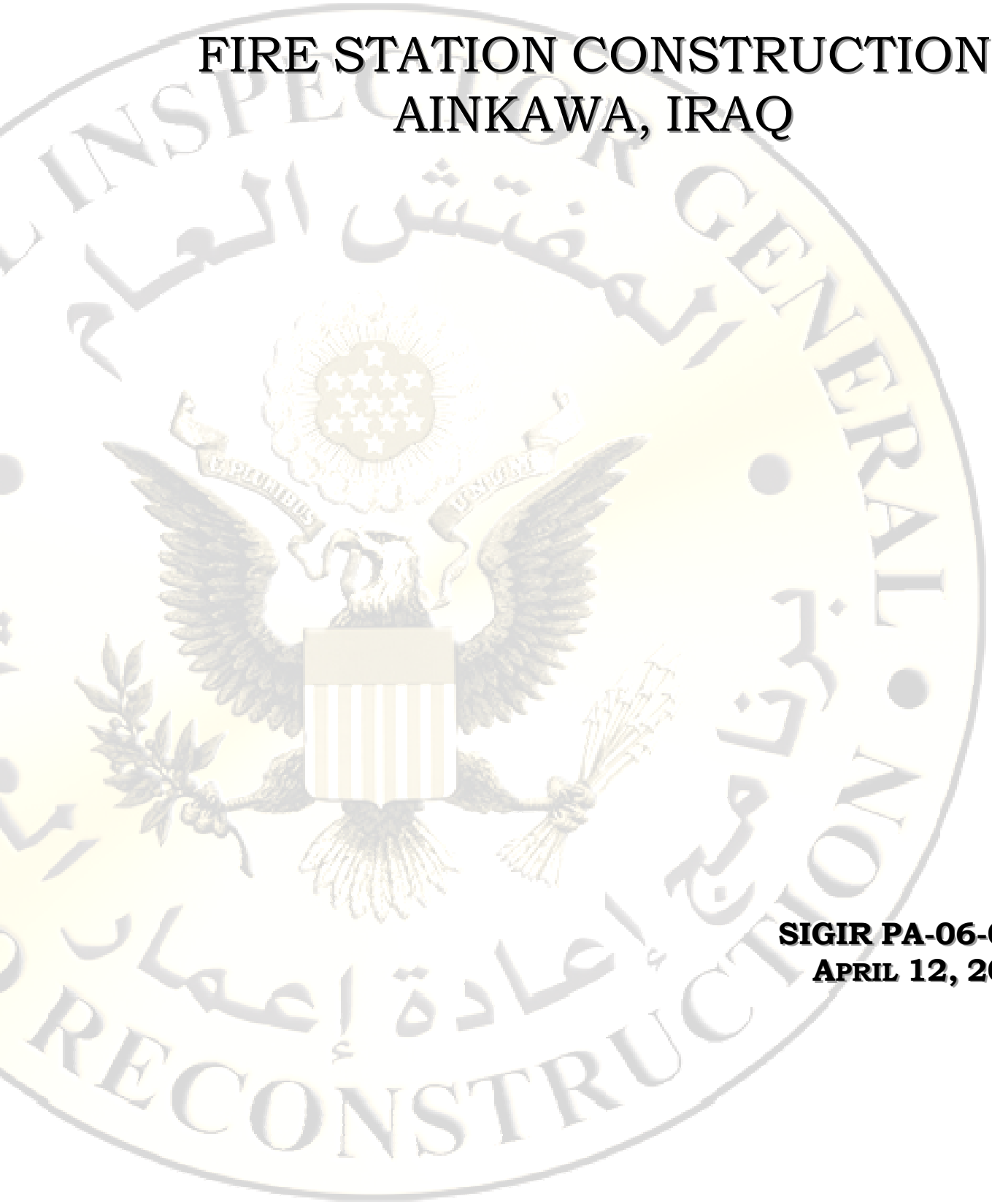
OFFICE OF THE SPECIAL INSPECTOR GENERAL FOR IRAQ RECONSTRUCTION

FIRE STATION CONSTRUCTION AINKAWA, IRAQ



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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 Fire Station Construction, Ainkawa, Iraq (Report Number SIGIR-PA-06-036)

We are providing this project assessment report for your information and use. We assessed the in-process construction work being performed for the Fire Station Construction, Ainkawa, Iraq to determine its status and whether intended objectives will be achieved. 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.

The comments received from the Commander, Gulf Region Division, U.S. Army Corps of Engineers, in response to a draft of this report addressed the issues raised and the actions taken and planned should correct the issues we identified. As a result, comments on this final 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-06-036 **April 12, 2006**

Fire Station Construction, Ainkawa, Iraq

Synopsis

Introduction. This project assessment was initiated as part of our continuing assessments of selected sector reconstruction activities for Facilities and Transportation. 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 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

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. The assessment team, at this time, cannot conclude whether the fire station, when completed, will meet the original project objectives. The overall project objective was to provide emergency fire protection services in an underserved area within the Erbil Governate. The specific objective was the design and construction of a fire station in Ainkawa, Iraq. However, there are three unresolved issues associated with the design and construction that need management attention. They include:
   a. Structural integrity of the building. The U.S. Army Corps of Engineers Administrative Contracting Officer's letter of June 17, 2005 requested Parsons Global Services Inc. to certify that the structural elements had achieved full design strength. To date, there has been no certification of the ultrasound testing and analysis conducted by Parsons Global Services Inc. on the Level 1 columns, beams and shear walls.
   b. Adequacy of the rich cement-sand mortar mix for patching the honeycomb areas within the structural concrete. There are concerns expressed by the U.S. Army Corps of Engineers Resident Engineer regarding the durability of these patches.

c. Responsibility for constructing driveways, sidewalks and perimeter walls. Based on our review of the task order scope and other contract information, it is not clear if the construction of the fire station's driveways, sidewalks and perimeter walls are Parsons Global Services Inc.'s responsibility. These components are integral to a complete and usable facility. If their construction is not Parsons Global Services Inc.'s responsibility, then the Iraq Ministry of Interior needs to be informed so they can take appropriate action for constructing these components.

