

ERBIL CITY TRANSFORMERS
ERBIL, IRAQ

SIGIR PA-06-037
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SPECIAL INSPECTOR GENERAL FOR IRAQ RECONSTRUCTION

April 12, 2006

MEMORANDUM FOR COMMANDING GENERAL, MULTI-NATIONAL FORCES -
IRAQ
COMMANDING GENERAL, GULF REGION DIVISION,
U.S. ARMY CORPS OF ENGINEERS
DIRECTOR, IRAQ RECONSTRUCTION MANAGEMENT
OFFICE

SUBJECT: Report on Project Assessment of the Erbil City Transformers, Erbil, Iraq
(Report Number SIGIR-PA-06-037)

We are providing this project assessment report for your information and use. We assessed the in-process construction work being performed on the Erbil City Transformers, Erbil, Iraq to determine its status. This assessment was made to provide you and other interested parties with real-time information on a relief and reconstruction project underway and in order to enable appropriate action to be taken, if warranted. The assessment team included an engineer and an auditor.

This report does not contain any negative findings. As a result, no recommendations for corrective action are made and management comments on this report are not required.

We appreciate the courtesies extended to our staff. This letter does not require a formal response. If you have any questions please contact Mr. Brian Flynn at (703) 343-9149 or brian.flynn@iraq.centcom.mil or Mr. Andrew Griffith, P.E., at (703) 343-9149 or andrew.griffith@iraq.centcom.mil.

Stuart W. Bowen, Jr.
Inspector General

Special Inspector General for Iraq Reconstruction

SIGIR PA-06-037

April 12, 2006

Erbil City Transformers Erbil, Iraq

Synopsis

Introduction. This project assessment was initiated as part of our continuing assessments of selected Electrical Sector reconstruction activities. The overall objectives were to determine whether selected sector reconstruction contractors were complying with the terms of their contracts or task orders and to evaluate the effectiveness of the monitoring and controls exercised by administrative quality assurance and contract officers. We 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 a professional engineer and an auditor.

Project Assessment Objectives. The objective of this project assessment was to provide real-time relief and reconstruction project information to interested parties in order to enable appropriate action, when warranted. Specifically, we determined whether:

1. Project results were consistent with original objectives;
2. Project components were adequately designed prior to construction or installation;
3. Construction or rehabilitation met the standards of the design;
4. The Contractor's Quality Control plan and the U.S. Government's Quality Assurance program were adequate; and
5. Project sustainability was addressed.

Conclusions. The assessment determined that:

1. The Erbil City Transformer project results were consistent with the original project objectives. If current construction practices are continued, the electrical distribution system in Erbil will be significantly improved because of the upgrades and added service provided by this project. This occurred primarily because the U.S. Army Corps of Engineers Resident Engineer and Quality Assurance Representative effectively managed the project.
2. The design package was sufficiently complete and specific to construct the electrical distribution system segments. The contractor's plans and specifications augmented by the Ministry of Industry and Energy Construction Manual provided adequate construction and installation details and standards for overhead electrical power distribution system components. The design also took into account the previous planning and material estimates completed by the Ministry of Industry and Energy prior to the project starting.
3. All observed work met the standards of the design. The quality of the contractor's workmanship was good. In addition, the U.S. Army Corps of Engineers Resident Engineer and Quality Assurance Representative were fully engaged in construction

activities to ensure quality and compliance with the task order requirements. As a result, the project is providing the Governate of Erbil with necessary facilities that will enhance their current electrical distribution system.

4. The Contractor's Quality Control plan was sufficiently detailed to guide the contractor's quality management program, although none of the major work items required in this project (e.g., installation of 11kV – 400V/230V transformers) were listed as definable features of work in their plan. Further, the contractor's daily Quality Control reports contained only a listing of daily work activities and lacked any information about quality issues.

However, the Government Quality Assurance program was effective in monitoring the contractor's quality control program and construction activities. The U.S. Army Corps of Engineers Resident Engineer and Quality Assurance Representative ensured that all deficiencies cited during Quality Assurance inspections were corrected. They maintained an active presence on site and effectively managed the project to ensure the quality of workmanship met the task order requirements. The Quality Assurance Representative also maintained Quality Assurance reports that contained project specific information to document construction progress and highlight deficiencies. The Quality Assurance Representative also supplemented the Quality Assurance reports with detailed photographs that reinforced the narrative information provided in the reports.

5. Sustainability was addressed in the task order requirements. The task order Statement of Work required a 12-month warranty on all equipment and all operations. It also required the contractor to provide all site surveys, geotechnical investigations, designs, as-built drawings, preventive maintenance plans, and operations and maintenance manuals for installed equipment, which includes the 11kV – 400V/230V transformers. These will be provided to the Ministry of Industry and Energy upon completion of the project.

