

OFFICE OF THE SPECIAL INSPECTOR GENERAL FOR IRAQ RECONSTRUCTION

**REPAIR OF THE AL GHAZALIYAH
G-7 SEWAGE LIFT STATION**

UNDER THE COMMANDER'S EMERGENCY RESPONSE PROGRAM

BAGHDAD, IRAQ

**SIGIR PA-07-118
JANUARY 25, 2008**

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE 25 JAN 2008		2. REPORT TYPE		3. DATES COVERED 00-00-2008 to 00-00-2008	
4. TITLE AND SUBTITLE Repair of the Al Ghazaliyah G-7 Sewage Lift Station Under the Commander's Emergency Response Program Baghdad, Iraq				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Office of the Special Inspector General for Iraq Reconstruction, 400 Army Navy Drive, Arlington, VA, 22202				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			



SPECIAL INSPECTOR GENERAL FOR IRAQ RECONSTRUCTION

January 25, 2008

MEMORANDUM FOR COMMANDING GENERAL, MULTI-NATIONAL FORCES-
IRAQ,
COMMANDING GENERAL, MULTI-NATIONAL CORPS-
IRAQ,
COMMANDING GENERAL, JOINT CONTRACTING
COMMAND-IRAQ/AFGHANISTAN
COMMANDING GENERAL, GULF REGION DIVISION,
U.S. ARMY CORPS OF ENGINEERS
DIRECTOR, IRAQ TRANSITION ASSISTANCE OFFICE

SUBJECT: Report on Repair of the Al Ghazaliyah G-7 Sewage Lift Station in Baghdad,
Iraq (Report Number SIGIR PA-07-118)

The Office of the Special Inspector General for Iraq Reconstruction is assessing projects funded under the Commander's Emergency Response Program to provide real-time relief and reconstruction information to interested parties to enable appropriate action, when warranted.

We are providing this report for your information and use. It addresses the current status of the Al Ghazaliyah G-7 Sewage Lift Station in Baghdad, Iraq and whether intended objectives will be achieved.

SIGIR determined that the action being implemented by the 2nd Brigade of the 101st Airborne Division should be sufficient to resolve the problems noted in this assessment and consequently makes no recommendations. Therefore, management comments to this report are not required. However, we received comments on the draft of this report from the Gulf Region Division of the United States Army Corps of Engineers which provided clarifying information for the final report. We reviewed the clarifying comments and revised the final report as appropriate.

We appreciate the courtesies extended to our staff. If you have any questions please contact Mr. Brian Flynn at brian.flynn@iraq.centcom.mil or at DSN 318-343-9244. For public or congressional queries concerning this report, please contact SIGIR Congressional and Public Affairs at publicaffairs@sigir.mil or at (703) 428-1100.

Stuart W. Bowen, Jr.
Inspector General

Special Inspector General for Iraq Reconstruction

SIGIR PA-07-118

January 25, 2008

Repair of the Al Ghazaliyah G-7 Sewage Lift Station Under the Commander's Emergency Response Program Baghdad, Iraq

Synopsis

Introduction. The Office of the Special Inspector General for Iraq Reconstruction is assessing projects funded under the Commander's Emergency Response Program to provide real-time relief and reconstruction information to interested parties to enable appropriate action, when warranted. The overall objectives were to determine whether completed projects complied with the terms of their contracts and task orders and to evaluate the effectiveness of the monitoring and controls exercised by administrative quality assurance and contract officers. SIGIR conducted this project assessment in accordance with the Quality Standards for Inspections issued by the President's Council on Integrity and Efficiency. The assessment team included an engineer/inspector and an auditor/inspector.

The objective of the contract was to restore two lift stations, in the Al Ghazaliyah area, to designed operational capacity. Specifically, the repair and rehabilitation work was to include replacement and maintenance of generators and pumps at each site, as well as necessary electrical and control work and limited architectural renovations. The two lift stations covered by this contract were the Al Ghazaliyah G-6 and G-7 Sewage Lift Stations.

Project Assessment Objective. The objective of this project assessment was to provide real-time relief and reconstruction project information on repair of the Al Ghazaliyah G-6 and G-7 Sewage Lift Stations in Baghdad, Iraq to interested parties to enable appropriate action, when warranted. Specifically, SIGIR determined whether:

1. Project components were adequately designed prior to construction or installation;
2. Construction or rehabilitation met the standards of the design;
3. The contractor's quality control plan and the United States government's quality assurance program were adequate;
4. Project sustainability was addressed; and
5. Project results were consistent with original objectives.

Because of insurgent activity in the area of the Al Ghazaliyah G-6 Sewage Lift Station, both the U.S. Army and private security contractor denied the assessment team's repeated requests for escorts to inspect the site. Consequently, only the Al Ghazaliyah G-7 Sewage Lift Station is included in this assessment report. SIGIR will address the Al Ghazaliyah G-6 Sewage Lift Station in a future report.

Conclusions. The assessment determined that:

1. All project components were not adequately designed prior to renovation and construction at the Al Ghazaliyah G-7 Sewage Lift Station. The contract file lacked necessary design submittals from the contractor and the United States

Army Corps of Engineers, such as schematic diagrams identifying the flow of sewer water entering and exiting the Al Ghazaliyah G-7 and throughout the Al Ghazaliyah area. In addition, there were no diagrams providing clarity on the location and function of specific pieces of equipment. Further, the contract file lacked design calculations determining the volume of sewer water entering the facility and the capacity of each submersible pump, which would identify the correct number and size of submersible pumps needed for installation. Finally, no electrical plans or electrical single-line diagrams were available for the installation of the Main Distribution Panel connecting the facility to the on-site generator and main distribution grid.

2. Because of the limited amount of time available on site and the lack of available power at the site, SIGIR could not definitively determine the quality of the contractor's work. For example, the contract required a 100 kilo-Volt Amp generator and a 1,000 liter fuel tank; however, the generator was not operating on either of the site visits. In addition, a single 150 millimeter submersible pump was delivered and installed; but it was not operational during the site visits. Because the United States Army Corps of Engineers had already terminated the contract, no one was on site to operate the equipment. Consequently, SIGIR inspectors could not determine if either piece of equipment was non-operational because of inferior quality contract work or because of the lack of available power. SIGIR did identify construction deficiencies, including the inadequate installation of the Main Distribution Panel. Also, the panel was located outside, exposed to wind, rain, and excessive heat.
3. The contractor's quality control plan was sufficiently detailed, including the use of daily quality control reports to document construction deficiencies; but the contractor's quality control program implementation did not identify any significant construction deficiencies, such as potentially dangerous electrical installation practices. Specifically, the daily quality control reports did not identify any construction deficiencies or international standard violations. In addition, the daily quality control reports did not have a section to document construction deficiencies, international code violations, or test and/or inspection results. Further, no quality control deficiency log existed for this project.

The government quality assurance program was not adequate. According to United States Army Corps of Engineers documentation, only 12 daily quality assurance reports exist for this project, with the last daily quality assurance report issued in December 2006. The daily quality assurance reports were vague and did not document critical information, such as insight into any problems encountered at the site. In February 2007, the contractor submitted a final invoice; however, when a United States Army Corps of Engineers representative visited the site, it was determined the contractor had only "completed approximately 20%" of the project. The lack of on-site government quality assurance presence contributed to this situation.

4. Sustainability was addressed in the contract and delivery order requirements. The contract's "Warranty Management" clause required the contractor to provide a one-year overall warranty of construction; the delivery order required the contractor to provide all operations and maintenance manuals and all certified warranties. To maintain continuous use of the on-site generators, the delivery order provided that the sewage lift station be furnished with a six-month fuel supply. However, according to Gulf Region Central documentation, when the delivery order was terminated because the deteriorated security situation in the

area prohibited the contractor from completing the projects, the contractor had only furnished a three-month fuel supply to the project site.