2. Based on the review of the design drawings and specifications as well as the USACE project files, the design package is complete and sufficiently specific to construct the fire station building. However, the contractor did not submit a design for the driveways, sidewalks and perimeter walls, although it is unclear whether they are required by the task order. The Project Contracting Office and U.S. Army Corps of Engineers Gulf Region North District need to resolve whether these components are part of the contractual requirements. If they are, the U.S. Army Corps of Engineers should direct Parsons Global Services Inc. to design and construct the driveways, sidewalks, and perimeter walls. If these components are not required contractually, PCO should convey these requirements to the Iraq Reconstruction Management Office and the Ministry of Interior, so the Ministry can assume responsibility for their design and construction.

3. The construction of the Ainkawa Fire Station may not currently meet the standards of the contract and design. The honeycombing in the lower sections of the shear walls and columns may affect the structural integrity of the building and needs to be resolved. The honeycombing occurred because the contractor failed to follow its specifications for placing and vibrating concrete.

   The contractor's Quality Control Representative should have authority to stop production of work activities if required procedures are not followed. If the Quality Control Representative cannot or will not stop noncompliant work, the U.S. Army Corps of Engineers Quality Assurance Representative should have the authority to stop work until there is compliance with the contract provisions.

4. The Contractor's Quality Control Plan and the Government Quality Assurance Program were adequate. The Ainkawa Fire Station task order specified a requirement for a Contractor Quality Control plan. The contractor submitted an eight-page Quality Control plan although we did not receive any of the quality control procedures listed as attachments to the basic plan. The contractor provided daily reports and test results to the U.S. Army Corps of Engineers Resident Engineer office. The contractor also prepared nonconformance reports and maintained a nonconformance-tracking log.

   The U.S. Army Corps of Engineers Quality Assurance Representative monitored field activities with frequent visits to the construction site and by completing daily site reports. The Quality Assurance Representative forwarded the Quality Assurance reports to the Resident Engineer for review and verification of progress completed. The procedures in place ensured that potential construction deficiencies were detected and documented. In addition, the Quality Assurance Representative's reports were sufficiently complete, accurate, and timely. Furthermore, Quality Assurance reports included project specific or detailed photographs that reinforced the narrative information provided in reports.

5. Sustainability coverage under the current task order appears adequate for the operation of the fire station. The task order requires the contractor to provide all site surveys, geotechnical investigations, designs, as-built drawings, warranties, and preventative

maintenance plans and manuals in English, Arabic and Kurdish. Further, the task order requires the contractor to provide the Ainkawa Fire Station with 12-month warranties for all the mechanical, electrical, and/or electronic device equipment, and sustainment of operations.

Recommendations. We recommended that the Commander, U.S. Army Corps of Engineers, Gulf Region Division:

1. Formally direct Parsons to certify that the shear walls, beams and columns are structurally sound and consistent with the design specifications.

2. Require Parsons to provide evidence regarding the durability of the rich cement-sand mortar patches made to the honeycomb areas of the structural concrete.

3. Direct a review of the requirements of the task order and clarify whether the contractor or the Iraqi Ministry of Interior is responsible for constructing driveways, sidewalks, and perimeter walls.

Management Comments. The Commander, Gulf Region Division of the U.S. Army Corps of Engineers provided comments concurring with the draft report and delineating the corrective actions taken and planned to address our recommendations. He also provided additional information used in the preparation of this final report.

Evaluation of Management Comments. The management comments addressed the issues raised in our report and the actions taken and planned should correct the issues we identified.

Table of Contents

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

Contract

The Ainkawa Fire Station project will be completed under Delivery Order (DO) 039 of Contract W914NS-04-D-0009. Contract W914NS-04-D-0009, dated 26 March 2004, was a design build, indefinite delivery/indefinite quantity (IDIQ) contract with a $900 million ceiling. The contract was between the Coalition Provisional Authority and Parsons Delaware Inc. On 8 April 2005, an amendment was issued to the contract to change the business name from Parsons Delaware Inc. to Parsons Global Services Inc. For the balance of the report, we will use "Parsons" when referring to the contractor.

Contract W914NS-04-0009 currently consists of 15 modifications. Table 01 lists the modifications for Contract W914NS-04-0009.

Modification Number	Date	Description
P00001	6-Apr-04	Refer to P00015 description. Original P0001 (dated 3 Aug 04) is replaced and re-numbered as P0002. New P0001 (dated 6 Apr 04) transfers Contracting Officer authority.
P00002	3-Aug-04	Refer to P00015 description. Initially, there was no P0002. However, original P0001 (dated 3 Aug 04) becomes P0002. This modification adds contract language for processing of invoices.
P00003		Does not exist – see P00015 description.
P00004	18-Oct-04	Transfer administrative responsibility for task orders issued for this contract to US Army Corps of Engineers (USACE) Gulf Region Division (GRD)
P00005		Does not exist – see P00015 description.
P00006	10-Nov-04	Incorporate a revised Award Fee Plan and make changes to the current Award Fee Period.
P00007		Does not exist – see P00015 description.