Recommendations and Management Comments. This report does not contain any negative findings. Although, management comments were not required, the Commander, Gulf Region Division, U.S. Army Corps of Engineers, provided comments concurring with the draft report and providing data which was used in the preparation of this final report.

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Introduction

Objective of the Project Assessment

The objective of this project assessment was to provide real-time relief and reconstruction project information to interested parties in order to enable appropriate action, when warranted. Specifically, we determined whether:

1. Project results were consistent with original objectives;
2. Project components were adequately designed prior to construction or installation;
3. Construction or rehabilitation met the standards of the design;
4. The Contractor's Quality Control (CQC) plan and the U.S. Government's Quality Assurance (QA) program were adequate; and
5. Sustainability was addressed.

Pre-Site Assessment Background

Contract, Task Order and Costs

The Erbil¹ City Transformer project will be completed under contract W914NS-04-D-0010, Task Order 03, Project Number GBAGH-009. Contract W914NS-04-D-0010, dated 12 March 2004, was a design build, indefinite delivery/indefinite quantity (IDIQ) contract with a \$500 million ceiling. The contract was between the Coalition Provisional Authority and Washington International, Inc.

There are 20 modifications to Contract W914NS-04-D-0010 which are summarized in Table 1.

Modification Number	Date	Description
P00001	22-Apr-04	Transferred Contracting Officer authority to CPA Contracting Activity.
P00002	13-Jul-04	Changed the Contractor mailing address.
P00003	14 Jul-04	Transferred contracting office to Project and Contracting Office.
P00004	15-Jul-04	Changes the Contractor zip code on the mailing address.
P00005	16-Aug-04	Incorporates instruction manual for entry of RMS data.
P00006	20-Oct-04	Corrects the contractor name, address, and cage code.
P00007	21-Oct-04	Delegates administrative contracting authority to U.S. Army Corps of Engineers Gulf Region Division.

¹ Due to the various spellings for cities/governates in Iraq, and in an effort to achieve standardization in SIGIR reports, Arbil as noted in project documentation will be referred to as Erbil.

P00008	20 Nov 04	<ul style="list-style-type: none"> Removes all references for the use of Primavera P3e/c and Primavera Expedition. Removes the instruction manual for entry of RMS data and requirement for entering RMS data.
P00009	11-Feb-05	Deleted/superseded by P00013.
P00010	01-Apr-05	Deleted/superseded by P00013.
P00011	22-Apr-05	Provides language in contract regarding communications with host government.
P00012	01-May-05	<ul style="list-style-type: none"> Eliminates requirement to produce manuals in Arabic Changes report submission requirements.
P00013	31-May-05	<ul style="list-style-type: none"> Deletes Attachment 2 in P00009. Thus, the whole of Modification P00009 has been replaced or deleted in its entirety. Replaces Attachment 1, revised 1 Apr 2005 in Modification P00010, with Attachment 1, revised 31 May 2005.
P00014	06-March 06 ²	Changes contractor reporting requirements.
P00015	08-Aug-05	<ul style="list-style-type: none"> Clarifies and defines Life Support Services. Formalizes invoicing procedures. Clarifies and directs actions within the Award Fee Process. Adds the War Clause to the contract.
P00016	30-Aug-05	Deletes the language incorporated in P00015 on the Award Fee Process.
P00017	27-Dec-05	Incorporates the requirements for subcontract and capacity development reporting.
P00018	03-Jan-06	<ul style="list-style-type: none"> Modifies life support privileges to include Third Country Nationals passport holders. Clarifies contractual information for the purpose of fulfilling badge requirements throughout Iraq.
P00019	13-Feb-06	Exercise the option for the period of 11 March 2006 through 11 March 2007.
P00020	06-Mar-06	Incorporates CENTCOM directed arming policy for contractor personnel.

Table 1: Modifications to Contract W914NS-04-D-0010

None of the modifications listed in Table 1 resulted in an increase in the contract funding.

Task Order 0003 was issued 03 May 2004 by CPA to Washington International, Inc. for a not to exceed amount of \$14,700,000 for the site assessment, design,

² The original modification was not signed. This was identified by SIGIR during our contract review. The Joint Contracting Command – Iraq Contracting Officer subsequently signed the modification.

procurement, construction, and commissioning of the Erbil Governate Distribution network. Task Order 0003 included a limited notice-to-proceed (\$300,000 ceiling) for contract line item (CLN) 001AA, for a site assessment and long lead items associated with electrical distribution system hardware. The task order, when issued, was not definitized. However, the task order required the contractor to prepare and submit, within 30 days, the necessary proposals to definitize the task order.

