducted over a 2-day period.

The purpose of this inspection was to identify and quantify the presence of leaks from the pipeline, and to permit remediation of any leaks by TSC.

The inspection began on Monday, Aug 8th and was completed on Aug 9th. TSC provided a schedule to conduct the inspection within a period of one to two days. In addition, TSC provided adequate access to each insertion valve and proper valve adaptation for PPIC's equipment. The 30" Fiberglass pipeline consisted of 4 Test Areas and was conducted using 2 insertion points called Test Taps (TT). These test areas are presented in Table 1.

Table 1. Test Area Summary

Test Areas	Insertion Point Name		Desired Survey Length (ft)	Survey Direction
	From	To		
1	TT#2	TT#1	764	West
2	TT#2	TT#3	1,903	East
3	TT#4	TT#3	1,562	West
4	TT#4	TT#5	1,050	South

The survey lengths shown in the above table were determined from the drawings made available to PPIC.

Because this project required the use of mule-tape to pull the sensor through the pipeline to inspect the desired test areas, the pipeline had to be de-pressurized every time a new insertion was conducted.

Figure 3. Mule-tape was installed in the pipeline at Insertion Point TT#2. It exits the valve and riser for connection to the Sahara sensor head.

At each insertion point the pipeline was de-pressurized; PPIC tied the mule-tape to the sensor, and inserted the sensor and the sensor cable into the pipeline. Once the sensor was inserted into the pipeline and pulled through the desired test area, the pipeline was re-pressurized to approximately 150 psi. The sensor cable was then pulled back through the pipeline towards the insertion point while simultaneously listening for possible leaks. The exiting points for the mule-tape were appurtenances modified with a sealing gland to allow only the mule-tape to pass and exit the pipeline.

Once the mule-tape rope is secured to the sensor head, an insertion tube is mounted to the valve and riser for inserting the sensor head and cable into the pipeline.

Table 2 shows the details at each inspection test area, specifically the actual survey lengths and test pressure for the test areas. The actual distances found in Table 3.1 and later in this report, were derived by using a measuring wheel, Sahara odometer equipment and/or a Global Positioning System (GPS) receiver.

Table 2. Insertion Details

Date	Test Area	Inspection Length (ft)		PSI
		Desired	Actual	
08-Aug-05	1	764	764	150
08-Aug-05	2	1,903	1,716	150
09-Aug-05	3	1,562	1,562	150
09-Aug-05	4	1,050	1,050	150

Table 3 provides detailed information on the leaks. The table lists the number of leaks found, the direction and distance the leak was found from the insertion point, a calculated station number, and the leak's magnitude.

Table 3. Leak Details

Leak #	Test Area	Date & Time (Local)	Insertion Point (Name)	Distance from Insertion Point (direction / ft)	STA# of Leak (Calculated)	Size of Leak (sm / med / lg)
1	1	8 Aug, 13:26	TT#2	West / 471'	N/A	Small / Medium
2	3	9 Aug, 11:27	TT#4	West / 1355'	N/A	Small