Modification Number	Date	Description
P00008		Does not exist – see P00015 description.
P00009	4-Aug-05	Add DFARS clause on Government Property.
P00010	8-Aug-05	Transfer administrative responsibility for task orders issued for this contract to US Army Corps of Engineers (USACE) Gulf Region Division (GRD).
P00011	25-Aug-05	Incorporate changes in the Award Fee Plan.
P00012	26-Oct-05	Change the Statement of Work regarding availability of fuel from government sources.
P00013	29-Oct-05	Deletes P00012.
P00014	27-Nov-05	Change the word "fifth" in the Statement of Work, Paragraph 2.3.5 to "Twentieth."
P00015	27-Dec-05	Change P00001 (effective date 8/3/04), to read P00002. Insert new P00001 (effective date 4/6/04). P00003, P00005, P00007 and P00008 do not exist.
P00016	28-Dec-05	Incorporate the requirements for subcontract and capacity development reporting into the Subcontracting Excellence Program (SCEP) Database.
P00017	12-Jan-06	Add clauses to the Statement of Work regarding warranties.
P00018	5-Feb-06	Transfer GP# 743906-1120 (2000 Liter Fuel Tank) from contract no. W914NS-04-D-0009 (Parsons S&J) to contract no. W914NS-D-0006 (Parsons BHE).
P00019	8-Feb-06	Exercise the option for the period of 26 March 2006 through 25 March 2007 in accordance with FAR Part 52.217-9 Option to Extend the Term of the Contract.

Table 01. Modifications to Contract W914NS-04-D-0009

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

Task Order

The Ainkawa Fire Station construction project was awarded to Parsons as Delivery Order 039,[1] under IDIQ contract W914NS-04-D-0009. The cost plus award fee task order was issued on 23 June 2004 with a not to exceed estimate of $901,876. On 4 December 2004, Parsons submitted a proposal based on the 30% design for a Class A firehouse that would accommodate twenty firefighters and ten staff. The proposal was incorporated by reference in Modification #01 to the delivery order dated 8 December 2004. This increased the estimated contract value to Parsons' proposed estimate of $1,392,492, which is broken down as follows:

Estimated Cost	$1,214,119
Base Fee	36,417
Award Fee	141,956
Total Cost and Fee	$1,392,492

[1] The term delivery order and task order are used interchangeably in the contract supporting documentation. For simplicity and consistency in the balance of the report, we will use "task order."

Modification # 02 dated 29 December 2005 approved an award fee of $34,343 from the award fee pool of $70,978 for the six month period from 26 March 2005 to 25 September 2005. The remaining $36,635 not awarded was de-obligated from the contract, which reduced the contract value to $1,355,857. The following summarizes these changes:

	Before	Change	New Cost
Estimated Cost	$1,214,119	0	$1,214,119
Base Fee	36,417	0	36,417
Award Fee	141,956	(36,635)	105,321
Total Cost and Fee	$1,392,492	(36,635)	$1,355,857

Task Order Contractor and Subcontractors

Parsons utilized multiple subcontractors to perform the design-build requirements of the task order. Parsons subcontracted out the design to TPS Consult Ltd. (TPS) and subcontracted the construction, construction management, and quality management to Innovative Technical Solutions Inc. (ITSI). ITSI then subcontracted the actual construction of the fire station to the Zozik Company (Zozik), an Iraqi construction contractor.

Other Contract Information

Contract administration authority was delegated to the Chief of Contracting, Gulf Region North (GRN) District, U.S. Army Corps of Engineers (USACE) on 9 August 2005.

The Ainkawa Fire Station project is identified as project number "6176" in the Project and Contracting Office (PCO) database. PCO's database lists the actual start date for the Ainkawa Fire Station as 31 December 2004. As of 14 January 2006, PCO reported the fire station project to be 49% complete.

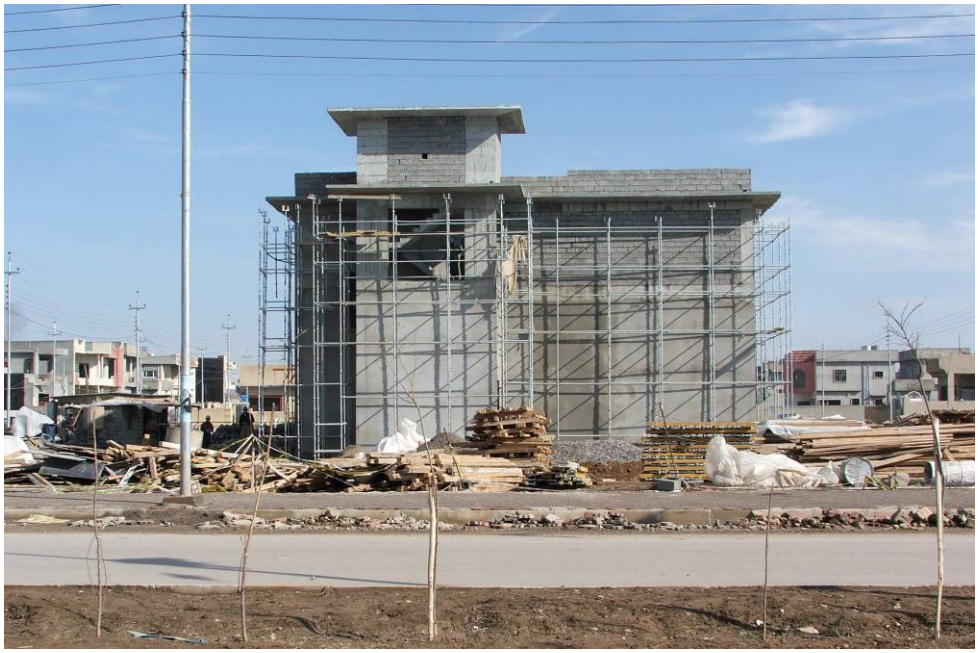
Project Objective

Based on the task order Scope of Work, the overall project objective was to provide emergency fire protection services in an underserved area within the Erbil[2] Governate. The specific objective was the design and construction of a fire station in Ainkawa, Iraq. The fire station is designed to accommodate twenty firefighters that can stay overnight in two dormitories, and ten daytime administrative staff members. The fire station will have capacity to house three fire trucks as well as two sport utility vehicles (SUVs).