There were 10 modifications to Task Order 0003. They included:

- Modification 01 dated 12 May 2004, revised Section 00020 (Statement of Work). There was no increase or decrease in the task order funding.
- Modification 02 dated 07 June 2004, increased the limited notice-to-proceed (NTP) amount for contract line item (CLIN) 0001 from \$300,000 to \$3,182,127 to provide additional funding required for the site assessment and identification of long lead items. The modification also extended the date for proposal submission to 31 July 2004.
- Modification 03, dated 19 July 2004, eliminated some of the individual projects within the task order, reduced the scope on other projects, and also added new projects. This modification also issued a NTP and authorized an increase in the not to exceed amount from \$3,182,127 by \$13, 194,163 to \$ 16,376,290. This amount does not include the fee portion for the NTP. The amount of fee committed for this NTP was \$567,964 base fee and \$1,987,873 award fee. Thus, the total amount for the Task Order was \$18,932,127.
- Modification 04 dated 04 September 2004 replaced the warranty paragraph with new language. There was no increase or decrease in the task order funding.
- Modification 05 dated 14 October 2004, incorporated the final definitized Scope of Work (individual projects listed as sub-contract line items to CLIN 0001) and established the delivery schedule for construction on Task Order 0003. The definitized amount for the task order, including award fee, was \$29,147,000.
- Modification 06 dated 20 November 2004, added a second part to task order CLIN 0001 that was definitized in Modification 05. The second part of the definitized task order included seven added electrical distribution system projects in the Erbil Governate. The revised definitized amount for the task order including award fee was \$44,668,556.
- Modification 07 dated 02 December 2004, made corrections to the descriptions of the subcontract line items. There was no increase or decrease in the task order funding.
- Modification 08 dated 02 December 2004, extended the construction scheduled start date from 18 October 2004 to 15 March 2005 for the Khosnaw 33 Kilovolt (kV) substation on Task Order 0003. There was no increase or decrease in the task order funding.
- Modification 09 dated 09 December 2004, corrected a typing error on Modification 06 by changing the final task order delivery date from 30 November 2004 to 30 November 2005. There was no increase or decrease in the task order funding.
- Modification 10 dated 11 February 2006, increased the task order amount to \$46,092,916 because of added material requirements needed to complete the task order. The task order completion date was changed to 29 January 2006.

Within Task Order 0003, there are 14 subcontract line items, each representing a separate Erbil Electrical Distribution System project. One of the 14 subcontract line items is 0001AH, "Erbil Overload Transformers," Project Number: GBAGH-009.

This assessment only considers the work under project GBAGH-009. The project is identified as Project Number 5623, “*Erbil City Transformers*,” in the Project and Contracting Office’s (PCO) construction database, dated 14 January 2006. For the balance of the report, the project name will be referred to as “Erbil City Transformers.” At the time of our assessment, the project was reported to be 55% complete. According to the PCO database, the total reported project cost was \$3,372,288.

Project Objective

The overall objective of Task Order 0003 was to improve the reliability of the Erbil Governorate electrical distribution system including 33kV/11kV substations; 33kV and 11kV lines; 11kV to 400 volt/230 volt (V) distribution transformers; and 400/230V service conductors and associated equipment. The specific objective of the Erbil City Transformer project was to upgrade an existing overhead distribution system using 11kV to 400V/230V transformers, connected to medium voltage (11kV) and low voltage (230V/400V) conductors that will provide service for the population of Erbil.

Description of the Facility (preconstruction)

The description of the facility (preconstruction) was based on information obtained from the contract, the USACE project file, and discussions with PCO personnel. The project site was located within the Erbil Governate, primarily around the periphery of the City of Erbil. According to PCO’s Electrical Distribution System Program Manager, the United Nations (UN), in 2003, under a United Nations Development Program (UNDP) contract, installed H-poles³ throughout Erbil for the Erbil Governate’s Ministry of Industry and Energy (MOIE). The H-poles were placed as a first step in a planned upgrade of Erbil’s electrical distribution system. Under the UNDP contract, H-poles were installed around Erbil without connections to the existing electrical grid. The Erbil City Transformer project utilizes the H-poles installed by the UNDP project and incorporates them into project GBAGH-009.

Prior to the start of the Erbil City Transformer project, the electrical demand in these areas in Erbil exceeded the supply. Erbil is one of the largest cities in northern Iraq, with an estimated population of almost one million people. The distribution system components required in GBAGH-009 were to be constructed adjacent to or near existing roads and city streets within residential and commercial areas around Erbil. Site Photo 1 shows a typical pole line location within a residential area.

³ An H-pole in this context consists of two utility poles connected near the mid-height point by brackets which form a mounting platform between the poles.



Site Photo 1: Pole line location along city street in Erbil- Photo provided by USACE

Scope of Work of the Contract

The task order Statement of Work (SOW) required the contractor to rehabilitate or construct new components for the distribution network, including substations, required overhead 11kV distribution lines, 11kV-400V/230V distribution transformers and 230V/400V service conductors, and distribution system components. The Scope of Work for GBAGH-009 included the upgrade of the existing electrical distribution system by installing and connecting 144, three-phase, 11kV - 400V/230V transformers on existing or new H-poles in Erbil, as well as providing new electrical distribution service to and from the new transformers.