5. The Al Ghazaliyah G-7 Sewage Lift Station renovation and construction project results were not consistent with the original objectives of the delivery order. The delivery order Statement of Work required the contractor to “provide a complete and useable facility upon the conclusion of construction....” Specifically, this project was needed to eliminate the excessive amount of backed-up sewer water in the Al Ghazaliyah neighborhood. At the time of the site visits, the Al Ghazaliyah G-7 facility was not operational. Consequently, SIGIR witnessed sewer water backing up in the neighborhood streets. In addition, broken sewer pipes leading into the facility resulted in a large pool of sewer water that settled directly outside of the building. As a result, the neighborhood residents continue to wade through large pools of sewer water and live in constant threat of disease and illness.

Additional Contract to Complete Facility. During the course of this assessment, the 2nd Brigade of the 101st Airborne Division representatives informed SIGIR team members that they had identified and developed contract terms to resolve the outstanding issues and problems the Al Ghazaliyah G-7 Sewage Lift Station and make it functional and useable. As the SIGIR team completed its assessment, the 2nd Brigade of the 101st Airborne Division was in the process of awarding the contract

Recommendations and Management Comments. SIGIR determined that the action being implemented by the 2nd Brigade of the 101st Airborne Division should be sufficient to resolve the problems noted in this assessment and consequently makes no recommendations. Therefore, management comments to this report are not required. However, we received comments on the draft of this report from the Gulf Region Division of the United States Army Corps of Engineers which provided clarifying information for the final report. We reviewed the clarifying comments and revised the final report as appropriate. Comments received are provided verbatim in Appendix D of this report.

Table of Contents

Synopsis	i
Introduction	
Objective of the Project Assessment	1
Pre-Site Assessment Background	1
Contract, Costs and Payments	1
Project Objective, Pre-Construction Description	1
Statement of Work	4
Project Design and Specifications	4
Site Assessment	6
Project Quality Management	14
Project Sustainability	15
Conclusions	16
Recommendations and Management Comments	18
Appendices	
A. Scope and Methodology	19
B. Acronyms	20
C. Report Distribution	21
D. Management Comments	23
E. Project Assessment Team Members	27

Introduction

Objective of the Project Assessment

The objective of this project assessment was to provide real-time relief and reconstruction project information on repair of the Al Ghazaliyah G-6 and G-7 Sewage Lift Stations in Baghdad, Iraq to interested parties to enable appropriate action to be taken, when warranted. Specifically, SIGIR determined whether:

1. Project components were adequately designed prior to construction or installation;
2. Construction or rehabilitation met the standards of the design;
3. The contractor's quality control (QC) plan and the U.S. government's quality assurance (QA) program were adequate;
4. Project sustainability was addressed; and
5. Project results were consistent with original objectives.

Due to insurgent activity in the area of the Al Ghazaliyah G-6 Sewage Lift Station, both the private security contractor and the U.S. Army denied the assessment team's repeated requests for escorts to inspect the site. Consequently, only the Al Ghazaliyah G-7 Sewage Lift Station is included in this assessment report. The Al Ghazaliyah G-6 Sewage Lift Station will be addressed in a subsequent report.

Pre-Site Assessment Background

Contract, Costs and Payments

Contract W917BG-06-D-0007, awarded on 24 March 2006 to a local contractor, was an indefinite delivery/indefinite quantity (ID/IQ) contract, with a 12-month base year and two, 12-month option years. The not to exceed amount of the contract was \$20 million.

Delivery Order (DO) 0006 of contract W917BG-06-D-0007 was issued on 26 September 2006. This firm-fixed-fee DO was in the amount of \$328,775. Based on project file documentation, the Notice to Proceed was issued on 7 November 2006 with a period of performance to complete the project in 150 days.

On 10 November 2007, a Contract Modification Letter of Direction was issued by the United States Army Corps of Engineers (USACE) Gulf Region Central (GRC) for DO 0006. The contract modification stated that the U.S. government determined a "Change in Security Conditions" occurred at both lift station sites, which prohibited the contractor from completing the projects. Consequently, the GRC Resident Office decided to de-scope all items not completed at both project sites. A negotiated price of \$253,246.15 was agreed upon to compensate the contractor for work completed at both project sites.

Project Objective, Pre-Construction Description

The objective of the project was to repair and renovate two existing sewage lift stations. Specifically, the "Contractor is responsible to provide a complete and useable facility upon the conclusion of construction."

The description of the facility (pre-construction) was based on information obtained from the contract and the USACE project file. The objective of the DO was to restore two lift stations, in the Al Ghazaliyah area, to designed operational capacity. Specifically, the repair and rehabilitation work was to include replacement and maintenance of generators and pumps at each site, as well as necessary electrical and control work and limited architectural renovations. The two lift stations covered by this contract were the Al Ghazaliyah G-6 and G-7 Sewage Lift Stations (Site Photo 1).



Site Photo 1. Exterior view of the Al Ghazaliyah G-7 Sewage Lift Station

The Al Ghazaliyah area of Baghdad is a predominantly residential neighborhood consisting of several blocks of one and two-story houses and some small businesses (Aerial Image 1).

The two Al Ghazaliyah Sewage Lift Stations service the Al Ghazaliyah area (Aerial Image 2). A sewage lift station is used to raise the elevation of and facilitate the flow of sewer water across several areas or neighborhoods. In Iraq, the wastewater systems use gravity to transport waste from homes and businesses to undergo water treatment at a central facility. In the city of Baghdad, there are many changes in elevation, which require the use of lift stations to pump the wastewater to higher elevations.

Prior to the issuance of the contract, this area of Baghdad suffered from excessive amounts of backed-up sewer water in the neighborhood streets. This required residents to wade through large pools of sewer water when leaving and entering their homes. Consequently, the situation left the neighborhood residents in constant threat of disease and illness.

Little information about the origin and condition of the G-7 lift station is known. During our site visits, inspectors were told that the facility was approximately 5 years old. It appears this facility was constructed under the former regime, but was never completely finished or operated.

According to an “Engineering Report” completed by the contractor shortly after being awarded the contract, the G-6 and G-7 lift stations each consist of a single two-story building. In the basement of each building is the wet well; while the electrical control panels are located on the ground floor. Both lift stations have two, 6 inch submersible pumps, each with 0.3 cubic meters per second (m³/second) capacity. However, the Engineering Report did not indicate whether the existing submersible pumps were operational. The G-7 lift station receives waste water from Mahalla (neighborhood) 655.



Aerial Image 1. Neighborhood surrounding the G-7 lift station



Aerial Image 2. Location of the G-6 and G-7 lift stations

The contract file lacked any schematic diagrams to show the flow of sewer water between the two lift stations or the number and location of manholes throughout the Al Ghazaliyah area. In addition, the contract file did not contain any information regarding the condition of the sewer lines leading into and out of the lift station. This information is critical to determine the causes of sewer water backup throughout the area.

Statement of Work

The USACE's Statement of Work (SOW) to rehabilitate the G-7 lift station required the contractor to perform the following:

- Supply and install two 150 millimeter (mm) submersible pumps to match the existing pumps together with all necessary piping and controls;
- Inspect and repair or replace the existing pump hoist as required;
- Supply and install 100 kilo-Volt Amp (kVA) generator set to operate the lift station. The generator and 1,000 liter fuel tank are to be installed on 200 mm reinforced concrete pads. Generator will be sized to allow for continuous operation of the station and the care taker facility;
- Supply and install Main Distribution Panel for the facility together with all necessary switches, breakers, and cabling to connect the facility to the generator and to the main distribution grid;
- Supply and install an oil-filled, pad mounted transformer sized to allow the connection of the facility to the main distribution grid;
- Supply and install the cabling necessary to connect the facility to the main distribution grid. Contractor shall connect the facility to the main distribution grid;
- Perform routine periodic maintenance of the facility's generators per the manufacturer's recommendations; and
- Supply fuel for 6 months of operation (deliveries to be made weekly for the 6 month period).