Description of the Facility (preconstruction)

The site, which was a vacant lot, is located in an urban area of Ainkawa, Iraq. Ainkawa is approximately three kilometers northwest of the City of Erbil. The topography of the site is level and the surrounding land use is primarily residential with some small commercial establishments close by. City water serves as the water source and commercial power is available, although the fire station will have a backup generator. A septic tank system will be used for holding and treating wastewater. For a view of the site at the time of the assessment team's visit, refer to Site Photo 1.

[2] 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 henceforth be referred to as Erbil.



Site Photo 1: Side elevation of fire station showing lot and adjacent lane use

Scope of Work of the Contract

The Statement of Work (SOW) described in the Parsons 4 December 2004 proposal incorporated in Modification #1, includes the following significant work items:

- Structural systems
- Electrical / communication systems
- Mechanical systems (heating, ventilation and air conditioning)
- Water/sewer systems
- Finishing (windows/doors/tile/paint/ceilings)
- Civil site work (perimeter security fence and lighting, sidewalks and concrete/asphalt driveways and parking areas)

Current Project Design and Specifications

The fire station is a 1020 square meter (m^2) four level building constructed with structural reinforced concrete (columns, beams, slabs, and shear walls) and block walls finished with a cement-sand coating.

Within the fire station, the living and training quarters will be on the third level above the parking area for the three fire trucks and two SUVs. In addition, the third level will contain a kitchen and dining area. A reception and office area will be on the ground floor, and the mezzanine (2^{nd}) level includes separate men's and women's bathrooms. The fire chief will have his own bedroom and bathroom on the third level. Connections to existing utilities, a septic tank, driveways and parking areas are also included.

The task order's SOW included a requirement for the submittal and approval of all project designs and specifications. The SOW required submission of a 30% design submittal, design development (60%) submittal, and construction documents (90%) for review and approval from the Sector Program Management Office (SPMO).

The task order also required conformance to the following codes and standards for the design and construction:

- International Building Code (IBC)
- International Plumbing Code (IPC)
- International Mechanical Code (IMC)
- International Fire Code (IFC)
- International Electromechanical Commission (IEC)
- National Fire Protection Agency (NFPA)
- Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)
- Underwriter's Laboratory (UL)
- ASTM
- American Society of Mechanical Engineers (ASME)
- American Society of Heating Refrigerating and Air Conditioning Engineers Inc., Standard 52 (ASHRAE 52)

The 90% design included the following major components:

- Four level building with two dormitories for 10 workers each
- Commercial grade kitchen and dining hall for thirty workers
- Offices; storage rooms; restrooms; training hall for twenty
- First floor garage with three bays for fire trucks and two bays for SUVs
- Storage areas and control room
- Connections to city sewer if available, or septic tank system
- Backup electrical generator

Parsons' provided SIGIR with copies of the current 90% design for the fire station building, septic tank and backup generator, which included architectural, interior finish, electrical, mechanical, and structural drawings and specifications. In addition, we later received the same drawings and specifications from USACE. The 90% design did not include any civil drawings showing site development of the lot around the fire station, to include paved driveways, sidewalks, perimeter fencing and a controlled access point. These items had been part of the original Scope of Work, but were omitted at the 90% stage.

Further, in the 90% design submissions summary submitted by Parsons, it states:

"*It was necessary to value engineer the scheme to limit the cost per site to 500,000*."

Parsons' design summary also compares the 30% and 90% list of requirements comprising the Scope of Work. The 30% scope includes: "Perimeter security fence with main entrance and guard shack, secure service entrance, for fuel, supplies, etc", whereas the 90% list of requirements leaves out these site related elements. Additionally, in an interview with Parsons' representatives, they confirmed that no external landscaping, sidewalks, entryways, perimeter fencing or driveways are part of the current construction requirements.

SIGIR's review of the 90% design drawings and specifications also considered the contract requirements, as well as discussions with the USACE Resident Engineer (RE) and USACE Quality Assurance Representative (QAR). Based on our review, the submitted design drawings and technical specifications appeared to be

consistent with the task order's requirements to construct the fire station building, septic tank, and generator. However, the elimination of critical exterior elements such as the paved driveways and sidewalks could negatively affect the fire station's ability to respond to fires and other emergencies, especially if there is no paved access from the station to the street.

Site Assessment

On 22 January 2006, we performed a site assessment of the Fire Station in Ainkawa. During our site visit, we also met with the contractor's on-site Project Manager and their on-site Quality Control Manager. The USACE RE and USACE QAR also attended the meeting. In addition to the meeting, the site visit included an assessment of work completed, work in-progress, and pending work. On the day of the site visit, Parsons' subcontractors (ITSI and Zozik) were working at the fire station.

Work Complete

No significant work items were 100% completed prior to our site visit. Later in this section, all work items are addressed in either work in progress or work pending.

Work in Progress

Work in progress included:

- Constructing the structural components of the building including reinforced concrete
- Constructing two staircases
- Construction of the roof, and enclosure for the water tanks
- Concrete block wall construction
- Base preparation for Level 1 ground slab

Constructing Reinforced Concrete Structural Components
Structural components of the building included reinforced concrete foundations, beams, columns, floor slabs, and shear walls. The task order design and specification required all of the structural reinforced concrete on the project to be cast in place. Site Photo 2 shows the basic structure of the building and its general status at the time of our assessment and Site Photo 3 shows interior reinforced beams and columns.

All of the structural concrete had been placed, except for the ground floor slab, at the time of the assessment. However, as will be discussed later in the report, there are concerns regarding the quality of concrete.