Specifically, the Scope of Work required the contractor to carry out the following tasks for project GBAGH-009:

- Placement of new galvanized steel poles (428 poles in the project budget) for the distribution system
- Conductor installation consisting of stringing, sag and tie-in of medium and low voltage overhead aluminum conductors and cable
- Installation of platform mounted 11kV - 400V/230V transformers and low voltage distribution panels on existing and new H-poles

Current Project Design and Specifications

The task order SOW included requirements for project design and specifications submittals. The SOW required submission of concept, 30%, 60%, and 90% designs to the Sector Project Management Office (i.e., PCO Electrical Sector) for review and approval. The SOW also required the design and installation of equipment, materials and work to conform to the International Electric Code, or other international standards, codes, and regulations, as may be specified.

We were not able to verify the formal submittal and approval process of the 30%, 60%, and 90% designs; however, according to the PCO Electrical Distribution System Program Manager, they were submitted by the contractor.

The USACE RE provided electronic copies of the 90% design drawings and specifications to the assessment team. The design drawings included 11kV - 400V/230V transformer connection arrangements on H-poles, details on conductor stringing and connections on poles, details on conductor termination assemblies (i.e., dead-ending), and conductor sag details between poles. There were also drawings on four different galvanized tubular steel pole configurations as well as supporting cross arm attachment details.

The specifications for the Erbil City Transformers project, prepared by Washington International, Inc. included the following:

- Overhead conductor specifications
- Distribution transformers (11kV - 400V/230V)
- Galvanized steel poles
- Concrete

The overhead conductor specifications titled: “*Construction Installation Manual Supplement for Installation of 11kV- 400V Overhead Power Distribution Lines*” included guidelines on the transformer installation, the erection of poles, conductor sagging, and information on low voltage conductors. In addition, Section 2.1.1 of the Supplement states:

“Appendix I (Ministry of Industrial & Energy (MOIE), General Directorate of Electricity Construction Manual), along with this Supplement represents in part, the required guidelines necessary to construct Medium Voltage (11kV) and Low Voltage (0.4kV) power distribution lines.”

The MOIE Construction Manual provided detailed construction standards for overhead electrical power distribution lines and distribution transformers. The manual provided technical specifications of materials, selection of materials, and construction methods for overhead medium and low voltage lines. The manual also contained standard drawings for electrical distribution system components and installation arrangements.

The contractor was also furnished material lists based on available funding for GBAGH-009. Overall, the summary material list dated 14 September 2004 contains a requirement for 144, 11kV – 400V/230V distribution transformers, and 428 galvanized steel poles, in addition to conductors, bundled cable, and other material and accessories to complete the project. The contractor was also supplied with individual site material lists for 114 potential sites within Erbil. These material estimates were developed by the United Nations Development Program project office prior to the start of GBAGH-009. During our site visit to Erbil, we were provided with a revised transformer list, which reduced the total number of transformers for GBAGH-009 to 110.

The USACE RE provided the assessment team with a map of Erbil showing the transformer locations. Based on discussions with the USACE Resident Engineer (RE), the transformer locations were determined through consultations between the RE, PCO, and the MOIE. Grid coordinate locations were provided to the RE by the MOIE. There have been changes in transformer locations based on shifting MOIE

requirements. However, the overall project scope remains unchanged based on the utilization of 110 transformers, 428 poles, and a fixed amount of conductor and related electrical distribution system components.

Based on our review of the drawings, diagrams, and specifications they appeared to be consistent with the task order's requirements and demonstrated the contractor's understanding for constructing an electrical distribution system.

Site Assessment

On 22 January 2006, we performed an on-site assessment of the Erbil City Transformers project. The on-site assessment included a site visit and inspection of the work being conducted in the Hasarok area of Erbil, as well as, a tour of the contractor's material storage facility. We were accompanied on the site visit by the USACE RE and USACE Quality Assurance Representative (QAR). We were also met on site by the contractor's field engineer and quality control representative.

Work Completed

No work elements were completely finished prior to the site visit.

Work in Progress

Significant work items in progress included pole installation, transformer and low voltage distribution panel installation, conductor stringing, and connections.

Galvanized Steel Pole Installation

According to the USACE RE's 18 January 2006, progress report, 344 galvanized steel poles had been installed on the project. The design specifications for poles required 11 meter (m) long poles for 11kV lines and 9 m long poles for low voltage (400V/230V) lines.

According to the design for the 9 m poles, the base of the pole is encased in concrete 1.5 meters below grade. The design for the 11 m pole requires the bottom 1.8 m of the pole to be encased in concrete below grade. For excavating, the contractor used hand digging methods in some areas and a mechanical auger in other locations.