Project Design and Specifications

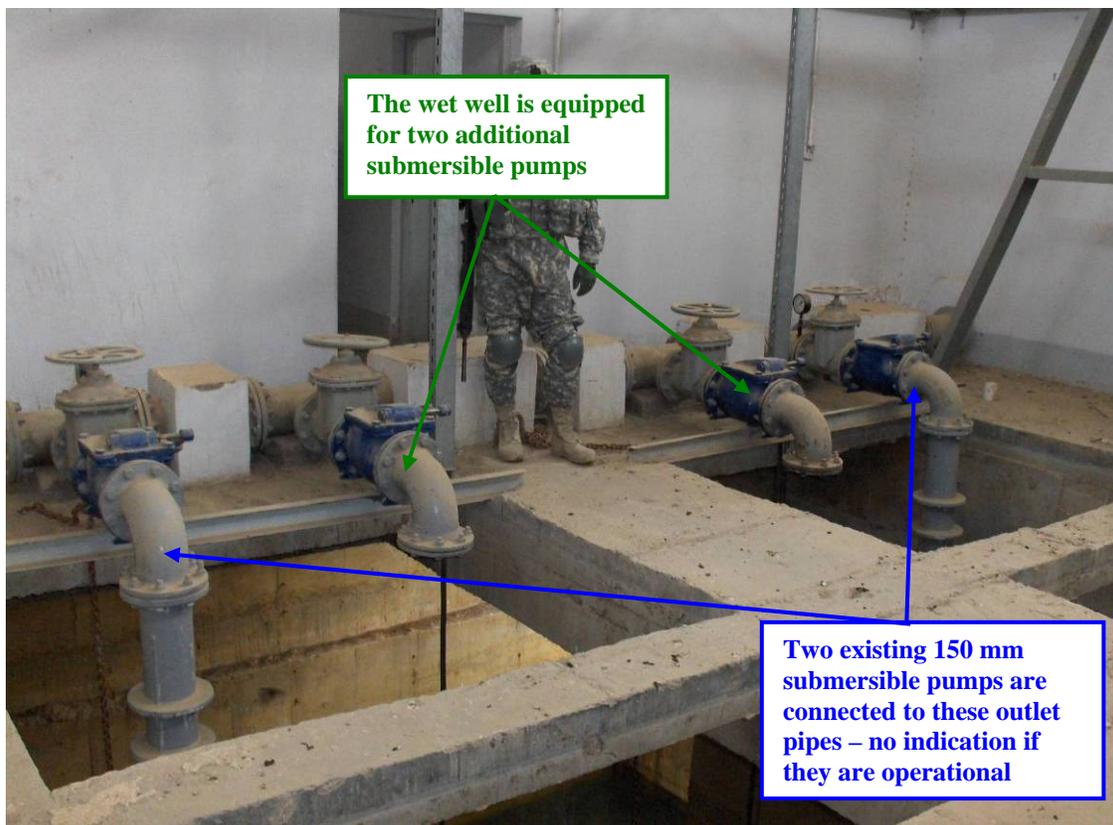
The contract required the submission of the "design of all site civil work and utilities; architectural, structural, mechanical, plumbing, electrical, life safety, and communications design." In addition, "shop drawings and specifications for the generators and pumps must be submitted for review and approval." The completed construction drawings, design calculations, and construction specifications were to be submitted to the Resident Engineer for review. The drawings were to "contain all the details necessary to assure clear understanding of the work throughout construction."

The SOW also required that all work must comply with the following codes and standards:

- International Building Code (IBC), International Code Council (ICC)
- International Existing Building Code (IEBC), ICC
- International Electric Technical Commission (IEC)
- National Fire Protection Association (NFPA)
- Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)
- International Mechanical Code (IMC)

- International Plumbing Code (IPC)
- International Standards Organization (ISO)

The contract file lacked any design submittals from the contractor or by the USACE. As mentioned earlier in the Project Objective, Pre-Construction Description section, there were no schematic diagrams or drawings identifying the flow of sewer water into and out of the G-7 lift station and throughout the Al Ghazaliyah area. In addition, there are no diagrams or drawings providing clarity on the location and function of specific pieces of equipment. For instance, the SOW required the installation of two-150 mm submersible pumps to match the existing pumps. However, it is unclear whether the two submersible pumps were to replace or compliment the existing pumps (Site Photo 2). The contract file lacked design calculations determining the volume of sewer water entering the facility and the capacity of each pump, which would identify the correct number and size of submersible pumps needed for installation.



Site Photo 2. Interior view of Al Ghazaliyah G-7 Sewage Lift Station building

The SOW required the “design of all site civil work and utilities; architectural, structural, mechanical, plumbing, electrical, life safety, and communications...” Site plans were needed to identify the existing and new underground/above ground utilities. In addition, since the contractor was to install the Main Distribution Panel and connect the facility to the generator and the main distribution grid, design submittals were required for the electrical distribution system design, including flow diagrams. Also, electrical plans and an electrical single-line diagram were needed—showing details for equipment installation, schedules of fixtures, and main and branch circuit distribution detail.

Although the contractor did not provide drawings that “contain all the details necessary to assure a clear understanding of the work throughout construction,” construction/renovation of the G-7 lift station was initiated and continued.

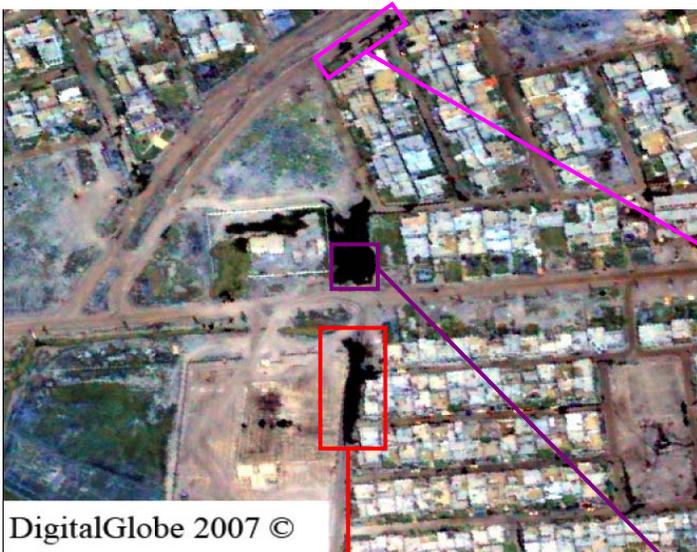
Site Assessment

On 9 November 2007 and 29 November 2007, with assistance from U.S. military maneuver unit personnel, SIGIR made on-site assessments of the Al Ghazaliyah G-7 Sewage Lift Station.

Due to security concerns, SIGIR performed expedited assessments. The time allotted by our military escorts for each site visit was approximately 30 minutes; therefore, a complete review of all project work completed was not possible.

General Observations

During both site visits, SIGIR identified several streets in the Al Ghazaliyah area with backed-up sewer water (Aerial Image 3 and Site Photos 3-5).



Aerial Image 3. Streets surrounding the G-7 lift station



Site Photo 3. Backed-up sewer water



Site Photos 4 and 5. Backed-up sewer water in the Al Ghazaliyah area of Baghdad



The degree of the streets' backed-up sewer water varied from several inches deep near the gutters to the entire width of the street.

Inspectors also viewed a large pool of collected sewer water outside the sewage lift station building (Aerial Image 4 and Site Photos 6 and 7). During our site visit, maneuver unit personnel stated that the sewer pipes leading into the facility were old and broken. Considering the depth of the sewer water pool and the growth of weeds around it, the sewer line was broken for an extended period. However, the SOW did not address the problems with the broken sewer pipes. Without addressing this problem, the completion of this project will not lead to a "complete and useable facility" because the sewer water will not enter the lift station's wet well (to be pumped out to the next manhole).