Site Photo 2. Exterior view of the Ainkawa fire station

Site Photo 3: Interior structure showing concrete block walls, columns, and beams

Since the majority of prior and current construction activities were structural tasks, our assessment focused primarily on whether the construction of these elements on Levels 1-4 met the requirements of the task order design and specifications. Thus, we targeted the assessment towards the structural integrity of the fires station's columns, beams, ceiling/floor slabs, and shear walls. Prior to inspecting the site, we

discussed the processes used to construct the structural components with the USACE RE and the USACE QAR. In addition, these processes were also discussed at the site meeting with the contractor's Project Manager and Quality Control Representative. Following are the results of our on-site assessment:

Aggregate Used in Concrete

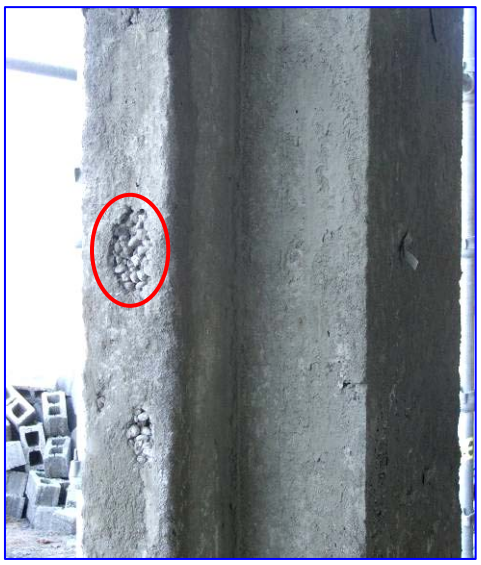
The task order specifications for concrete required the use of naturally occurring sand and crushed gravel, uniformly graded. The aggregate utilized in the reinforced concrete shown in Site Photos 5-9 appears to be rounded, uncrushed gravel.

Quality of Concrete Placement

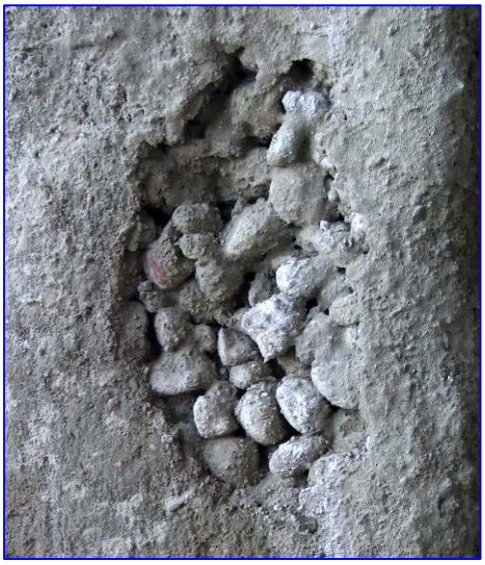
The USACE RE informed us there is a serious issue with the quality and possible structural integrity of the reinforced concrete shear walls, columns and beams located in Level 1. Parsons constructed these structural members in Level 1 in early May 2005. There were considerable voids in the reinforced concrete on this level, particularly in the columns. The first three meters of the columns contain significant honeycombing[3] resulting from improper placement and poor vibration of the concrete. The contractor batched the concrete onsite utilizing a small drum mixer (less than 1 cubic meter (m^3) in size). The mixer produced one small batch at a time without proper controls in place to assure the same mix ratio was utilized for every batch. The process used by the contractor to fill the forms with concrete was similar to a "fire brigade," where buckets of concrete were passed down a line of workers, up a ladder and poured into the form from the top. By pouring the concrete from the top of the forms, vibrators could not reach the bottom. As a result, the concrete could not be uniformly distributed, especially in the lower areas of the column or wall. Site Photos 4-8 show honeycombing found in columns in Levels 1 and 2 after concrete placement.

Site Photo 4. Honeycombing/exposed reinforcing steel in concrete column on Level 1 - Photo provided by USACE.

[3] Honeycombing refers to the voids left in the concrete due to failure of the mortar to effectively fill the spaces among course aggregate particles (*American Concrete Institute*).



Site Photo 5. Honeycombing after surface coating



Site Photo 6. Closeup of Site Photo 5

Site Photos 5 and 6 show the honeycombing on an exterior t-shaped stub wall after the gypsum plaster surface coating had been applied.

Site Photo 7. Honeycombing and exposed rebar in concrete on Level 1. Photo provided by USACE.

Site Photo 8. Honeycombing on Level 2 column

The proper procedure for filling the forms is detailed in section 6.9.9 of Parsons' concrete specifications. It states:

"*Forms for walls and thin sections of considerable height shall be provided with openings and other devices that will permit the concrete to be placed in a manner that will prevent segregation and accumulation of hardened concrete on the forms or metal reinforcement above the level of the concrete*."

Further, section 6.9.3. of Parsons' concrete specification states:

"*Concrete shall not be dropped or thrown into place.*"

In order to comply with these specifications, the method of placement involves two stages. The first is providing an opening in the lower section of the form, which allows concrete to be poured close to the bottom and the vibrator to reach the lower level. Once concrete fills the form to the opening level, the hole is closed and concrete is poured from the top of the form in order to achieve efficient placement and adequate vibration.

Parsons' quality control engineer discovered the honeycombing and reported it in his 10 May 2005 quality control report. Based on a 17 June 2005 letter from

the USACE Administrative Contracting Officer (ACO), Parsons' quality control engineer instructed the subcontractor to repair the concrete defects using an epoxy grout. However, Parsons' home office quality control engineer in Baghdad directed the subcontractor to make the repairs using a rich cement and sand mortar mix. Subsequently, the contractor patched the honeycomb areas utilizing the rich cement and sand mix as illustrated in Site Photo 9. The USACE RE was not satisfied with this method of repair, favoring instead the use of an epoxy grout to fill the voids in the concrete.