At ground level, the design also requires a concrete base around the pole to a height of not less than 100 millimeters (mm) above the ground surface. Although we did not review the pole placement during our site visit, a review of photographs and progress reports provided by the USACE RE indicate the contractor was excavating to proper depths. We did observe some of the concrete bases of the installed poles in the Hasarok area and they appeared to meet the 100 mm specification requirement. To see one of the galvanized pole concrete bases, refer to Site Photo 2.



Site Photo 2. Concrete base encasing the steel tubular pole

In the Hasarok area, we observed both pole sizes and verified the poles were the appropriate types for the medium and low voltage conductors. Site Photo 3 shows a 9 m pole line partially constructed, carrying low voltage conductors. Site Photo 4 shows a series of 11 m poles that carry 11kV conductors supported by the cross arm near the pole cap. The poles in Site Photo 4 are also carrying 400V/230V conductors attached just below the cross arm.



Site Photo 3. 9 meter poles with low voltage conductors attached



Site Photo 4. Pole line with medium and low voltage conductors

The design sets maximum pole spacing for pole lines parallel to the road. The maximum spacing for low voltage conductors on 9 m poles is 45 m. For combination poles with 11kV conductors and low voltage conductors, the maximum spacing is 35 m. Based on our observations, the pole lines in the Hasarok area met the requirements for pole spacing.

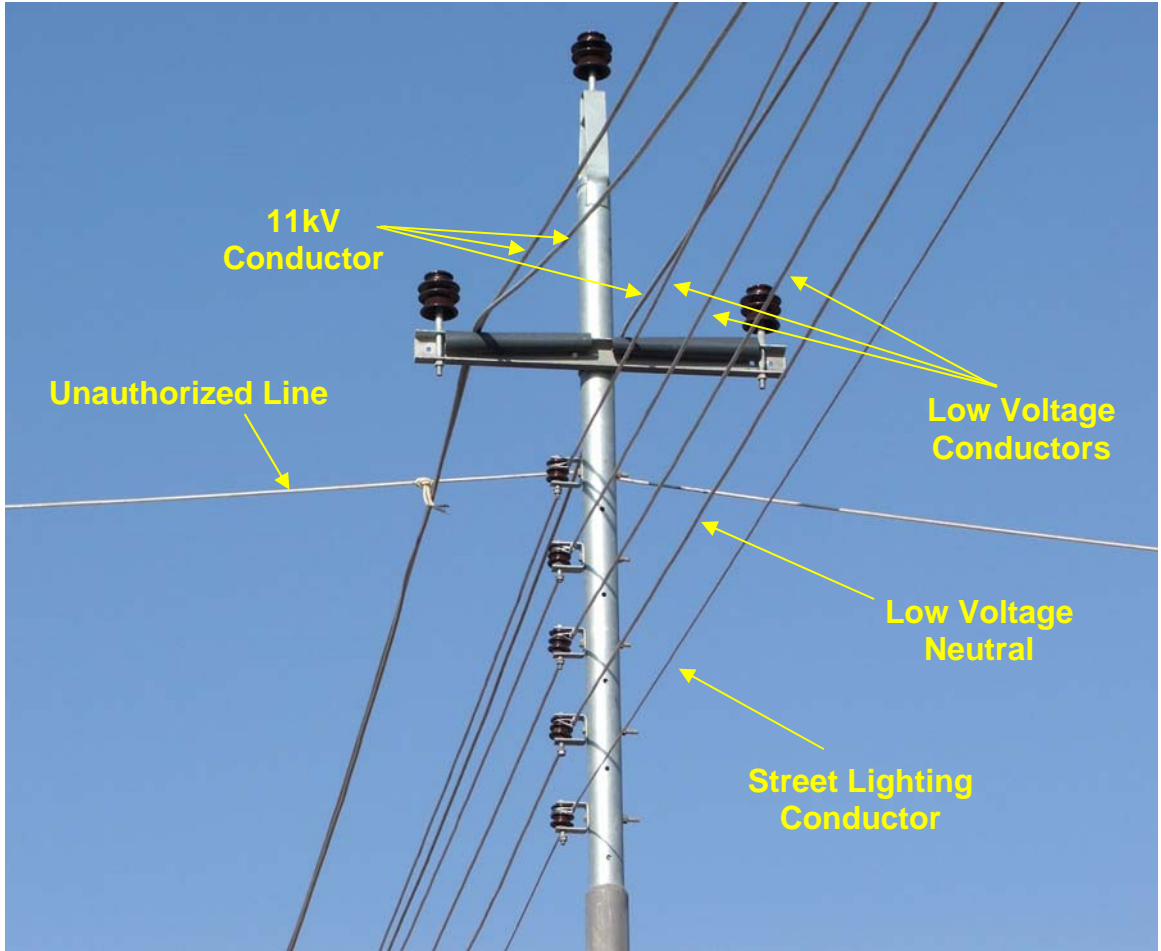
Conductor Installation

The majority of the conductor stringing had been completed at the time of our assessment. However, the conductors we viewed in the Hasarok area had not been energized.