DigitalGlobe 2007 ©

Aerial Image 4. Aerial view of the Al Ghazaliyah G-7 Sewage Lift Station



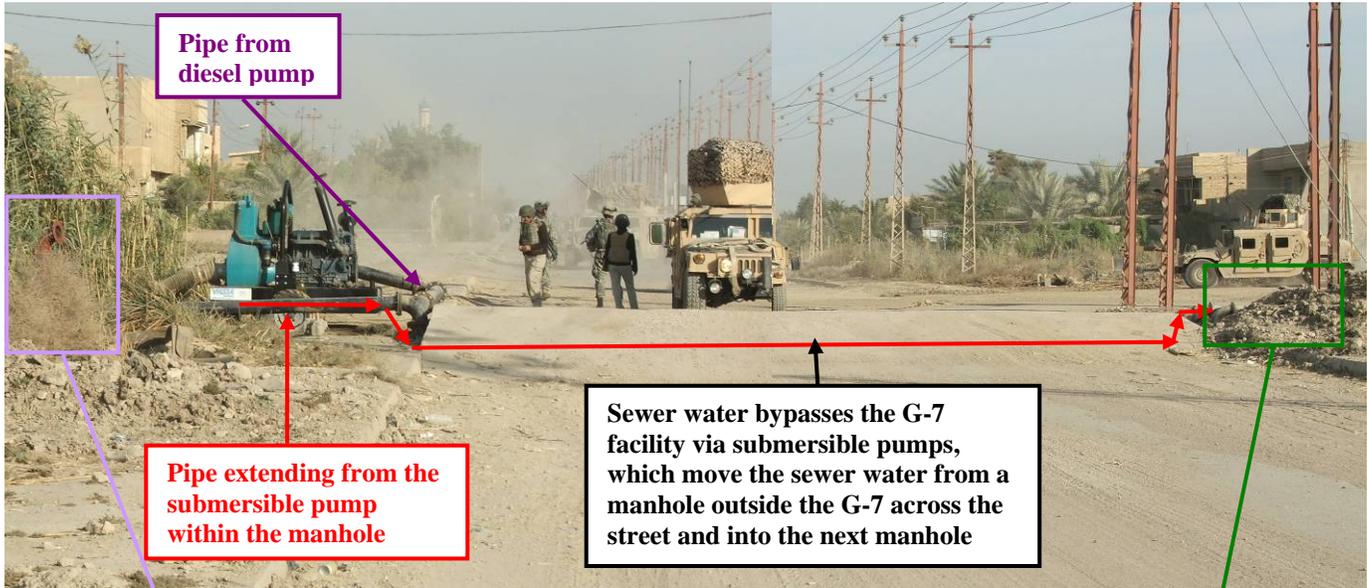
Site Photos 6 and 7. View of pool of accumulated sewage water outside the G-7 lift station

Installation of two-150 mm submersible pumps

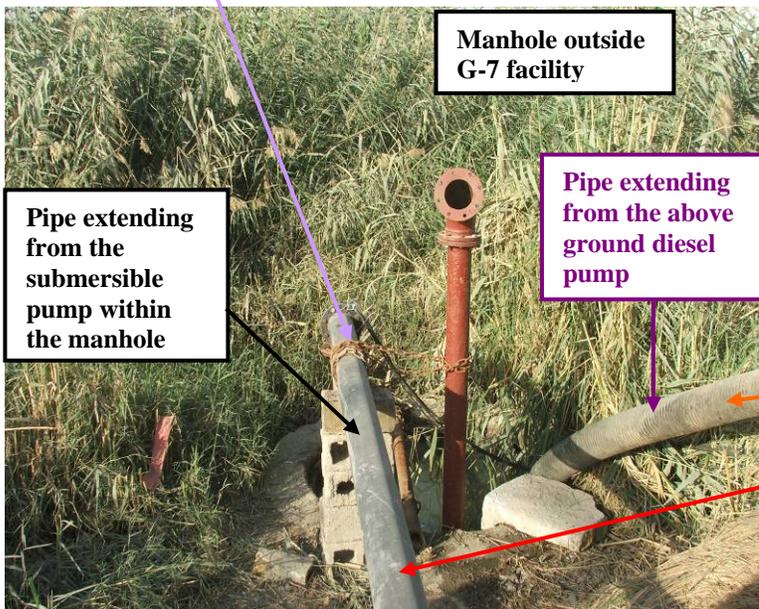
The SOW required the contractor to supply and install two-150 mm submersible pumps, including all necessary piping and controls. According to GRC documentation, at the

time of contract termination, the contractor had supplied and installed only one 150 mm submersible pump.

During our site visit, inspectors noticed two pipes exiting a manhole outside the lift station (Site Photo 8). One pipe was attached to an above ground diesel pump; while the other pipe was attached to a submersible pump. The two out-flow pipes rose out of an existing manhole and passed under a concrete hump to cross the street in order to use a higher elevation manhole as an outlet point (Site Photos 9 and 10).



Site Photo 8. View of bypass system employed to allow sewer water to flow to the next available manhole



Site Photos 9 and 10. Enlarged views of Site Photo 8.

On 4 December 2006, the daily contractor's quality control (QC) report documented the delivery and installation of the single 150 mm submersible pump (Site Photo 11); while

the 5 February 2007 daily government quality assurance (QA) report documented the arrival of the diesel pump at the facility (Site Photo 12).



Site Photo 11. Installation of 150 mm submersible pump into manhole outside G-7 lift station (Photo courtesy of USACE)



Site Photo 12. Diesel pump used at the manhole outside the G-7 lift station (Photo courtesy of USACE)

The contract file lacked documentation to explain the need for the submersible pump outside the lift station facility. As previously mentioned in the Project Design and Specifications section, the contractor did not provide design drawings to identify the use of the equipment required by the SOW. However, it appeared the original intent was to use the two submersible pumps either to replace or compliment the two existing submersible pumps inside the facility.

The use of the submersible pump inside the manhole appears to be a short term solution to deal with the large pool of sewer water outside the lift station building. Since the broken sewer pipe does not allow sewer water into the facility, the accumulation of sewer water grew each day. Installing the submersible pump into the wet well of the lift station would not help to alleviate the growing pool of sewer water outside.

Though nothing was documented in the contract file, it is our opinion that a decision was made to use the submersible pump to reduce the accumulated pool of sewer water. The sewer water was at least partially redirected to the outside manhole and the submersible pump attempted to pump the water out of this manhole to the next manhole across the street. SIGIR could not determine if the sewer water was redirected from the previous manhole or if a trench was dug from the standing pool of sewer water (Aerial Image 5). However, either the submersible pump was not operational or was limited by the lack of available power, which necessitated the use of the above ground diesel pump. The contract file did not address this diesel pump and it was not included in the original SOW.

During our second site visit, SIGIR met a member from a military maneuver unit in the area who stated that the back up of sewer water throughout the neighborhood was so pervasive that the local provincial council or the ministry provided equipment for the lift station. SIGIR located multiple submersible pumps on site (Site Photo 13); however, they appeared to be repainted old pumps (Site Photo 14).

Inspectors could not evaluate the installation of the submersible pump because, at the time of our site visit, neither the submersible pump nor the diesel pump was operational.

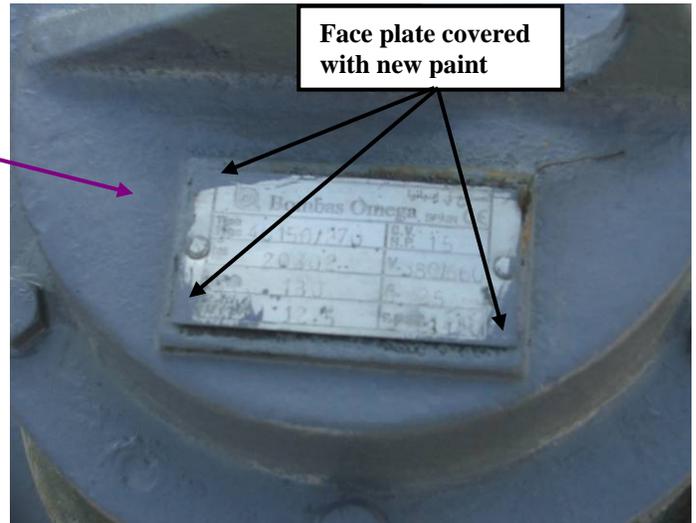
It is not clear if the submersible pump will remain in the manhole or whether it will eventually be moved into the lift station facility. The use of the submersible pump and the diesel pump to alleviate the sewer water pool has had little effect because inspectors noticed a significant accumulation near the side of the lift station facility.