Site Photo 9. Rich cement-sand patches made on a Level 1 shear wall

In addition to the patching of the honeycomb areas, the ACO also noted in their 17 June 2005 letter that USACE continued to have serious concerns regarding the structural integrity of the work performed. The ACO requested Parsons to certify that full design strength of the elements in question had been achieved. As of 14 February 2006, Parsons had not provided the certification. Parsons did conduct ultra sound testing on 12 and 13 November 2005 to determine the density of the concrete in the walls, columns and beams. Test results were recorded in newtons per square millimeter (N/mm^2), with values ranging from 25.6 to 36.7 N/mm^2. The testing report also stated:

"*From the results above, the concrete is homogeneous. The compressive strength exceeding 30 N/mm*^{2}*.*[4] *Rendering with bonding agent or Epoxy paste must treat ALL Location of segregation.*[5]"

The test results were forwarded to the Parsons' structural engineering consultant, TPS, for analysis and recommendations on any corrective action. On 6 February 2006, ITSI emailed a document to PCO, the Iraq Reconstruction Management Office (IRMO), and SIGIR, reporting the findings of TPS' investigation. The document indicated the strength of the columns, slabs, beams and shear walls met the design requirements of 25 N/mm^2 and that no further action was necessary.

[4] 30 N/mm^2 is roughly equivalent to 4,350 pounds per square inch.

[5] Segregation – Refers to the differential concentration of components of mixed concrete, aggregate or the like, resulting from non-uniform proportions in the concrete (*American Concrete Institute*). The terms "segregation" and "honeycombing" are often used synonymously.

SIGIR responded to ITSI and Parsons on 7 February 2006 asking them if they intended to use the TPS findings to respond to the USACE ACO's 17 June 2005 letter requesting certification that the full design strength of the structural elements has been achieved. The USACE RE also noted that they (*USACE*) would accept findings of the tests if Parsons (as the design-builder) would issue a letter certifying the results. However, USACE is still not satisfied with the cement-sand patch utilized to repair the honeycombing instead of the epoxy grout. To date, SIGIR has not received any further information from Parsons on the structural concrete problems.

Staircase Construction

The design required two reinforced concrete staircases on each side of the fire station, serving levels 1-4. Reinforced concrete walls support the staircases, which are connected at each staircase landing. At the time of our assessment, the structural elements of the staircases were completed, but finish work had not started. Site Photo 10 shows the staircase connections to the shear walls.

Site Photo 10. Staircase construction and supporting shear wall. Photo provided by USACE.

Site Photo 11 shows an exterior view of the enclosed staircase taken at the time of our assessment.

Site Photo 11. Exterior view of staircase # 1

We inspected the staircases from level 1 to the roof level and determined the rise and run of the steps were adequate and consistent with the design.

Roof Construction

The roof was partially constructed at the time of our assessment. The roof design consisted of a reinforced concrete slab and a perimeter parapet. The roof also contained additional concrete roof slabs for the staircases, a shelter for two water tanks, and a roof light (skylight). Additionally to complete the roof, the design required an insulating layer of sand underneath 400 mm x 400 mm concrete panels sealed with an asphalt bituminous joint compound. For drainage, the design required the main roof to be sloped from the middle to a perimeter edge channel with outlets in the corners. Exterior pipes would take the water down to ground level. As shown in Site Photo 12, construction consisted of a flat reinforced concrete slab and parapet with a central raised roof light, a water tank enclosure and a roof over the staircase. When we inspected the roof area, we did not find any noticeable problems or defects with the structural concrete or block work at this level.

Site Photo 12. Fire station roof construction

Concrete Block Walls

The design required concrete block walls consisting of 200 mm thick external walls and internal walls of varying widths (100 mm, 150 mm, and 200 mm). Additionally, the task order specifications required a gypsum plaster coating for all interior walls and exposed concrete surfaces inside the fire station, and a cement sand mix for rendering the external surfaces. Site Photo 13 shows the external wall construction at the time of our assessment. Site Photo 14 shows the required surface coating over the walls and columns in level 1.

Site Photo 13. External concrete block wall construction on Level 3

Site Photo 14. Finish coating applied to concrete surfaces on Level 1

The design for the external walls required the walls to be tied back to the structural reinforced concrete frame using stainless steel sleeved angled wall ties. For interior block walls, the design specified hot galvanized stainless steel sleeved angled wall ties for anchoring to the structural frame.

We reviewed prior site reports to determine if the contractor documented examples of the tie-in connections. Site Photo 15 taken from the contractor's 25 November 2005 site report shows the tie-in for the concrete block walls to the supporting wall. Our observations of the concrete wall work underway at the time of our assessment indicated the contractor is complying with the design standard.

Site Photo 15. Concrete block wall tie-in connection to structural frame. Photo provided by USACE.

Base Preparation for Level 1 Ground Slab

The design specifications for the reinforced concrete floor on Level 1 required a 200 mm thick reinforced concrete slab over a 150 mm thick consolidated hardcore (crushed aggregate) base. A damp proof membrane separates the hardcore and concrete. In addition, to fill in the voids within the hardcore and to create a smooth surface, the design called for a thin layer of fine material over the hardcore. At the time of our site assessment, the hardcore installation was in progress in Level 1. In the fire truck and SUV parking bays, the contractor had placed the hardcore and covered it with a layer of fine material. In the other areas, the hardcore was in place, but had not yet been covered with the fine material layer. Site Photo 16 provides an illustration of the fine material covering the hardcore in the fire truck parking bays. The work in Level 1 appeared to meet the contract requirements.

Site Photo 16. Base Preparation in Level 1 prior to floor slab construction

Work Pending

The following work had not started at the time of our site assessment:

- Interior electrical service and lighting
- Electrical generator installation
- Interior finish plumbing for latrines and kitchen
- Septic tank installation
- Water supply plumbing and water tank installation
- Roof insulation and finishes
- Heating, ventilation and air conditioning systems
- Door and window installation
- Interior finishes (floor tiling, wall and ceiling finishes)

As mentioned previously, the contractor provided 90% plans and specifications for those pending work items. Further, the contractor did not provide designs for the perimeter security fence, guard shack, security lighting, sidewalks, and driveways, because of the scope reductions made after the 30% submission. However, the

contractor is currently assessing the feasibility of constructing asphalt driveways within their current budget.