Required conductor types and sizes included:

- Aluminum conductor steel reinforced (ACSR), 120 mm, for 11kV lines
- All aluminum conductor (AAC), 95 mm, for low voltage lines
- AAC, 16 mm, for street lighting
- Aerial bundled cable (ABC), 95 mm, for low voltage lines when close to buildings

Site Photo 5 shows one of the 11 m poles carrying medium voltage (11kV) and low voltage (400V/230V) conductors. The conductors had been strung, but were not sagged or secured to the insulators. For securing the conductors, the design called for four low voltage insulators mounted to the pole using D-brackets, and three 11kV pin insulators (two mounted on each side of a cross arm and one at the pole cap). The insulators and assembly components, as installed, appeared to meet the requirements of the design.



Site Photo 5: 11kV and 400V/230V conductors positioned on 11 m pole

According to the USACE RE, the contractor can secure the conductor either by working from a ladder or from a small bucket truck. The cable sag is then set and the conductor secured down onto the insulator as the contractor moves down the street, pole to pole.

Also shown in Site Photo 5 is an illegal power tap run from across the street or from a neighborhood generator. It has nothing to do with the Erbil City Transformer project. Someone in the local area is taking advantage of the newly installed poles to run their unauthorized line across the street. Based on discussions with USACE RE, these illegal taps regularly occur. However prior to turnover of the project, the unauthorized line will be removed.

The design specifications suggested the use of ABC lines when close to buildings or in congested lanes when bare conductor cannot be installed. The design also establishes vertical and horizontal clearance requirements for the cable. Site Photo 6 shows an example of one of the ABC lines run in the Hasarok area. The ABC line in this area met the vertical and horizontal clearance requirements.



Site Photo 6. ABC line in Hasarok area in Erbil

Transformer and Low Voltage Distribution Panel Installation

As of 18 January 2006, according to records provided by the USACE RE, 55 of 110 transformers on the Erbil City Transformer project had been installed and 44 had been energized. There were several transformers and low voltage distribution panels installed in the Hasarok area when we toured the site. Site Photo 7 shows one of the 11kV - 400V/230V transformers we examined.

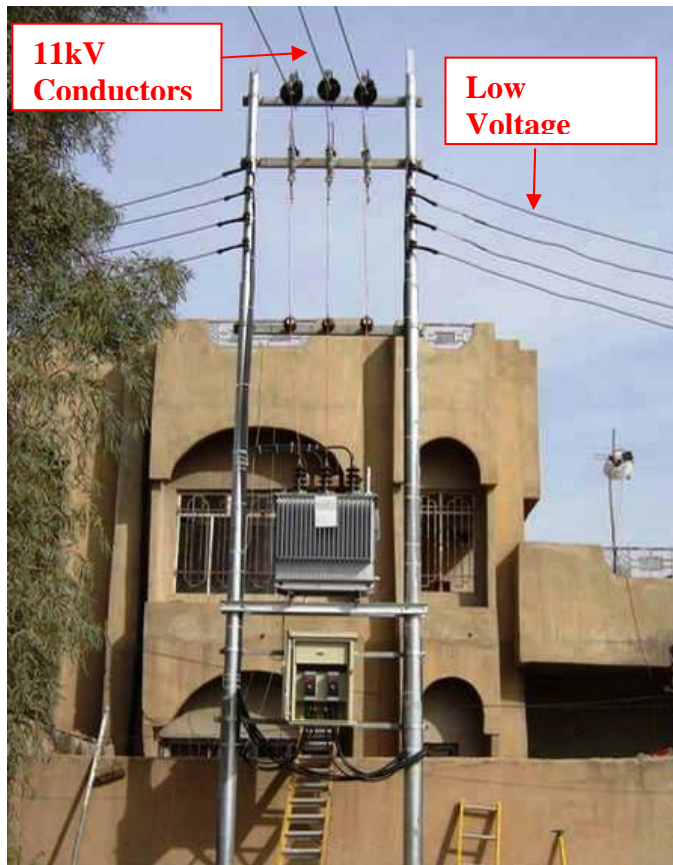


Site Photo 7. Transformer and low voltage electrical distribution panel (EDP)

The design for installation required the 11kV - 400V/230V transformer to be supported and attached to two steel channels that form a mounting platform. The design also required the low voltage distribution panel to be mounted directly to one of the steel tubular poles. The installation of the low voltage distribution panel did not adhere to the design drawings. However, the installation method utilized by the contractor as shown in Site Photo 7, appeared to be sufficient to carry the weight of the panel and also facilitated the running and connection of low voltage cable to and from the panel.