Aerial Image 5. Aerial view of the flow of sewer water from the manhole outside the G-7 lift station to the next available manhole across the street



Site Photo 13. Submersible pumps located outside the G-7 lift station



Site Photo 14. Close up view of a submersible pump (appears old pumps were just painted)

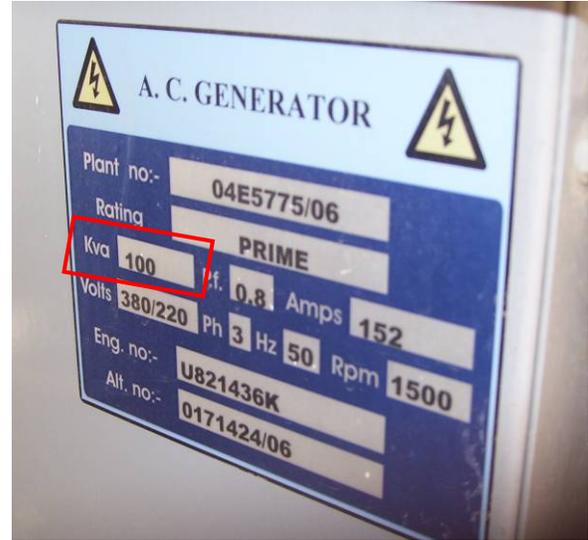
Installation of 100 kVA generator set

The contract required the installation of a 100 kVA generator set, including a 1,000 liter fuel tank.

During our site visits, SIGIR identified two generators at the lift station site – one in front of the lift station and one in the rear. According to GRC documentation, the contractor supplied the generator in the rear of the facility (Site Photo 15). GRC personnel verified the contractor provided the contract required size generator (Site Photo 16). The generator was installed on a reinforced concrete pad, as required by the SOW.



Site Photo 15. Contractor provided 100 kVA generator



Site Photo 16. 100 kVA generator face plate

SIGIR identified two fuel tanks at the lift station. According to the daily QC reports, the smaller tank was the SOW required 1,000 liter fuel tank. The contract file lacked documentation to confirm this fuel tank is the required size. The fuel tank was installed on a reinforced concrete pad, as required by the SOW (Site Photo 17).



Site Photo 17. 1,000 liter generator fuel tank

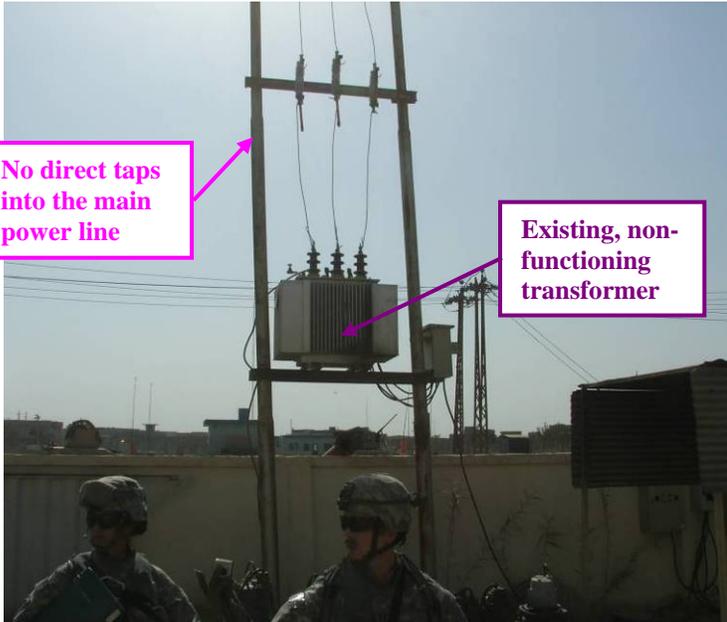
Installation of a transformer

The contract's SOW required the installation of an oil-filled pad mounted transformer, sized to allow the connection of the facility to the main distribution grid. At the time of the contract's termination, the contractor had not installed the new transformer.

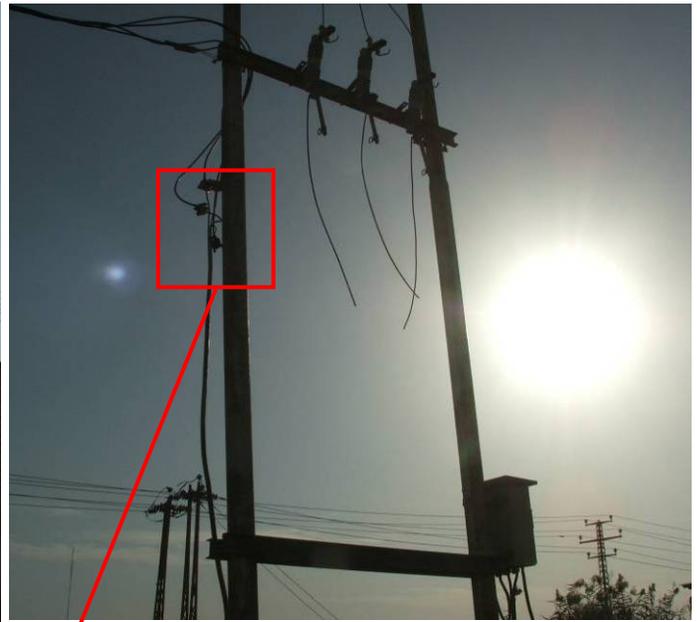
During our first site visit, SIGIR identified the old, non-operational transformer (Site Photo 18). The transformer was subsequently removed and the facility was directly tapped into the main power line by jury-rigging the electrical wires (Site Photo 19). This is an extremely dangerous practice and likely will damage and/or destroy the facility's electrical equipment and controls as well as endanger the safety of the operator. Iraqi main power lines normally carry 400 volts. Without a step-down transformer, turning on the control panel could potentially short circuit the equipment and potentially electrocute

the operator. It is extremely unsafe to have unregulated splices in power cables carrying relatively high voltage since the splices are unsupported and unprotected (Site Photo 20). As a result, it is possible that a loose wire could come free and potentially electrocute someone in the vicinity of the lift station.

The lift station requires a new transformer to take advantage of the electrical grid and also the two on site generators.



Site Photo 18. Existing transformer



Site Photo 19. Missing transformer and direct tapping into the main power line



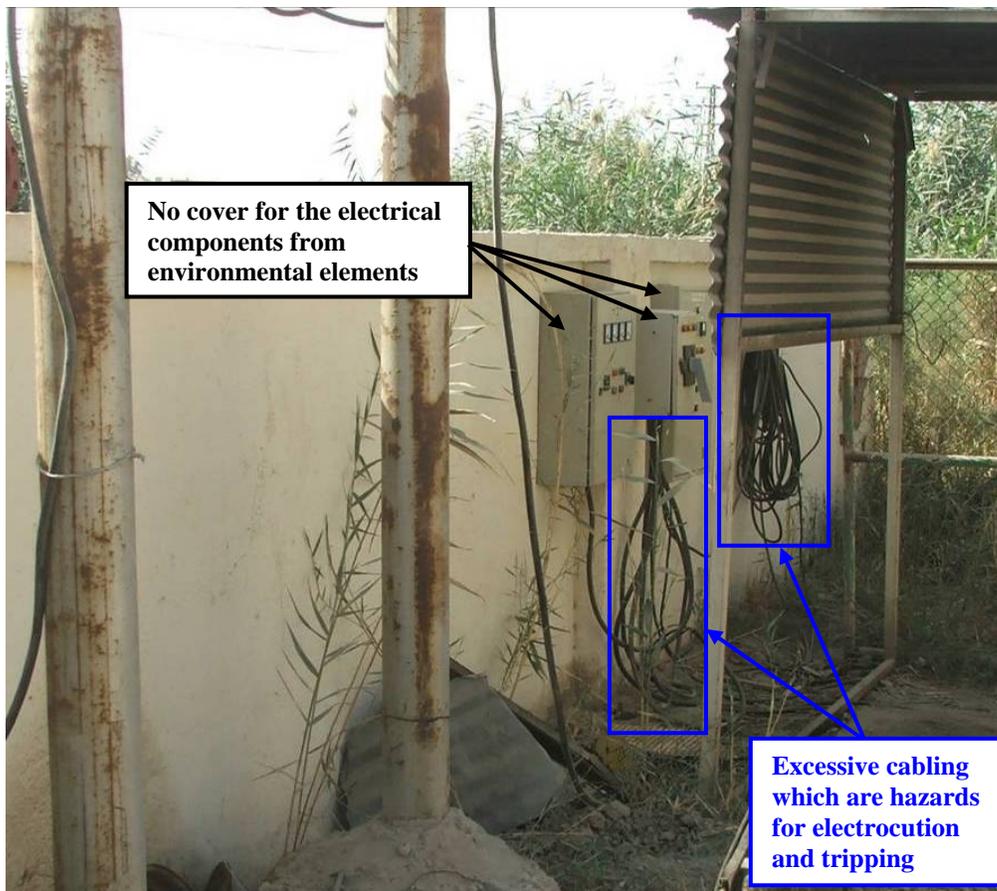
Site Photo 20. Unsafe splices directly into the main power line

Installation of the Main Distribution Panel and the cabling to connect the facility to the main distribution grid

The SOW required the contractor to install the Main Distribution Panel to connect the facility to the generator and the main distribution grid, including supplying and installing the necessary cabling.