Project Quality Management

Contractor's Quality Control Program

The Ainkawa Fire Station task order specified a requirement for a Contractor Quality Control (CQC) plan. The Quality Control (QC) management plan was to be adhered to throughout the duration of the design, construction, installation, testing, and commissioning phases. Parsons developed a Quality Control Plan, which included QC requirements for its subcontractors. Parsons' Quality Control Plan is a generic plan, 8 pages in length that lacks any site or task specific details. The plan's table of contents does show a list of 14 different procedures as attachments to the 8-page QC Plan. These procedures such as "Corrective and Preventive Action" or "Inspection and Testing" were not attached to the plan we received. However, a supplemental document provided to us lists each definable feature of work and describes the contractor's Quality Control 3-Phase Inspection Procedure (preparatory, initial and follow-up) on each definable feature of work.

ITSI, Parsons' construction management subcontractor has been delegated responsibility to manage the quality control and assurance requirements for Parsons. For the construction of new fire stations, ITSI hired three local Iraqi Nationals to serve in the positions of Project Manager, QC Manager and Safety Manger. The QC Manager's responsibilities included:

- Review work progress
- Verification that quality assurance and control requirements for workmanship and materials are being met
- Submission of daily reports and digital photographs of work to ITSI Project Managers

Parsons provided the assessment team with daily MS Excel-based, QC reports that presented brief information on the number of workers, the work activities completed, any tests or inspections performed, equipment utilized, material delivered to the jobsite and a look ahead for the next day's work. The QC reports were very brief in the manner in which the information was presented, possibly due to the language challenges associated with reporting in English. However, the QC Manager frequently supplemented his reports with pictures showing ongoing work.

For contract deficiencies, the contractor's QC representative completed a Nonconformance Report, which documented problems and provided a recommended course of action. A nonconformance log was also maintained to record deficiencies noted in each Nonconformance Report. The log indicates seven deficiencies have been recorded by the QC Manager. For example, there is a log entry for the Nonconformance Report of 10 May 2005, which addressed the honeycombing in the Level 1 concrete columns and shear walls.

Parsons contract specifications require testing of materials (e.g. aggregate) and performance testing (e.g., pressure testing on water line installation). To date, the contractor has utilized the Erbil Governate Laboratory to perform most of the testing. The USACE RE provided the assessment team with test results and a testing log documenting test results. According to the test log, between December 2004 and January 2005, a series of 28 tests had been conducted. Many of the tests

such as those for compressive strength of concrete were performed on multiple samples. The log also documents test failures. When there were failures, retesting was conducted.

Based on our review of the Contractor's Quality Control Plan and other quality control documents, the contractor's quality management program appears to be satisfactory. However, the honeycombing and exposed rebar associated with the concrete placement from 8 May to 10 May 2005 indicates problems with adherence to the Quality Control plan. Specifically, after the USACE QAR advised the contractor "to pour the columns and the shear walls in a two-stage procedure to minimize any honeycomb defects," the contractor poured the shear walls and columns in one stage without adequate vibration. This method of placement resulted in significant honeycombing. Initially, as noted previously, the ITSI QC manager directed the contractor to repair the defective areas in the concrete by using an epoxy grout patching mix. However, Parsons' QC Engineer in Baghdad superseded the local QC Manager's direction. As a result, the contractor corrected the honeycombing by patching with a rich cement-sand mortar mix. Thus, there are still concerns regarding the structural integrity of the building and the durability of the cement-sand patches.

Government's Quality Assurance Program

The USACE Engineering Regulation 1110-1-12 and the PCO Standard Operating Procedure (SOP) CN-100 specified requirements for a Government Quality Assurance program. The USACE QA program on the Ainkawa Fire Station met these requirements. The USACE QAR was routinely onsite during construction. The QAR monitored field activities and submitted daily QA reports and Weekly Summation Reports. The QAR forwarded the QA reports to the USACE RE for review and verification of progress completed. The procedures in place ensured that potential construction deficiencies were detected and documented. In addition, the QAR's reports were sufficiently complete, accurate, and timely. Furthermore, QA reports included project specific or detailed photographs that reinforced the narrative information provided in reports.

Project Sustainability

Upon completion of the project, the Ainkawa Fire Station will be turned over to the Iraq Ministry of Interior. The task order addressed sustainability by requiring the contractor to provide all site surveys, geotechnical investigations, and designs (with calculations and CAD drawings). It also required as-built drawings, warranties, preventative maintenance plans and manuals in English, Arabic and Kurdish. Further, the task order required the contractor to provide the Ainkawa Fire Station with warranties for all the mechanical, electrical, and/or electronic device equipment, and operations for 12 months.

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 overall objective of this task order was to provide emergency fire protection services in an underserved area within the Erbil Governate. The specific objective of

this project was the design and construction of a fire station in Ainkawa, Iraq. However, pending resolution of the following issues, the assessment team cannot conclude at this point whether the project results to date, are consistent with the original task order objectives. These are the unresolved issues:

a. The structural integrity of the building. The USACE ACO's letter of 17 June 2005 requested Parsons to certify that the structural elements had achieved full design strength. To date, there has been no certification of the ultrasound testing and analysis conducted by Parsons on the Level 1 columns, beams and shear walls.

b. The adequacy of the rich cement-sand mortar mix for patching the honeycomb areas within the structural concrete. There are concerns expressed by the USACE RE regarding the durability of these patches.

c. The responsibility for constructing driveways, sidewalks and perimeter walls. Based on our review of the task order scope and other contract information, it is not clear if the construction of the fire station's driveways, sidewalks and perimeter walls are Parsons' responsibility. These components are integral to a complete and usable facility. If their construction is not Parsons' responsibility, the Ministry of Interior needs to be informed so they can take appropriate action for constructing these components.