Site Photo 8 shows a complete installation of the transformer, an open low voltage distribution panel (with two main circuit breakers), fuse cutouts⁴, and insulators on the H-pole as well as the medium voltage conductors connected to the high side of the transformer and the low voltage conductors on each side of the H-pole.

⁴ Fuse cutouts are basically high voltage fuses designed to protect lines or line equipment in the event of a fault.



Site Photo 8. H-Pole with connections to 11kV and low voltage conductors
Photo provided by USACE

During our site visit, the contractor was preparing one H-pole on the ground prior to setting it in place. Site Photo 9 shows the contractor working on the three fuse cutouts. The contractor at that time was also tying off the insulated low voltage cable to each of the two sides of the H-pole.



Site Photo 9. Preparing fuse cutouts on H-Pole prior to setting

Based on our observations, contract work on the transformer and low voltage distribution panel installation met the design and specification requirements.

In addition to Hasarok, the assessment team also visited the contractor's material storage facility located in another area in Erbil. There, we viewed the remaining transformers as seen in Site Photo 10. We examined transformer factory plate data, and verified that the transformers met contract requirements.



Site Photo 10. 11kV - 400V/230V transformers at contractor's storage facility

Work Pending

Remaining work included completion of the electrical distribution system items such as transformer installation, setting the sag in overhead conductors, securing overhead conductors to pole insulators, as well as testing, energizing, and commissioning of the distribution system.

Project Quality Management

Contractor's Quality Control Program

The task order SOW required the contractor to perform all quality control (QC) based on their Quality Control plan throughout the duration of design, construction, installation, and testing and commissioning.

Washington International, Inc.'s QC plan contains information on their quality control organization, submittals control, field operations and control, tests and inspections, documentation, forms, and notification of noncompliance and corrective action. The plan also contains a section on the inspection/test matrix and definable features of work. However, the matrix did not list definable features relevant to construction of an overhead electrical distribution system such as steel pole installation, conductor stringing, and transformer installation.

The contractor's QC representative also submitted daily QC reports. The QC reports were completed throughout the project by the contractor on a daily basis, but they lacked depth and did not adhere to the requirements contained in the QC Plan. The QC plan lists 10 items that should be included in QC daily report. Examples of these items include:

- Results of the preparatory phase meetings held, including the location of the definable feature of work and a list of personnel present at the meeting
- A list of rework items identified, but not corrected by close of business
- Instructions given/received and conflicts in plans or specifications

The QC reports we reviewed only included the date, the weather, and listing of work activities. They lacked information about any quality issues. Possibly one factor in the lack of detail in the QC reports is because of the language challenges associated with reporting in English. When on site, we discussed the project with one of the contractor's field engineers and the QC representative, both Iraqi Nationals. Each person seemed very knowledgeable about the project.

In addition to the QC reports, we did review two non-conformance reports prepared by the contractor. Both of the reports addressed damage to 11kV - 400V/230V transformers.

Based on the information provided to the assessment team, we determined the contractor's QC plan and reporting procedures did not meet the standards addressed in ER 1180-1-6 (*Construction Quality Management*) or PCO Standard Operating Procedure CN-103 (*Contractor Construction Quality Control Plan*). However, based on our personal observations of the work taking place in Hasarok, the quality of workmanship appeared to be good.

Government's Quality Assurance Program

The QAR prepared QA reports that documented any deficiencies noted at the site. For example, one of the early reports identified a problem with the galvanize thickness on the steel poles. The report identified the concerns, discussed the testing conducted on site, and stated a recommended course of action. Based on our review of all of the QAR reports, we found them to be sufficiently complete, accurate, and with appropriate detail in reporting progress, identifying deficiencies and corrective action. In addition, the QAR also supplemented the reports with photographs that reinforced the narrative information provided in the reports. The USACE QAR did not maintain a QA deficiency log; however, the RE and the QAR did ensure that all deficiencies cited during QA inspections were corrected.

The Government Quality Assurance program was effective in monitoring the contractor's quality control program and construction activities for the Erbil City Transformers project. This condition occurred because of the efforts of the Project Engineer and QAR during the course of the project.

Project Sustainability

The task order SOW required a warranty to be provided to the MOIE on all equipment, which includes any mechanical, electrical and/or electronic devices, and all operations for 12 months after issuance of the Taking-Over-Certificate.

The SOW also required the contractor to provide all site surveys, geotechnical investigations, designs, as-built drawings and preventive maintenance plans and manuals in English, Arabic, and Kurdish. Operations and maintenance (O&M) manuals and a testing report were also required. These will be provided to the MOIE upon completion of the project.

Based on discussions with PCO Electrical Sector's Distribution System Program Manager, the components of the project (galvanized steel poles, ACSR and AAC conductors, 11kV-400V/230V transformers, and low voltage distribution system panels) are essentially maintenance free. Further, MOIE personnel are very familiar with the project design and construction efforts because of the close coordination with them by the USACE RE and PCO during the course of the project.