SIGIR identified the Main Distribution Panel and the cabling supplied and installed by the contractor to connect the facility to the main distribution grid (Site Photo 21). The installation technique used by the contractor was not adequate. For example, the contractor situated the control panel outside the facility without any method to protect the electrical components from the environmental elements, such as rain, excessive heat, sand, and dirt, which over time, will reduce the lifespan and usefulness of the control panel. In addition, an excessive amount of cabling was used, which resulted in electrical cable dangling down on the ground. The dangling cabling poses not only a tripping hazard, but could become damaged and also lead to electrocution.

In view of the previously noted fact that the electrical control panels were improperly directly tapped from the main distribution grid and without use of a step-down transformer, inspectors did not feel it was safe to touch the electrical control panels. As a result, we could not assess the quality of the contractor's performance.



Site Photo 21. Main Distribution Panel for the G-7 lift station

Project Quality Management

Contractor's Quality Control Program

Department of the Army Engineering Regulation (ER) 1180-1-6, dated 30 September 1995, provides general policy and guidance for establishing quality management procedures in the execution of construction contracts. According to ER 1180-1-6, "...obtaining quality construction is a combined responsibility of the construction contractor and the government."

The contract for the G-7 lift station project required the contractor to "establish and maintain an effective quality control program to ensure the requirements of the contract are provided as specified." This required the contractor to describe "procedures for tracking preparatory, initial, and follow-up control phases for construction and control, verification, and acceptance tests including documentation." In addition, the contractor needed procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures establish verification to identify that deficiencies have been corrected. Further, the "QC Plan shall be implemented by an assigned person within the Contractor's organization who shall be cognizant of and assure that all documents have been coordinated. This individual shall be a person who has verifiable engineering experience and is a registered professional engineer."

The contractor developed a QC plan, which established procedures for the inspection, surveillance, audit, and testing for the construction of the project.

GRC provided us with 51 daily QC reports for the G-7 lift station project. The daily reports covered the time period of December 2006 through May 2007. The daily QC reports contained information such as the number of workers on site each day, the work activities performed, and the total completion percentage.

SIGIR reviewed the GRC provided daily QC reports and found them inadequate. The quality control representative (QCR) monitored field activities and completed daily QC reports. However, the daily QC reports did not include sufficiently complete daily observations of what occurred at the site, problems encountered at the site that required corrective actions, or solutions achieved to correct site problems. For example, each daily QC report was vague when describing work accomplished ("ongoing civil work in the site"). Further, not a single daily QC report identified a construction deficiency or an international code violated at the G-7 lift station. In addition, even if the QCR identified a construction deficiency or international code violation, the daily QC reports did not have a section to document it.

The daily QC reports did not contain any test and/or inspection results. The daily QC reports did not have a section to discuss any testing and/or test results for this project. Therefore, there is no certainty that either the generator or the submersible pump was ever tested.

Finally, no QC deficiency log existed for this project. Deficiency logs are important to document identified deficiencies and the corrective actions taken to correct each deficiency. Without a QC deficiency log, it is unknown what, if any, deficiencies were caught and if so whether they were corrected.

Government Quality Assurance Program

USACE ER 1110-1-12 and the Project and Contracting Office (PCO) Standard Operating Procedure (SOP) CN-100 specified requirements for a government QA program. Specifically, PCO SOP CN-100 provides guidance for the USACE's Gulf Region Division (GRD) staffs to "...ascertain if the contractor CQC system is functioning and the specified level of construction quality is being attained."

GRD provided us with 12 daily QA reports; the daily QA reports covered the time frame from November to December 2006. SIGIR reviewed the daily QA reports and determined they were vague and did not document critical information. For example, the daily QA reports only addressed the following topics and questions:

- daily report to higher HQ
- work activities being performed
- general remarks
- contractors that were on the jobsite for the day

The daily QA reports were vague regarding the work performed ("...watch the work activity in the jobsite...") and provided little insight into any problems encountered at the site.

The standard practice should be to document construction deficiencies and corrective actions taken by the subcontractor through the use of a QA deficiency log. However, no deficiency log was maintained by the QAR.

According to GRC documentation, in April 2007, the G-7 area was very dangerous and as a result, "...no Iraqi Engineers from our office have visited the site in the past 60 days." The lack of an on-site presence allowed this project to fall significantly behind schedule. In February 2007, the contractor submitted a final invoice; yet when a USACE representative visited the site on 8 April 2007, he found the site completely "abandoned" and that the contractor had only "completed approximately 20%" of the project. Specifically, the USACE representative stated that the "site is in horrible shape

Project Sustainability

The contract's "Warranty Management" clause stated that the contractor would provide a one-year overall warranty of construction. The DO required the contractor to provide all operations and maintenance manuals and all certified warranties.

To maintain continuous use of the on-site generators, the DO provided that the sewage lift station be furnished with a 6-month fuel supply. However, according to GRC documentation, at the time the DO was terminated because the deteriorated security situation in the area prohibited the contractor from completing the projects, the contractor had only furnished a 3-months fuel supply to the project site.

Completing the Project

At the time of termination, GRC invoice documentation indicated the contractor completed approximately 75% of the project. However, critical deliverables from this contract are still needed, including at least one additional submersible pump, a transformer, and three additional months of fuel supply.

More importantly, even if all the deliverables for this renovation contract are provided and properly installed, the G-7 lift station will not be a “complete and useable facility.” In order to make this facility complete and useable, the source of the sewer water on the side of the facility needs to be identified and corrected. That is, the source of the broken sewer line outside the facility needs to be found and either fixed or replaced. Also, the sewer line exiting the facility must be examined to determine if it will be able to handle the pressure from possibly operating four submersible pumps simultaneously and also to identify any potential clogs in the line. Further, an analysis of the entire Al Ghazaliyah sewer pipeline needs to be completed to provide a schematic diagram of the sewer water flow throughout the area.

Finally, the existing pool of sewer water needs to be drained from the facility to protect neighborhood residents from disease and illness.

Additional Contract to Complete the Project

The 2nd Brigade of the 101st Airborne Division (2-101), working with personnel from the embedded Provincial Reconstruction Team (ePRT), Civil Affairs, and the Government of Iraq, developed a SOW to complete the G-7 lift station and make it functional and useable. The 2-101 personnel are confident their SOW will adequately resolve the outstanding issues and problems at the G-7 lift station and ultimately result in providing Al Ghazaliyah with streets absent of backed up sewer water.

At the time of our site visit, the 2-101 was unaware of the previous contract awarded by the USACE and any work done by the contractor.

Conclusions

Based upon the results of our site visit, SIGIR reached the following conclusions for our assessment objectives. Appendix A provides details pertaining to Scope and Methodology.