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

   Based on the review of the design drawings and specifications as well as the USACE project files, the design package is complete and sufficiently specific to construct the fire station building. However, the contractor did not submit a design for the driveways, sidewalks and perimeter walls, although it is unclear whether they are required by the task order. PCO and USACE-GRN need to resolve whether these components are part of the contractual requirements. If they are, USACE should direct Parsons to design and construct the driveways, sidewalks, and perimeter walls. If these components are not required contractually, PCO should convey these requirements to IRMO and the Ministry of Interior so the Ministry can assume responsibility for their design and construction.

3. Determine whether construction or rehabilitation met the standards of the design.

   The construction of the Ainkawa Fire Station may not currently meet the standards of the contract and design. The honeycombing in the lower sections of the shear walls and columns may affect the structural integrity of the building. The honeycombing occurred because the contractor failed to follow its specifications for placing and vibrating concrete.

   To ensure specifications are followed, the contractor's QC representative should have authority to stop production of work activities if required procedures are not met. If the QC representative cannot or will not stop noncompliant work, the USACE QAR should have the authority to stop work, until there is compliance with the contract provisions.

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

   The Ainkawa Fire Station task order specified a requirement for a Contractor Quality Control plan. The contractor submitted an adequate quality control plan, although we

did not receive any of the quality control procedures that were listed as attachments to the basic plan. The contractor provided daily reports and test results to the USACE RE office. The contractor also prepared nonconformance reports and maintained a nonconformance-tracking log.

The USACE QAR monitored field activities with frequent visits to the construction site and by completing daily site reports. The QAR forwarded the QA reports to the USACE RE for review and verification of progress completed. The procedures in place ensured that potential construction deficiencies were detected and documented. In addition, the QAR's reports were sufficiently complete, accurate, and timely. Furthermore, QA reports included project specific and detailed photographs that reinforced the narrative information provided in reports.

5. Determine if project sustainability was addressed.

   Sustainability coverage appears adequate under the task order for the operation of a fire station. The task order requires the contractor to provide all site surveys, geotechnical investigations, designs, as-built drawings, warranties, preventative maintenance plans and manuals in English, Arabic and Kurdish. Further, the task order required the contractor to provide the Ainkawa Fire Station with warranties for all the mechanical, electrical, and/or electronic device equipment, and operations for 12 months.

Recommendations

We recommended that the Commander, U.S. Army Corps of Engineers, Gulf Region Division and Director, Project and Contracting Office should:

1. Formally direct Parsons to certify that the shear walls, beams and columns are structurally sound and consistent with the design specifications.

2. Require Parsons to provide evidence regarding the durability of the rich cement-sand mortar patches made to the honeycomb areas of the structural concrete.

3. Direct a review of the requirements of the task order and clarify whether the contractor or the Iraqi Ministry of Interior is responsible for constructing driveways, sidewalks and perimeter walls.

Management Comments

The Commander, Gulf Region Division of the U.S. Army Corps of Engineers provided comments concurring with the draft report and delineating the corrective actions taken and planned to address our recommendations. He also provided additional information used in the preparation of this final report.

1. The district has formally directed the contractor to certify that the sheer walls and columns are structurally sound and consistent with the design specifications on two occasions; 17 June 2005 and 4 April 2006. The contractor was asked to respond within 15 days of receipt of the latest letter.

2. This directly relates to Recommendation 1. Mortar patches were made to the walls and columns to correct the defects in the concrete. The district has formally directed the contractor to certify that the sheer walls and columns are structurally sound and consistent with the design specifications on two occasions; 17 June 2005 and 4 April 2006. The contractor was asked to respond within 15 days of receipt of the latest letter.

3. On 27 March 2006 and again on 6 April 2006, GRN requested GRD-PCO (Programs Directorate) determine if the task order requires driveways, sidewalks, and perimeter walls.

Evaluation of Management Comments

The management comments addressed the issues raised in our report and the actions planned and taken should correct the issues we identified.

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, Scope of Work;
- Reviewed the design package (drawings and specifications), Quality Assurance Plan, Quality Control Plan, Contractor's daily Quality Control Reports, and Quality Assurance Reports;
- Interviewed the U.S. Army Corps of Engineers Resident Engineer, Quality Assurance Representative and representatives from the prime and sub contractors; and
- Conducted an on-site assessment and documented results at Ainkawa Fire Station, a suburb of Erbil, Iraq.

Appendix B. Acronyms

ACO	Administrative Contracting Officer
GRN	Gulf Region Division – Northern District of the U. S. Army Corps of Engineers
IDIQ	Indefinite Delivery Indefinite Quantity
ITSI	Innovative Technical Solutions Inc.
mm^3	Cubic millimeters
mm^2	Square millimeters
m	Meter
mm	Millimeters
PCO	Project and Contracting Office
PE	Professional Engineer
QA	Quality Assurance
QAR	Quality Assurance Representative
QC	Quality Control
RE	Resident Engineer
SOW	Statement of Work
DO	Delivery Order
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, Logistics, and Technology
    Deputy Assistant Secretary of the Army (Policy and Procurement)
    Director, Project and Contracting Office
    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
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U.S. Central Command

Commanding General, Multi-National Force-Iraq
    Commanding General, Multi-National Security Transition Command-Iraq
    Commander, Joint Area Support Group-Central

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Inspector General, Department of the Treasury
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Inspector General, U.S. Agency for International Development
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- Subcommittee on Defense
- Subcommittee on State, Foreign Operations and Related Programs

Senate Committee on Armed Services

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- Subcommittee on Near Eastern and South Asian Affairs

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- Subcommittee on Federal Financial Management, Government Information and International Security
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U.S. House of Representatives

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- Subcommittee on Defense
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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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