Conclusions

Based upon the results of our site visit, we reached the following conclusions for assessment objectives 1, 2, 3, 4, and 5. Appendix A provides details pertaining to Scope and Methodology.

1. Determine whether project results were consistent with original objectives.

The Erbil City Transformer project results were consistent with the original project objectives. If current construction practices are continued, the existing electrical distribution system in Erbil will be significantly improved because of the upgrades and added service provided by this project. This occurred primarily because the USACE RE and QAR effectively managed the project.

2. Determine whether project components were adequately designed prior to construction or installation.

The design package was sufficiently complete and specific to construct the electrical distribution system segments. The contractor's plans and specifications augmented by the MOIE Construction Manual provided adequate construction and installation details and standards for overhead electrical power distribution system components. The design also took into account the previous planning and material estimates completed by the MOIE prior to the project starting.

3. Determine whether construction met the standards of the design

All observed work met the standards of the design. The quality of the contractor's workmanship was good. In addition, the USACE RE and QAR were fully engaged in construction activities to ensure quality and compliance with the task order requirements. As a result, the project is providing the Governate of Erbil with necessary facilities that will enhance their current electrical distribution system.

4. Determine whether the Contractor's Quality Control plan and the Government Quality Assurance Program were adequate.

The Contractor's Quality Control plan was sufficiently detailed to guide the contractor's quality management program, although, none of the major work items required in this project (e.g., installation of 11kV – 400V/230V transformers) were listed as a definable features of work in their plan. Further, the contractor's daily Quality Control reports contained only a listing of daily work activities, and lacked any information about quality issues.

However, the Government Quality Assurance program was effective in monitoring the contractor's quality control program and construction activities. The USACE RE and the QAR ensured that all deficiencies cited during QA inspections were corrected. They maintained an active presence on site and effectively managed the project to ensure the quality of workmanship met the task order requirements. The QAR also maintained QA reports that contained project specific information to document construction progress and highlight deficiencies. The QAR supplemented the QA reports with detailed photographs that reinforced the narrative information provided in the reports.

5. Determine if project sustainability was addressed.

Sustainability was addressed in the task order requirements. The task order SOW required a 12 month warranty on all equipment and all operations. It also required the contractor to provide site surveys, geotechnical investigations, designs, as-built drawings, preventive maintenance plans and O&M manuals for installed equipment, which includes the 11kV – 400V/230V transformers. These will be provided to the MOIE upon completion of the project.

Recommendations and Management Comments

This report does not contain any negative findings. Although, management comments were not required, the Commander, Gulf Region Division, U.S. Army Corps of Engineers, provided comments concurring with the draft report and providing data which was used in the preparation of this final report.

Appendix A. Scope and Methodology

We performed this project assessment from January through March 2006, in accordance with the Quality Standards for Inspections issued by the President's Council on Integrity and Efficiency. The assessment team included a professional engineer and an auditor.

In performing this Project Assessment we:

- Reviewed contract documentation to include the following: Contract, Contract Modifications, Task Order, Task Order Modifications, contract documentation, and Statement of Work;
- Reviewed the design package (drawings and specifications), Quality Control Plan, Contractor's Quality Control Reports, USACE Quality Assurance Reports, and Construction Progress Photos;
- Interviewed the U.S. Army Corps of Engineers Resident Engineer; and
- Conducted an on-site assessment and documented results at the Erbil City Transformers Project in Erbil, Iraq.

Appendix B. Acronyms

AAC	All Aluminum Conductor
ABC	Aerial Bundled Cable
ACSR	Aluminum Conductor Steel Reinforced
CQC	Contractor Quality Control
ER	Engineering Regulation
GRN	Gulf Region North
km	Kilometer
m	Meter
mm	Millimeter
MOIE	Ministry of Industry and Energy
QA	Quality Assurance
QAR	Quality Assurance Representative
QC	Quality Control
RE	Resident Engineer
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

U.S. Ambassador to Iraq

Director, Iraq Reconstruction Management 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

Director, Defense Reconstruction Support Office

Under Secretary of Defense (Comptroller)/Chief Financial Officer

Deputy Chief Financial Officer

Deputy Comptroller (Program/Budget)

Inspector General, Department of Defense

Director, Defense Contract Audit Agency

Director, Defense Finance and Accounting Service

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,
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Deputy Assistant Secretary of the Army (Policy and Procurement)

Director, Project and Contracting Office

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House Committee on Armed Services

House Committee on Government Reform

Subcommittee on Management, Finance and Accountability

Subcommittee on National Security, Emerging Threats and International Relations

House Committee on International Relations

Subcommittee on Middle East and Central Asia

Appendix D. 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:

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