1. All project components were not adequately designed prior to renovation and construction at the Al Ghazaliyah G-7 Sewage Lift Station. The contract file lacked necessary design submittals from the contractor and the United States Army Corps of Engineers, such as schematic diagrams identifying the flow of sewer water entering and exiting the Al Ghazaliyah G-7 and throughout the Al Ghazaliyah area. In addition, there were no diagrams providing clarity on the location and function of specific pieces of equipment. Further, the contract file lacked design calculations determining the volume of sewer water entering the facility and the capacity of each submersible pump, which would identify the correct number and size of submersible pumps needed for installation. Finally, no electrical plans or electrical single-line diagrams were available for the installation of the Main Distribution Panel connecting the facility to the on-site generator and main distribution grid.
2. Because of the limited amount of time available on site and the lack of available power at the site, SIGIR could not definitively determine the quality of the contractor’s work. For example, the contract required a 100 kilo-Volt Amp generator and a 1,000 liter fuel tank; however, the generator was not operating on either of the site visits. In addition, a single 150 millimeter submersible pump was delivered and installed; but it was not operational during the site visits. Because the USACE had already terminated the contract, no one was on site to

operate the equipment. Consequently, SIGIR inspectors could not determine if either piece of equipment was non-operational because of inferior quality contract work or because of the lack of available power. SIGIR did identify construction deficiencies, including the inadequate installation of the Main Distribution Panel. Also, the panel was located outside, exposed to wind, rain, and excessive heat.

3. The contractor's quality control plan was sufficiently detailed, including the use of daily quality control reports to document construction deficiencies; but the contractor's quality control program implementation did not identify any significant construction deficiencies, such as potentially dangerous electrical installation practices. Specifically, the daily quality control reports did not identify any construction deficiencies or international standard violations. In addition, the daily quality control reports did not have a section to document construction deficiencies, international code violations, or test and/or inspection results. Further, no quality control deficiency log existed for this project.

The government quality assurance program was not adequate. According to USACE documentation, only 12 daily quality assurance reports exist for this project, with the last daily quality assurance report issued in December 2006. The daily quality assurance reports were vague and did not document critical information, such as insight into any problems encountered at the site. In February 2007, the contractor submitted a final invoice; however, when a USACE representative visited the site, it was determined the contractor had only "completed approximately 20%" of the project. The lack of on-site government quality assurance presence contributed to this situation.

4. Sustainability was addressed in the contract and delivery order requirements. The contract's "Warranty Management" clause required the contractor to provide a one-year overall warranty of construction; the delivery order required the contractor to provide all operations and maintenance manuals and all certified warranties. To maintain continuous use of the on site generators, the delivery order provided that the sewage lift station be furnished with a six-month fuel supply. However, according to Gulf Region Central documentation, when the delivery order was terminated because the deteriorated security situation in the area prohibited the contractor from completing the projects, the contractor had only furnished a three-month fuel supply to the project site.
5. The Al Ghazaliyah G-7 Sewage Lift Station renovation and construction project results were not consistent with the original objectives of the delivery order. The delivery order Statement of Work required the contractor to "provide a complete and useable facility upon the conclusion of construction...." Specifically, this project was needed to eliminate the excessive amount of backed-up sewer water in the Al Ghazaliyah neighborhood. At the time of the site visits, the Al Ghazaliyah G-7 facility was not operational. Consequently, SIGIR witnessed sewer water backing up in the neighborhood streets. In addition, broken sewer pipes leading into the facility resulted in a large pool of sewer water that settled directly outside of the building. As a result, the neighborhood residents continue to wade through large pools of sewer water and live in constant threat of disease and illness.

Additional Contract to Complete Facility. During the course of this assessment, the 2nd Brigade of the 101st Airborne Division representatives informed SIGIR team members that they had identified and developed contract terms to resolve the outstanding issues and problems the Al Ghazaliyah G-7 Sewage Lift Station and make it functional

and useable. As the SIGIR team completed its assessment, the 2nd Brigade of the 101st Airborne Division was in the process of awarding the contract

Recommendations and Management Comments

SIGIR determined that the action being implemented by the 2nd Brigade of the 101st Airborne Division should be sufficient to resolve the problems noted in this assessment and consequently makes no recommendations. Therefore, management comments to this report are not required. However, we received comments on the draft of this report from the Gulf Region Division of the United States Army Corps of Engineers which provided clarifying information for the final report. We reviewed the clarifying comments and revised the final report as appropriate. Comments received are provided verbatim in Appendix D of this report.

Appendix A. Scope and Methodology

SIGIR performed this project assessment from November through December 2007 in accordance with the Quality Standards for Inspections issued by the President's Council on Integrity and Efficiency. The assessment team included an engineer/inspector and an auditor/inspector.

The objective of this project assessment was to provide real-time relief and reconstruction project information on repair of the Al Ghazaliyah G-6 and G-7 Sewage Lift Stations in Baghdad, Iraq to interested parties to enable appropriate action to be taken, when warranted. Due to insurgent activity in the area of the Al Ghazaliyah G-6 Sewage Lift Station, both the private security contractor and the U.S. Army denied the assessment team's repeated requests for escorts to inspect the site. Consequently, only the Al Ghazaliyah G-7 Sewage Lift Station is included in this assessment report. The Al Ghazaliyah G-6 Sewage Lift Station will be addressed in a subsequent report.

In performing this Project Assessment SIGIR:

- Reviewed contract documentation to include the following: Contract, Contract documentation, and Statements of Work;
- Reviewed the design package (drawings and specifications), quality control reports, quality assurance reports, construction progress photos, final situation report, and invoices; and
- Conducted on-site assessments on 9 November 2007 and 29 November 2007 and documented the results in Baghdad, Iraq.

Appendix B. Acronyms

2-101	2 nd Brigade of the 101 st Airborne Division
CQC	Contractor Quality Control
DO	Delivery Order
ePRT	Embedded Provincial Reconstruction Team
ER	Engineering Regulation
GRC	Gulf Region Central of the Gulf Region Division
GRD	Gulf Region Division of the United States Army Corps of Engineers
IBC	International Building Code
ICC	International Code Council
ID/IQ	Indefinite Delivery/Indefinite Quantity
IEBC	International Existing Building Code
IEC	International Electric Technical Commission
IMC	International Mechanical Code
IPC	International Plumbing Code
ISO	International Standards Organization
kVA	kilo-Volt Amp
mm	Millimeter
m ³ /second	Cubic meters per second
NFPA	National Fire Protection Association
PCO	Project and Contracting Office
QA	Quality Assurance
QC	Quality Control
QCR	Quality Control Representative
SIGIR	Special Inspector General for Iraq Reconstruction
SMACNA	Sheet Metal and Air Conditioning Contractor's National Association
SOP	Standard Operating Procedure
SOW	Statement of Work
USACE	United States Army Corps of Engineers

Appendix C. Report Distribution

Department of State

Secretary of State

Senior Advisor to the Secretary and Coordinator for Iraq

Director of U.S. Foreign Assistance/Administrator, U.S. Agency for
International Development

Director, Office of Iraq Reconstruction

Assistant Secretary for Resource Management/Chief Financial Officer,
Bureau of Resource Management

U.S. Ambassador to Iraq

Director, Iraq Transition Assistance Office

Mission Director-Iraq, U.S. Agency for International Development

Inspector General, Department of State

Department of Defense

Secretary of Defense

Deputy Secretary of Defense

Under Secretary of Defense (Comptroller)/Chief Financial Officer

Deputy Chief Financial Officer

Deputy Comptroller (Program/Budget)

Deputy Assistant Secretary of Defense-Middle East, Office of Policy/International
Security Affairs

Inspector General, Department of Defense

Director, Defense Contract Audit Agency

Director, Defense Finance and Accounting Service

Director, Defense Contract Management Agency

Department of the Army

Assistant Secretary of the Army for Acquisition, Logistics, and Technology

Principal Deputy to the Assistant Secretary of the Army for Acquisition,
Logistics, and Technology

Deputy Assistant Secretary of the Army (Policy and Procurement)

Commanding General, Joint Contracting Command-Iraq/Afghanistan

Assistant Secretary of the Army for Financial Management and Comptroller

Chief of Engineers and Commander, U.S. Army Corps of Engineers

Commanding General, Gulf Region Division

Chief Financial Officer, U.S. Army Corps of Engineers

Auditor General of the Army

U.S. Central Command

Commanding General, Multi-National Force-Iraq

Commanding General, Multi-National Corps-Iraq

Commanding General, Multi-National Security Transition Command-Iraq

Commander, Joint Area Support Group-Central

Other Federal Government Organizations

Director, Office of Management and Budget
Comptroller General of the United States
Inspector General, Department of the Treasury
Inspector General, Department of Commerce
Inspector General, Department of Health and Human Services
Inspector General, U.S. Agency for International Development
President, Overseas Private Investment Corporation
President, U.S. Institute for Peace

Congressional Committees and Subcommittees, Chairman and Ranking Minority Member

U.S. Senate

Senate Committee on Appropriations
 Subcommittee on Defense
 Subcommittee on State, Foreign Operations, and Related Programs
Senate Committee on Armed Services
Senate Committee on Foreign Relations
 Subcommittee on International Development and Foreign Assistance, Economic Affairs, and International Environmental Protection
 Subcommittee on International Operations and Organizations, Democracy and Human Rights
 Subcommittee on Near Eastern and South and Central Asian Affairs
Senate Committee on Homeland Security and Governmental Affairs
 Subcommittee on Federal Financial Management, Government Information, Federal Services, and International Security
 Subcommittee on Oversight of Government Management, the Federal Workforce, and the District of Columbia
Permanent Subcommittee on Investigations

U.S. House of Representatives

House Committee on Appropriations
 Subcommittee on Defense
 Subcommittee on State, Foreign Operations, and Related Programs
House Committee on Armed Services
 Subcommittee on Oversight and Investigations
House Committee on Oversight and Government Reform
 Subcommittee on Government Management, Organization, and Procurement
 Subcommittee on National Security and Foreign Affairs
House Committee on Foreign Affairs
 Subcommittee on International Organizations, Human Rights, and Oversight
 Subcommittee on the Middle East and South Asia

Appendix D. Management Comments



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
GULF REGION DIVISION
BAGHDAD, IRAQ
APO AE 09348

CEGRD-CO

12 January 2008

MEMORANDUM FOR Special Inspector General for Iraq Reconstruction, US Embassy Annex,
M-202, Old Presidential Palace, APO AE 09316

SUBJECT: Draft SIGIR Assessment Report – Repair of the Ghazaliyah G-7 Sewage Lift Station
(SIGIR Project PA-07-118)

1. This memorandum provides the U.S. Army Corps of Engineers, Gulf Region Division response to the subject draft audit report.
2. We appreciate the opportunity to comment on the draft report. The Gulf Region Division and the Gulf Region Central district reviewed the draft report and our comments are enclosed.
3. If you have any questions, please contact Mr. Robert Donner at (540) 665-5022 or his email robert.l.donner@usace.army.mil.

Encl


JEFFREY J. DORKO
Brigadier General, USA
Commanding

COMMAND REPLY
to
**SIGIR Draft Sustainment Assessment Report –
Repair of the Ghazaliyah G-7 Sewage Lift Station
PA-07-118**

CRD Comments. The Gulf Region Division provides the following specific comments related to the draft assessment report:

1. **Draft Report, Page i and ii, Conclusion 1.** "All project components were not adequately designed prior to renovation and construction at the Al Ghazaliyah G-6 Sewage Lift Station. The contract file lacked necessary design submittals from the contractor and USACE such as schematic diagrams identifying the flow of sewer water entering and exiting the Al Ghazaliyah G-7 and throughout the Al Ghazaliyah area. In addition, there were no diagrams providing clarity on the location and function of specific pieces of equipment. Further, the contract file lacked design calculations determining the volume of sewer water entering the facility and the capacity of each submersible pump, which would identify the correct number and size of submersible pumps needed for installation. Finally, no electrical plans or electrical single-line diagrams were available for the installation of the Main Distribution Panel connecting the facility to the on-site generator and main distribution grid."

Command Comments. The contract Bill of Quantities (BOQ) does not require the contractor to prepare a detailed design for this project. The project calls for repairing and rehabilitating and does not include new construction. The contract BOQ asks the contractor to prepare a survey report that identifies the necessary improvements to restore the lift station facilities to design operational capacity (see item # 1 of contract BOQ). The contractor submitted a survey report without mentioning the problems of the collapsed sewer lines. The sewer line problems are outside the scope of the contract statement of work (SOW). The sewer lines are located outside the facility. The BOQ didn't require a detailed design or contractor design calculations.

2. **Draft Report, Page ii, Conclusion 2.** "Due to the limited amount of time available on site and the lack of available power at the site, SIGIR could not definitively determine the quality of the contractor's work. For instance, the contract required a 100 kilo-Volt Amp generator and a 1,000 liter fuel tank; however, the generator was not operating on either of the site visits. In addition, a single 150 millimeter submersible pump was delivered and installed; however, it was not operational during the site visits. Since the United States Army Corps of Engineers had already terminated the contract, there was no one on site to operate the equipment. Consequently, SIGIR inspectors could not determine if either piece of equipment was non-operational because of inferior quality contract work or was simply not working due to a lack of available power. SIGIR did identify construction deficiencies, such as the inadequate installation of the Main Distribution Panel; the panel is located outside, exposed to environmental factors, such as wind, rain, and excessive heat."

Enclosure

Command Comments. The maneuver units tested and operated all of the installed equipment during their three site visits. The units identified and reported poor quality work to the GRC-IZ Resident Office. The GRC-IZ Resident Office addressed several reports of deficient work to the contractor.

Draft Report, Page ii, Conclusion 3. "The contractor's quality control plan was sufficiently detailed, including the use of daily quality control reports to document construction deficiencies; yet the contractor's quality control program implementation did not identify any significant construction deficiencies, such as potentially dangerous electrical installation practices. Specifically, the daily quality control reports did not identify any construction deficiencies or international standard violations. In addition, the daily quality control reports did not have a section to document construction deficiencies, international code violations, or test and/or inspection results. Further, no quality control deficiency log existed for this project."

"The government quality assurance program was not adequate. According to United States Army Corps of Engineers documentation, only 10 daily quality assurance reports exist for this project, with the last daily quality assurance report occurring in December 2006. The daily quality assurance reports were vague and did not document critical information, such as insight into any problems encountered at the site. In March 2007, the contractor submitted a final invoice; yet when a United States Army Corps of Engineers representative visited the site, it was determined the contractor had only "completed approximately 20% of the project. The lack of on-site government quality assurance presence contributed to this situation."

Command Comments. Due to security concerns, a quality assurance representative (QAR) did not witness the contractor's work. GRC did not prepare a quality control deficiency log due to these security concerns. In addition, the accurate work progress for G7 only as of April 07 is thirty percent. The draft report states twenty percent.

4. **Draft Report, Page iii, Conclusion 5.** "The Al Ghazaliyah G-7 Sewage Lift Station renovation and construction project results were not consistent with the original delivery order objectives. The delivery order Statement of Work required the contractor to "provide a complete and useable facility upon the conclusion of construction...Specifically, this project was needed to eliminate the excessive amount of backed-up sewer water in the Al Ghazaliyah neighborhood streets. At the time of the site visits, the Al Ghazaliyah G-7 facility was not operational. Consequently, SIGIR witnessed backed-up sewer water in the neighborhood streets. In addition, broken sewer pipes leading into the facility resulted in a large pool of sewer water that settled directly outside of the building. As a result, the neighborhood residents continue to wade through large pools of sewer water and live in constant threat of disease and illness."

Command Comments. The contract BOQ and scope of work required rehabilitation of the facility by providing new equipment to improve the capacity of the lift station. The broken sewer lines located outside the lift station were not part of the contract BOQ. Repairing the collapsed sewer lines located outside the facility is not part of the contract BOQ or SOW. The

Amanat does not allow a contractor to perform work outside the lift station because the Amanat considers this its responsibility.

5. **Draft Report, Page 12.** "The lift station requires a new transformer to take advantage of the electrical grid and also the two on site generators." Site Photos 18, 19:

Command Comments. The contractor supplied and installed a bad quality transformer in G7. The GRC-IZ Resident office rejected this transformer, and made no payment. After GRC terminated the contract, the contractor removed the bad transformer from the site.

Appendix E. Project Assessment Team Members

The Office of the Assistant Inspector General for Inspections, Office of the Special Inspector General for Iraq Reconstruction, prepared this report. The principal staff members who contributed to the report were:

Kevin O'Connor

Yogin Rawal, P.E.